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Gender disproportionality in special education: An analysis of odd ratios and trends

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Abstract

In Turkey, the special education population has steadily increased since 2006. By generating a 16-year period of data obtained from the National Education Statistics (NES) published annually by the Presidency of Strategy Development of the Ministry of National Education, we synthesize the gender odds ratios and trends by special education categories and/or educational settings. We used odds ratios and the Mann-Kendall test for data analysis. Gender disproportionality exists in favour of males with special needs in the majority of educational settings. In addition, we found uptrends, downtrends, and no trends for gender odds ratios. Gender disproportionality is discussed, along with implications for research and practice.

KEYWORDS
disproportionality, gender, inclusive education, odds ratio, special education

1 | INTRODUCTION

The issue of disproportionality has been debated for decades. Disproportionality is defined as "the representation of a particular group of students at a rate different than that found in the general population" (Gravois & Rosenfield, 2006, p. 42). The over/underrepresentation of one race, culture, ethnicity, language, or gender in special education has been well cited in the literature (Anderson, 1997; Arms et al., 2008; Artiles et al., 2002; Bruce & Venkatesh, 2014; Connor & Boskin, 2001; Coutinho & Oswald, 2000, 2005; Dever et al., 2016; Harry & Klinger, 2006; Kvande et al., 2018; Wehmeyer & Schwartz, 2001). Among these factors, gender disproportionality has received more attention. Although a clear framework has been put forward, especially with research centred in the USA and European countries, it is clear that more thorough research is needed to understand gender disproportionality in other countries. Gender disproportionality is an insidious form of gender inequality that "can take the form of girls getting less education than boys of the same social class" (Lorber, 2001, p. 5), which is more

likely to affect education in developing countries. For instance, Caner et al. (2016) found that dropout rates are higher for female students during and after primary school as compared to male students. In addition, lower educational attainment is observed in the female students whose mothers have traditional views. Even with mothers with non-traditional views, girls are still at disadvantage since the dropout rates are higher for girls. In another study conducted in Turkey, gender inequality exists since female students' enrolment, attendance, and dropout of school rates are not well-documented (Cin & Walker, 2016).

Gender inequality continues to be a subject of intense study, but particularly needs more attention in special education because of the vulnerability associated with students' special needs. Underrepresentation and overrepresentation in special education are problematic situations. Whilst children who are underrepresented in certain special education categories may not be able to receive appropriate support, children who are overrepresented in special education categories may receive inappropriate support as a result of wrong diagnosis. In addition, females with special needs may face double discrimination, experiencing both gender and disability bias. In a well-cited study (Wehmeyer & Schwartz, 2001), boys were not necessarily overrepresented; however, gender bias existed for girls, implying underrepresentation, which in turn meant that girls might not be able to benefit from special education services. Gender bias is a lifelong issue, continuing in different aspects of life, such as employment of individuals with special needs. According to the European Human Rights Report (2023), only 20% of women with disabilities work full time, compared to 29% of men with disabilities. Gender inequality in special education is a pressing issue that deserves attention and action.

1.1 | Gender disproportionality in special education

Special education legislation (The Individuals with Disabilities Education Improvement Act, 2004; The Special Education Services Regulations, 2018) mandates that students with special needs be educated in less restrictive environments, which is widely accepted in today's education to mean inclusive education. Gender disproportionality in schools has been revealed in many research studies (Coutinho & Oswald, 2005; McCoy et al., 2012; Oswald et al., 2003). By generating the data biannually for a 20-year period, Oswald et al. (2003) found that boys were more likely to be identified as having disabilities particularly for emotional disturbance than in any other category. Likewise, Coutinho and Oswald (2005) investigated gender disproportionality by certain disability categories, such as intellectual disabilities, emotional disturbance, and learning disabilities at state, regional, and national levels. The results indicated that there was a gender disproportionality in favour of boys in all three disability categories at both state level and national level. In addition, the researchers detected significant differences for intellectual disabilities and learning disabilities, but not for emotional disturbance, at regional level. As is evident in a study conducted in Ireland (McCoy et al., 2012), boys were more likely to be identified as having multiple disabilities, speech and language impairment, learning disabilities, and emotional behavioural disorders. Cooc and Kiru (2018) pointed out the underrepresentation of girls in special education in their synthesis of international research with regard to disproportionality in special education. Moreover, similar patterns were yielded in the reviewed literature with respect to gender disproportionality for the United States, Germany, Kenya, and India (Bruce & Venkatesh, 2014). In a study using the American Mathematics Competition scores from 2009 to 2019, Bahar (2021) found that the number of males exceeded the number of females in all three exams for each year. In addition, odds ratios of number of males to number of females were significantly increased for the decade. Considering that having a specific academic aptitude implies being gifted and talented according to the Marland Report (1972), it can be assumed that gender disproportionality also exists for the category of giftedness. All of these studies suggest that access to special education services remains a challenge for girls.

The referral is crucial in determining eligibility for special education services (Buckrop et al., 2016). Accuracy of the referral mechanism ensures the equity to access special education services. One concern related to the accuracy of the referral process is teachers' decisions in regard to referral and placement (Yakut

& Lauterbach, 2019). In the study, teachers were more likely to refer a student with behavioural challenges for special education and place the student with behavioural problems in a special education classroom. Certain factors (gender, problem type, societal stereotypes) can influence the referral process, leading to the disproportionality in special education.

Less attention has been paid to the disproportionate representation of students with special needs in their educational settings, such as general education schools and special education schools. Skiba et al. (2006) found that African American students were overrepresented in more restrictive environments and underrepresented in the categories of emotional disturbance, mild intellectual disabilities, moderate intellectual disabilities, learning disabilities, and speech and language impairments. In the study by Cakiroglu and Melekoglu (2014), the researchers descriptively examined the data obtained from the Ministry of National Education for the academic years 2004–2005 and 2010–2011. While males constituted 61.5% of the total students who received special education services in inclusive settings for the academic year 2004–2005, the male population declined sharply to 32% (27,444 males of 84,580 students) for the academic year 2010–2011. This substantial decline draws our attention and requires more thorough statistical analysis of odds ratios and trend analysis using annual data longitudinally.

According to the Global Gender Gap Report (2023) published annually by the World Economic Forum, Turkey is ranked 99th out of 146 countries in the educational attainment sub-index for the year 2023. Educational attainment is particularly examined in enrolment in primary, secondary and tertiary education, showing gender inequality in favour of males. In the light of previous research and statistics, the analysis of nationwide data published annually by the Ministry of National Education since 2006 would be useful to understand both the disproportionate representation and trends in special education in conjunction with students' diagnosis and educational placement. Abstracting data from 2006 to 2020, this study provides a clear and unique perspective to policymakers and practitioners.

1.2 | Special education in Turkey

In Turkey, the special education population has steadily increased since 2006 (National Education Statistics Formal Education [Milli Egitim Istatistikleri Örgün Eğitim], 2022). There have been legislative efforts guiding special education services in Turkey. First, the Children with Special Education Needs Act [Özel Eğitime Muhtaç Çocuklar Kanunu], enacted in 1983, emphasized the identification and location of students with special needs, and further focused on the requirements of educating students with special needs in the same school settings as their peers without special needs. Another important piece of legislation is the Legislative Decree About Special Education numbered 573 [Özel Eğitim Hakkında Kanun Hükmünde Kararname], enacted in 1997, emphasizing the rights of all students with special needs and the principles of special education.

One recent piece of legislation is the Special Education Services Regulation ([Özel Eğitim Hizmetleri Yönetmeliği], SESR), enacted in 2000 and recently reauthorized in 2022, which regulates the procedures ensuring that individuals with special needs have access to education. According to the SESR (2018), special education is the education that is carried out in appropriate environments with specially trained personnel and programs developed to meet the educational and social needs of individuals who significantly differ from their peers in terms of individual and developmental characteristics and educational competencies.

Inclusion, which is highlighted in the above-mentioned legislation, is implemented in two forms, namely full-time inclusion and part-time inclusion (SESR, 2018). Full-time inclusion refers to education where students with special needs are educated with their peers without special needs in general education classrooms. Full-time inclusion is available at kindergarten, elementary, secondary, and high school levels. Part-time inclusion refers to the education of students with special needs enroled in special education classrooms in general education settings, but these students may also attend general education classrooms based on their ability. The number of all

students attending general education schools and the number of students with special needs attending to special education schools are provided in Table 1.

Non-inclusive settings are available for students with special education. For instance, special education day schools and boarding schools are available for students with visual disabilities, hearing disabilities, and physical disabilities at the elementary school and secondary school levels (Article 31 of the SESR, 2018). In addition, special education day schools are available for students with autism spectrum disorders and mild intellectual disabilities. Other non-inclusive settings are described below.

1.2.1 | Special education of vocational training schools

Special education in vocational training schools is available for students with visual disabilities, hearing disabilities, mild intellectual disabilities, and mild autism spectrum disorders (Article 32 of the SESR, 2018). When students graduate from these schools, the diploma enables them to benefit from the same rights granted to vocational high school graduates (Article 32 m of the SESR, 2018). Students can continue their education up to 27 years of age.

1.2.2 | Training schools of special education

Training Schools of Special Education are available for individuals with moderate or severe intellectual disabilities and individuals with moderate or severe autism spectrum disorders (Article 31 of the SESR, 2018). Special education curricula prepared by the Ministry of National Education are implemented in the training schools. Students with moderate or severe intellectual disabilities and students with moderate or severe autism spectrum disorders receive education in separate classes. The maximum class size is eight for students with intellectual disabilities and four for students with autism spectrum disorders (Article 31 of the SESR, 2018). Students can continue their education up to 27 years of age.

1.2.3 | Science and art centers (SACs)

Gifted students who receive their education in general education schools are educated in SACs, which provide extra education in order to develop their talents and maximize their capacities at the highest level (Article 33 of the SESR, 2018). Gifted students are identified according to general intelligence (with an IQ higher than 130), ability in the visual arts, or musical talents. Students can receive their education either after school or at the weekend (Article 33 of the SESR, 2018). Upon completion of five levels of the program, namely orientation, support education, recognizing individual abilities, developing special abilities, and project production and management in elementary, lower secondary, and upper secondary schools, students receive certificates (Guidance of the Science and Art Centers, 2016).

1.3 | Purpose of the study and research questions

The purpose of this study is to synthesize the gender odds ratios and trends by educational settings (inclusive and non-inclusive settings) obtained from the National Education Statistics (NES) published annually by the Presidency of Strategy Development of the Ministry of National Education for the academic years from 2006–2007 to 2021–2022. This study posed the following questions:

TABLE 1 General education and special education population.

	2017–2018		2018–2019		2019–2020		2020–2021		2021–2022	
Gender	**Male**	**Female**	**Male**	**Female**	**Male**	**Female**	**Male**	**Female**	**Male**	**Female**
General education	9,231,077	8,654,171	9,394,125	8,714,735	9,435,000	8,806,881	9,352,605	8,733,338	9,928,304	9,227,267
Special education	224,728	128,882	252,835	145,980	269,897	155,877	269,674	156,142	299,573	173,113

Research Question 1: What are the gender odds ratios by educational settings?

Research Question 2: What are the trends in the gender odds ratios by educational settings?

2 | METHOD

2.1 | Procedure and sample

The sample of this study was obtained through the National Education Statistics (NES) published annually by the Presidency of Strategy Development of the Ministry of National Education for the academic years from 2006–2007 to 2021–2022. Statistics are publicly available on the website of the Presidency of Strategy Development. Statistics are given according to school types and education levels, namely elementary school, lower secondary school, and upper secondary school. In all NES reports, the table named "*Number of schools, students, teachers and classrooms in Special Education Institutions*", which is primarily used for data synthesis in this study, presents the information regarding the distribution of special education students by school types, educational levels, and gender.

We used the NES data to construct the study variables. Before 2013, primary schools included the first eight grades in Turkey. Before 2012–2013, compulsory education was divided into two stages. The first stage was an 8-year primary education and the second stage was a 4-year upper secondary education. However, with a legal amendment established in the 2012–2013 academic year, compulsory education in Turkey increased to 12 years divided into three stages. The first stage is a 4-year elementary school (1st, 2nd, 3rd and4th grades) education, the second stage is a 4-year lower secondary school (5th, 6th, 7th and 8th grades) education, and the third stage is a 4-year upper secondary school (9th, 10th, 11th and 12th grades) education. Because of the shift from two stages to three stages of compulsory education, we examined the gender odds ratios and trends accordingly.

2.2 | Data analysis

First, we examined how data are represented for 16 years across the country by calculating gender odds ratios. The odds ratio value can be calculated in different ways (Cruz & Rodl, 2018; Dyson & Gallannaugh, 2008; Lindsay et al., 2006; Oswald et al., 2003). It can be simply defined as the ratio of male students to female students in a certain special education or risk group. However, we think that this calculation can only be valid in cases where the gender in the population is equally distributed. Thereby, the gender odds ratio in this study is calculated by the formula given below (students with hearing disabilities are used as an example), which enables us to compare the target population with the general population.

$$OddsRatio = \frac{\frac{\text{number of boys with hearing disabilities in elementary school}}{\text{number of boys in elementary school}}}{\frac{\text{number of girls with hearing disabilities in elementary school}}{\text{number of girls in elementary school}}}$$

It is possible to formulate the calculation as follows: number of boys with hearing disabilities in elementary school = a; number of boys in elementary school = b; number of girls with hearing disabilities in elementary school = c; number of girls in elementary school = d.

$$OddsRatio = \frac{\frac{a}{b}}{\frac{c}{d}}$$

In the NES, the total number of male (b) and female students (d) in elementary school, lower secondary school, and upper secondary school is not given. However, the gender ratio for each educational stage is explained in the NES as follows: It is the relative size of the gross enrolment rate of girls of a certain type of educational stage in a given academic year to the gross enrolment rate of boys of the same type of education in the same academic year. It is the ratio of two different indicators (gross enrolment rates) multiplied by 100, which is also equal to $\frac{d}{b} \times 100$.

Based on the available data, it is not possible to apply the odds ratio formula directly, but

$$\frac{\frac{a}{b}}{\frac{c}{d}} = \frac{a}{b} \times \frac{d}{c} = \frac{a}{c} \times \frac{d}{b} = \frac{\frac{a}{c}}{\frac{b}{d}}$$

$$OddsRatio = \frac{\frac{\text{number of boys with hearing disabilities in elementary school}}{\text{number of girls with hearing disabilities in elementary school}}}{\frac{\text{number of boys in elementary school}}{\text{number of girls in elementary school}}}$$

In other words, if we look at the formula

Gender Ratio $= \frac{d}{b} \times 100$ For the odds ratio, we need $\frac{b}{d}$ value $\frac{b}{d} = \frac{100}{GenderRatio} = \frac{100}{\frac{d}{b} \times 100} = \frac{b}{d}$ So $OddsRatio = \frac{\frac{a}{c}}{\frac{b}{d}} = \frac{\frac{a}{c}}{\frac{100}{GenderRatio}}$.

Using the above-mentioned formula, an odds ratio of 1 may be interpreted as an absence of disproportionate representation for boys; that is, boys and girls are equally likely to be identified with the disability. An odds ratio of 2 shows that boys are twice as likely to be identified with the disability, whereas an odds ratio of 0.5 shows that boys are one-half as likely to be identified.

Second, we used the Mann-Kendall (MK) trend test to analyse potential trends over time (Kendall, 1975; Mann, 1945). The MK test is a non-parametric method that *"is viewed best as an exploratory analysis and is used most appropriately to identify stations where changes are significant or of large magnitude and to quantify these findings"* (Bahar, 2021, p. 8). There are three assumptions of the MK test: (1) when there is no trend, the data obtained are independent and identically distributed, (2) measurements correspond to the actual conditions at the sampling times, (3) sampling, processing, and measurement methods are unbiased (Bahar, 2021). Meeting the MK test assumptions, we performed the MK test using XLSTAT software in conjunction with a more robust, non-parametric estimate of the slope, called Sen's (1968) slope.

3 | RESULTS

3.1 | Research question 1

We examined educational stages by the same school types for each type of disability. Educational stages are defined as elementary, lower secondary, and upper secondary. School types are specified as special education kindergarten, elementary school, lower secondary school, and upper secondary school, special education in vocational training school (upper secondary), training school of special education (elementary, lower secondary, upper secondary), private special school (elementary, lower secondary), special education class (elementary, lower secondary), inclusive class, and science and art centre. Gender odds ratios for the findings below are presented in detail in Table 2.

First, males with hearing disabilities are overrepresented for 16 years. Gender odds ratios are fluctuating from elementary school to lower secondary school for hearing disabilities (Table 2).

Second, males with visual disabilities are overrepresented for 16 years. Except for the academic years 2012–2013 and 2017–2018, all gender odds ratios of visual disability for lower secondary school are higher than the gender odds ratios of visual disability for elementary school (Table 2).

TABLE 2 Gender odds ratios over years.

	2006–2007	2007–2008	2008–2009	2009–2010	2010–2011	2011–2012	2012–2013	2013–2014	2014–2015	2015–2016	2016–2017	2017–2018	2018–2019	2019–2020	2020–2021	2021–2022
Special education kindergarten	1.55	1.35	1.33	1.43	1.29	1.28	1.17	1.42	1.65	1.60	1.66	1.61	1.62	1.77	1.95	1.74
Elementary school (hearing disability)	1.27	1.32	1.31	1.33	1.35	1.32	1.41	1.37	1.46	1.47	1.51	1.70	1.64	1.45	1.44	1.43
Lower secondary school (hearing disability)							1.31	1.39	1.40	1.53	1.54	1.44	1.52	1.53	1.56	1.58
Elementary school (visual disability)	1.26	1.34	1.31	1.40	1.42	1.40	1.54	1.35	1.36	1.34	1.40	1.43	1.36	1.37	1.30	1.20
Lower secondary school (visual disability)							1.42	1.61	1.50	1.54	1.51	1.41	1.42	1.46	1.40	1.47
Elementary school (orthopaedic disability)	1.37	1.06	1.19	1.15	1.16	1.16	1.18	1.23	1.15	1.10	1.20	1.03	1.17	1.31	1.35	1.20
Lower secondary school (orthopaedic disability)							1.23	1.23	1.24	1.33	1.23	1.42	1.26	1.19	1.24	1.43
Elementary school (mild intellectual disability)	1.83	1.81	1.78	1.77	1.78	1.78	1.67	1.59	1.72	1.75	1.76	1.73	1.92	1.95	1.87	1.84
Lower secondary school (mild intellectual disability)							1.87	1.84	1.81	1.95	1.74	1.67	1.67	1.72	1.79	1.77
Special education of vocational training centre (upper sec. – intellectual dis)	na	na	na	na	2.13	1.95	1.87	1.86	1.84	1.63	1.77	1.72	1.61	1.68	1.64	1.67
Training centre of special education (elementary)	na	na	na	na	na	na	1.84	1.76	1.78	1.74	1.82	1.90	1.96	1.94	1.97	2.00

TABLE 2 (Continued)

	2006–2007	2007–2008	2008–2009	2009–2010	2010–2011	2011–2012	2012–2013	2013–2014	2014–2015	2015–2016	2016–2017	2017–2018	2018–2019	2019–2020	2020–2021	2021–2022
Training centre of special education (lower secondary school)	na	na	na	na	na	na	1.88	2.00	1.94	1.96	1.92	1.82	1.75	1.77	1.83	1.94
Training centre of special education (upper secondary school)	na	na	na	na	na	na	1.93	1.85	1.87	1.86	1.73	1.73	1.77	1.74	1.72	1.74
Private special education elementary school	1.42	1.48	1.53	1.53	1.52	1.54	na	na	na	1.78	1.35	1.27	1.12	1.47	1.81	1.93
Private special education lower secondary school							na	na	na	0.55	0.64	0.76	1.08	1.21	1.21	0.96
Special education class (elementary school)	na	na	na	na	1.64	1.62	1.65	1.62	1.65	1.69	1.77	1.83	1.86	1.89	1.93	2.01
Special education class (lower secondary school)	na	na	na	na			1.66	1.68	1.64	1.64	1.63	1.66	1.68	1.71	1.75	1.78
Inclusive class (kindergarten)	na	na	na	na	na	na	na	na	na	1.77	1.87	1.76	1.57	1.51	1.48	1.68
Inclusive class (elementary school)	na	na	na	na	0.48	1.58	1.56	1.62	1.64	1.69	1.74	1.80	1.78	1.78	1.74	1.73
Inclusive class (lower secondary school)	na	na	na	na			1.63	1.65	1.60	1.64	1.66	1.71	1.71	1.74	1.74	1.72
Inclusive class (upper secondary school)	na	na	na	na	1.46	1.53	1.51	1.51	1.52	1.55	1.59	1.62	1.58	1.52	1.52	1.54
Science and arts centre (gifted and talented children)	0.91	0.93	0.99	0.98	1.05	1.10	1.21	1.23	1.15	1.05	1.03	0.98	0.89	0.95	1.01	0.92

Note: From 2006–2007 to 2011–2012, NES included single data combining elementary school and lower secondary school.

Third, males with orthopaedic disabilities are overrepresented for 16 years. The gender odds ratios of schools for orthopaedic disabilities are lower than those of other schools for students with visual disabilities, hearing disabilities, intellectual disabilities, and autism spectrum disorders. Except for these two academic years (2019–2021, 2020–2021), gender odds ratios for lower secondary schools of orthopaedic disabilities are higher than those for elementary schools of orthopaedic disabilities (Table 2).

Fourth, males with intellectual disabilities are overrepresented for 16 years. The gender odds ratios of elementary, lower secondary, and upper secondary schools increase in the first years of data, and then decrease in the last years of data (Table 2). The highest gender odds ratios are found for Special Education in Vocational Training Schools (upper secondary school for intellectual disabilities) ranging from 1.61 (academic year 2018–2019) to 2.13 (academic year 2010–2011).

Fifth, males are overrepresented in private special education elementary schools for 13 years (no data available for three years). However, this representation changes for private special education lower secondary schools, showing female and male representations are fluctuating. It was observed that the odds ratios in lower secondary schools are always lower, showing that female representation in private special education secondary schools is higher than their representation rate in private special education elementary schools (Table 2).

In addition, males are overrepresented in special education classes both for elementary school and lower secondary school. Gender odds ratios for elementary school and lower secondary school show similar rates for the first six years while gender odds ratios are lower for lower secondary school than elementary school for the last six years (Table 2).

Moreover, males are overrepresented in inclusive settings for kindergarten and upper secondary school (Table 2). The same representation exists for elementary and lower secondary schools except for the first year of data. Interestingly, females are twice as likely to be represented for the first year (odds ratio = 0.48).

Lastly, the gender odds ratio for gifted students at SACs is close to 1, showing that females and males are almost equally represented (Table 2). The lowest gender odds ratios are found for the SACs (gifted and talented Children) ranging from 0.89 (academic year 2018–2019) to 1.23 (academic year 2013–2014).

3.2 | Research question 2

We performed trend analysis to examine changes in the gender odds ratio from 2006–2007 to 2021–2022. Initially, the gender odds ratio for special education kindergarten increased from 1.17 to 1.95, with a mean of 1.53, from 2006–2007 to 2021–2022. As Table 3 shows, the MK test confirmed that the direction of the trend was upward, favoured males, and was statistically significant ($p = .00$). Figure 1 shows that the estimation of the magnitude of the trend was 0.035 as computed by Sen's slope (Table 4).

Second, the gender odds ratio for the elementary school (hearing disabilities) increased from 1.27 to 1.70, with a mean of 1.42, from 2006–2007 to 2021–2022. As Table 3 shows, the MK test confirmed that the direction of the trend was upward, favoured males, and was statistically significant ($p = .00$). Figure 1 shows that the estimation of the magnitude of the trend was 0.019 as computed by Sen's slope (Table 4). In addition, the gender odds ratio for the lower secondary school (hearing disabilities) increased from 1.27 to 1.58, with a mean of 1.42, from 2006–2007 to 2021–2022. As Table 3 shows, the MK test confirmed that the direction of the trend was upward, favoured males, and was statistically significant ($p = .00$). Figure 1 shows that the estimation of the magnitude of the trend was 0.021 as computed by Sen's slope (Table 4).

Third, the gender odds ratio for the lower secondary school (visual disabilities) increased from 1.26 to 1.61, with a mean 1.43, from 2006–2007 to 2021–2022. As Table 3 shows, the MK test confirmed that the direction of the trend was upward, favoured males, and was statistically significant ($p = .03$). Figure 1 shows that the estimation of the magnitude of the trend was 0.009 as computed by Sen's slope (Table 4).

TABLE 3 Mann–Kendall two-tailed trend test values for gender odds ratios.

	Min	Max	M	SD	Kendall's tau	S	Var (S)	*p*
Special education kindergartens	**1.17**	**1.95**	**1.53**	**0.21**	**0.53**	**64**	**493.33**	**.00**
Elementary school (hearing disability)	**1.27**	**1.70**	**1.42**	**0.12**	**0.60**	**72**	**493.33**	**.00**
Lower secondary school (hearing disability)	**1.27**	**1.58**	**1.42**	**0.11**	**0.77**	**92**	**493.33**	**.00**
Elementary school (visual disability)	1.20	1.54	1.36	0.08	−0.07	−8	493.33	.75
Lower secondary school (visual disability)	**1.26**	**1.61**	**1.43**	**0.09**	**0.40**	**48**	**493.33**	**.03**
Elementary school (orthopaedic disability)	1.03	1.37	1.19	0.09	0.17	20	493.33	.39
Lower secondary school (orthopaedic disability)	**1.06**	**1.43**	**1.24**	**0.10**	**0.43**	**52**	**493.33**	**.02**
Elementary school (mild intellectual disability)	1.59	1.95	1.79	0.09	0.08	10	493.33	.69
Lower secondary school (mild intellectual disability)	1.67	1.95	1.79	0.07	−0.28	−34	493.33	.14
Special education of vocational training centre (intellectual disability-upper secondary school)	**1.61**	**2.13**	**1.78**	**0.16**	**−0.73**	**−48**	**212.67**	**.00**
Training centre of special education (Elementary school)	**1.74**	**2.00**	**1.87**	**0.10**	**0.69**	**31**	**125.00**	**.01**
Training centre of special education (lower secondary)	1.75	2.00	1.88	0.08	−0.33	−15	125.00	.21
Training centre of special education (upper secondary school)	**1.72**	**1.93**	**1.79**	**0.07**	**−0.56**	**−25**	**125.00**	**.03**
Private special education elementary school	1.12	1.93	1.52	0.22	0.18	14	268.67	.43
Private special education lower secondary school	0.55	1.54	1.19	0.36	−0.21	−16	268.67	.36
Special education class (elementary school)	**1.62**	**2.01**	**1.76**	**0.10**	**0.88**	**58**	**212.67**	**.00**
Special education class (lower secondary school)	**1.62**	**1.78**	**1.67**	**0.05**	**0.55**	**36**	**212.67**	**.02**
Inclusive class (kindergarten)	1.48	1.87	1.66	0.15	−0.62	−13	44.33	.07
Inclusive class (elementary school)	**0.48**	**1.80**	**1.59**	**0.36**	**0.61**	**40**	**212.67**	**.01**
Inclusive class (lower secondary school)	**0.48**	**1.74**	**1.57**	**0.35**	**0.79**	**52**	**212.67**	**.00**
Inclusive class (upper secondary school)	1.46	1.62	1.54	0.04	0.39	26	212.67	.09
Science and art centre (gifted and talented children)	0.89	1.23	1.03	0.10	−0.07	−8	493.33	.75

Note: Bold values represent the statistically significant results.

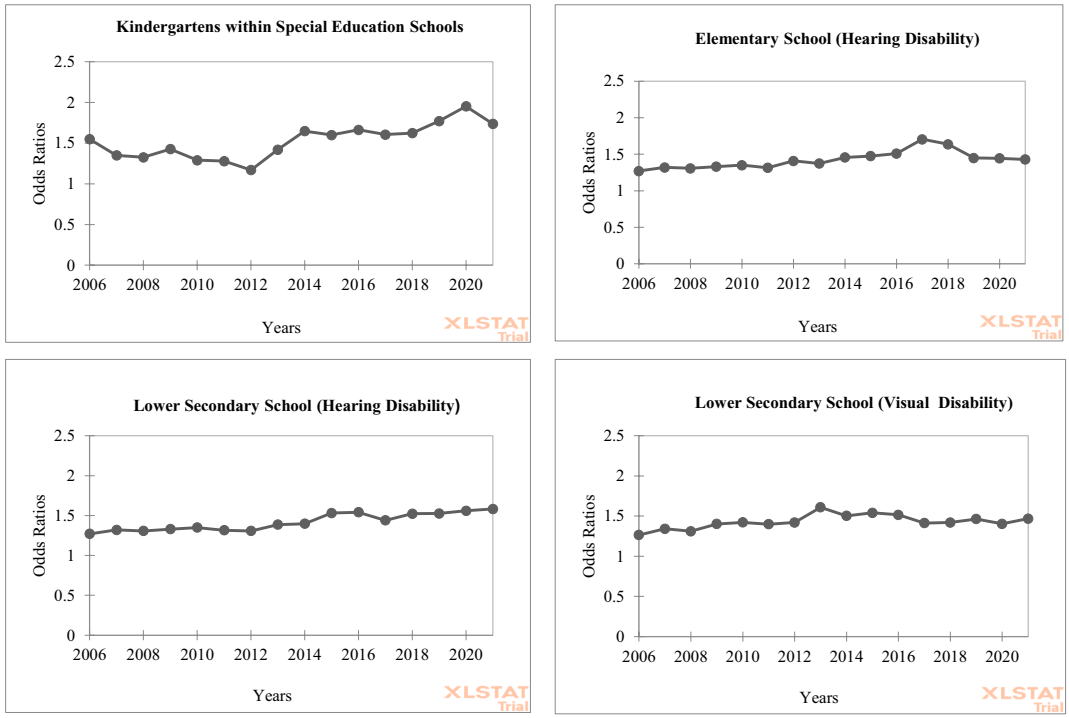

FIGURE 1 Trends of gender odds ratios of special education kindergarten, elementary school (hearing disability), lower secondary school (hearing disability), and lower secondary school (visual disability) and Sen's slope from 2006–2007 to 2021–2022.

Fourth, the gender odds ratio for the lower secondary school (orthopaedic disabilities), increased from 1.06 to 1.43, with a mean of 1.24, from 2006–2007 to 2021–2022. As Table 3 shows, the MK test confirmed that the direction of the trend was upward, favoured males, and was statistically significant ($p = .02$). Figure 2 shows that the estimation of the magnitude of the trend was 0.01 as computed by Sen's slope (Table 4).

Fifth, the gender odds ratio for special education in vocational training schools (intellectual disabilities – upper secondary) increased from 1.61 to 2.13, with a mean of 1.78, from 2006–2007 to 2021–2022. As Table 3 shows, the MK test confirmed that the direction of the trend was downward, favoured females, and was statistically significant ($p = .00$). Figure 2 shows that the estimation of the magnitude of the trend was −0.033 as computed by Sen's slope (Table 4).

Moreover, the gender odds ratio for the Training School of Special Education (elementary school), the odds ratio increased from 1.74 to 2.00, with a mean of 1.87, from 2006–2007 to 2021–2022. As Table 3 shows, the MK test confirmed that the direction of the trend was upward, favoured males, and was statistically significant ($p = .01$). Figure 2 shows that the estimation of the magnitude of the trend was 0.031 as computed by Sen's slope (Table 4). In addition, the gender odds ratio for the Training School of Special Education (upper secondary) increased from 1.72 to 1.93, with a mean of 1.79, from 2006–2007 to 2021–2022. As Table 3 shows, the MK test confirmed that the direction of the trend was downward, favoured females, and was statistically significant ($p = .03$). Figure 2 shows that the estimation of the magnitude of the trend was −0.018 as computed by Sen's slope (Table 4).

Furthermore, the gender odds ratio for the special education class (elementary school) increased from 1.62 to 1.78, with a mean of 1.76, from 2006–2007 to 2021–2022. As Table 3 shows, the MK test confirmed that the direction of the trend was upward, favoured males, and was statistically significant ($p = .00$). Figure 3 shows that the estimation of the magnitude of the trend was 0.036 as computed by Sen's slope (Table 4). The gender odds ratio

TABLE 4 Sen's slope values for the odd ratios.

	Value	Lower bound (95% CI)	Upper bound (95% CI)
Special education kindergarten			
Slope	0,035	0,013	0,049
Intercept	−68,197	−82,893	−45,944
Elementary school (hearing disability)			
Slope	0,019	0,010	0,025
Intercept	−36,426	−43,050	−27,107
Lower secondary school (hearing disability)			
Slope	0,021	0,014	0,026
Intercept	−40,370	−46,162	−33,810
Lower secondary school (visual disability)			
Slope	0,009	0,000	0,023
Intercept	−17,643	−31,183	−8,270
Lower secondary school (orthopaedic disability)			
Slope	0,010	0,002	0,024
Intercept	−19,602	−33,238	−10,843
Special education of vocational training centre (intellectual disability- upper secondary)			
Slope	−0,033	−0,050	−0,025
Intercept	68,217	59,947	84,961
Training centre of special education (elementary school)			
Slope	0,031	0,016	0,040
Intercept	−59,717	−69,539	−45,336
Training centre of special education (upper secondary school)			
Slope	−0,018	−0,041	0,006
Intercept	38,592	14,162	61,803
Special education class (elementary school)			
Slope	0,036	0,030	0,047
Intercept	−70,112	−81,510	−64,537
Special education class (lower secondary school)			
Slope	0,010	0,003	0,021
Intercept	−19,429	−29,547	−12,049
Inclusive class (elementary school)			
Slope	0,028	0,015	0,045
Intercept	−55,338	−72,503	−42,169
Inclusive class (lower secondary school)			
Slope	0,017	0,012	0,028
Intercept	−33,233	−44,080	−28,351

for the special education class (lower secondary school) increased from 1.62 to 1.78, with a mean of 1.67, from 2006–2007 to 2021–2022. As Table 3 shows, the MK test confirmed that the direction of the trend was upward, favoured males, and was statistically significant ($p = .02$). Figure 3 shows that the estimation of the magnitude of the trend was 0.010 as computed by Sen's slope (Table 4).

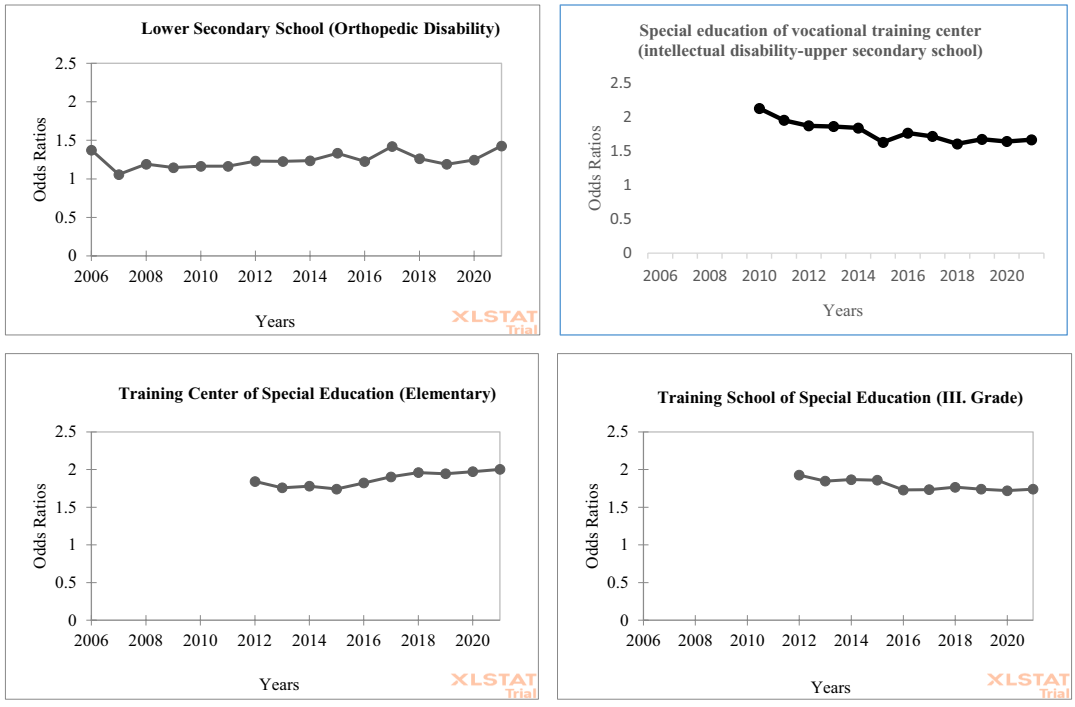

FIGURE 2 Trends of gender odds ratios of lower secondary school (orthopaedic disability), special education of vocational training centre (intellectual disability-upper secondary school), training centre of special education (elementary and upper secondary), and Sen's slope from 2006–2007 to 2021–2022.

Lastly, the odds ratio for inclusive classes (elementary school) increased from 0.48 to 1.80, with a mean of 1.59, from 2010–2011 to 2021–2022. As Table 3 shows, the MK test confirmed that the direction of the trend was upward, favoured males, and was statistically significant ($p = .01$). Figure 3 shows that the estimation of the magnitude of the trend was 0.028 as computed by Sen's slope (Table 4). In addition, the gender odds ratio for inclusive classes (lower secondary school) increased from 0.48 to 1.74, with a mean of 1.57, from 2010–2011 to 2021–2022. As Table 3 shows, the MK test confirmed that the direction of the trend was upward, favoured males, and was statistically significant ($p = .00$). Figure 3 shows that the estimation of the magnitude of the trend was 0.017 as computed by Sen's slope (Table 4). For all other special education categories and educational settings, there was no statistically significant trend.

4 | DISCUSSION

We aimed to examine gender odds ratios and trends by educational settings (inclusive and non-inclusive settings). One of the noteworthy results is that gender disproportionality exists in all school types except for the SACs (gifted and talented students). Another finding emerging from our study is that females are underrepresented, as such results imply gender inequality in special education. Women with disabilities face double vulnerability: "to be a woman and to have a disability" (Monedero et al., 2014, p. 115) is an issue that has been discussed for decades (Hanna & Rogovsky, 1991; United Nations, 2006).

Regarding our first research question, the results are discussed in detail. In terms of visual disabilities, except for the academic years 2012–2013 and 2017–2018, gender odds ratios at secondary school level are higher than the odds ratios at elementary school level. This means that either the number of male students diagnosed with

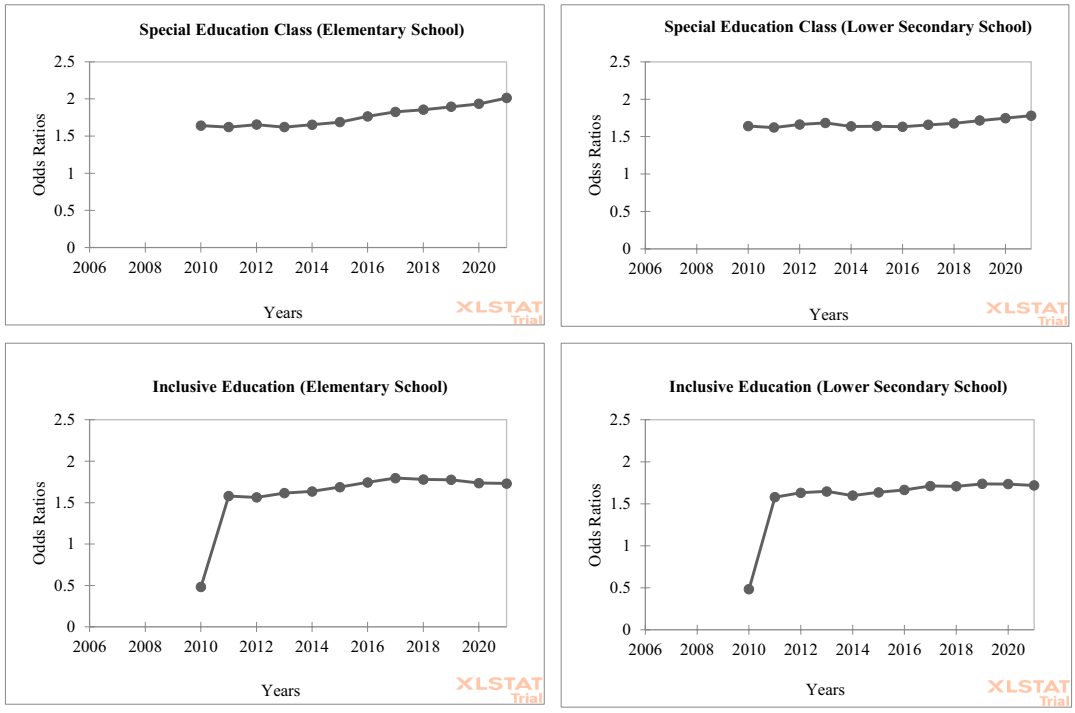

FIGURE 3 Trends of gender odds ratios of special education class (elementary school and lower secondary school), inclusive education (elementary, lower secondary), and Sen's slope from 2010–2011 to 2021–2022.

visual disabilities increases or the number of female students diagnosed with visual disabilities decreases in the transition from elementary school to secondary school. It is possible to conclude that female students with visual disabilities are at a disadvantage for receiving education in higher education stages.

In addition, gender odds ratios of students with orthopaedic disabilities are lower than those for most of the other special education groups, but still males are more represented. The higher representation of females compared to representation of females in other disability categories may be related to the fact that this type of disability can be directly observable.

In terms of intellectual disabilities, the odds ratios of elementary, lower secondary and upper secondary schools increase in the first years of data and decrease in the last years of data. This shows that there is no clear trend for students with intellectual disabilities as they move to upper educational stages.

With respect to private special education, the gender odds ratios in lower secondary schools are consistently lower than those in elementary school. Females are either overrepresented or equally represented in private lower secondary schools, showing that females had equal access to special education among the other educational settings across our dataset. This specific situation needs to be addressed with further research.

In terms of special education classes, gender odds ratios in lower secondary schools are higher in the first two years of data, whereas gender odds ratios in lower secondary schools are lower in the last eight years. Regarding inclusive classes at kindergarten, elementary schools, secondary schools, and lower secondary schools, gender odds ratios decrease as students move to the upper stages. Considering that inclusive classes constitute the largest special education setting, the underrepresentation of female students in inclusive classes especially at lower stages shows that females are at a disadvantage in the big picture. While this needs investigation, it is possible to speculate that it is related to the onset of diagnosis. Well cited in the literature, male students showed more problem behaviours in the classroom (Wehmeyer & Schwartz, 2001) and female students exhibited more compliance (Bakkaloğlu & Sucuoğlu, 2018; Sucuoğlu & Özokçu, 2005).

If this is the case in our data, female students may not be able to be diagnosed on time and thus not be able to access special education services, although providing early intervention is necessary (Legislative Decree About Special Education numbered 573, 1997).

In contrast to the above results, gender odds ratios for gifted students studying at the SACs were found to be close to 1 (these were below 1 in the first four years, exceeded 1 in the following seven years, and then fell below 1 again in the last years). Almost equal representation of females and males can be related to the standardized screening of gifted students starting from the 1st grade of elementary school which is implemented across the country. The standardized early screening in giftedness shows the necessity of transferring similar screening for other special education categories. The equal representation of females and males also makes us consider the labelling effect (Shifrer, 2013; Shifrer et al., 2013). The positive label of giftedness can be a determinant for early identification, while the labelling which may influence the perceptions of parents, teachers, and administrators, which in turn affect their practices, can delay identification of other special education categories.

Regarding our second research question, in which we examined the trends in the gender odds ratios by educational settings, we found uptrends, downtrends, and no trends. Initially, we found uptrends in favour of males for special education kindergartens, elementary school (hearing disability), lower secondary school (hearing disability), lower secondary school (visual disability), lower secondary school (orthopaedic disability), training school of special education (elementary school), special education class (lower secondary school), inclusive class (elementary school), and inclusive class (lower secondary school). These results suggest that the uptrends in these schools will increase gender disproportionality over time, which leads to gender inequality if the necessary actionable measures are not taken on time.

Second, we found downtrends in favour of females for special education in vocational training schools (intellectual disability-upper secondary school), and training schools of special education (upper secondary school) despite the overrepresentation of males in these schools. The results are interpretative in nature; however, we can postulate that parents and teachers encourage female students with special needs to gain vocational and training skills, which are fundamental skills enhancing their employability and ability to live independently.

Lastly, we found no trends for elementary school (visual disability), elementary school (orthopaedic disability), elementary school (mild intellectual disability), lower secondary school (mild intellectual disability), training school of special education (lower secondary), private special education elementary school, private special education lower secondary school, inclusive class (kindergarten), inclusive class (upper secondary school), and the SACs (gifted and talented children). However, these results should be interpreted cautiously. Except for private special education lower secondary schools and the SACs (gifted and talented children), gender disproportionality still exists in favour of males, and thus needs attention and requires prevention.

To conclude, our analysis on a 16-year period of data not only showed that male students with special needs are overrepresented in most of the educational settings but also indicated uptrends in favour of males. Unfortunately, the results of this study are not promising in terms of gender equality.

4.1 | Implications

Addressing gender disproportionality in special education has significant implications for schools, teacher training programs, policymakers, and researchers. There is a great need, from individual schools to educational systems, to identify the causes of gender disproportionality, particularly the underlying factors contributing to the trend of boys being overrepresented in certain disability categories. There are many factors implicated in the disproportionate representation in special education, while none of them alone explains the disproportionality (Sullivan, 2011). For instance, Coutinho and Oswald (2005) particularly emphasized the examination of either the pre-referral process or administrative preferences preventing teachers from referring (e.g., students' internalizing

problems, unnecessary referrals). In another study, teachers' decisions to refer students who are suspected of having disabilities for special education evaluation are influenced by problem type (Yakut & Lauterbach, 2019).

To address this issue, it is imperative to implement rigorous assessment protocols that consider individual needs without being swayed by expectations. In addition, race, location (e.g., rural, suburban, urban), socioeconomic factors, time from referral to assessment, identification procedures, and eligibility criteria at state level were suggested as factors moderating disproportionality (Travers et al., 2013). Implementing universal screening approaches to identify students who may need additional support early on will also reduce the likelihood of gender disproportionality. All of these studies highlight the importance of systematic policies and professional development opportunities for teachers and administrators to prevent the aforementioned issues.

Addressing the disproportionality through qualitative research will expand our knowledge about the potential teacher related, student related, parent related, and society related factors. In addition, it is worth to further explore non-indicative gender disproportionality since attendance, full-time enrolment, and other negative outcomes may exist in reality. More research needs to be done to understand how other demographic factors influence gender disproportionately in special education. It is important to note that we examine disproportionality at national level. Research that seeks to understand gender disproportionality at a district level and a regional level is needed to understand the same phenomenon.

4.2 | Limitations

It is important to consider that our results are limited to the NES, in which neither all special education categories nor statistics for certain years are presented. For instance, we have single data for all students educated in inclusive settings rather than data for diagnostic categories. In addition, due to the shift from two stages to three stages of compulsory education in Turkey, we do not have separate data for the first stage (1st, 2nd, 3rd, 4th grades) and the second stage (5th, 6th, 7th and 8th grades) from 2006 to 2011. Such limitations might be barriers to understanding gender odds ratios and trends by special education categories. Another limitation is related to the nature of the data and data analysis. Our results cannot provide any causal hypothesis regarding gender disproportionality in special education. The current study is a premise of research on disproportionality, and the lack of rigorous comparison of the results with prior research remains a limitation.

5 | CONCLUSION

The current study presents a unique investigation of the gender odds ratios and trends in educational settings in Turkey. While previous studies on disproportionality are particularly initiated and dominant in the US, without any doubt, longitudinal examinations of data are crucial for all countries to understand the trends in special education over time.

The persistence of gender disproportionality for decades shows that more efforts and policies are necessary to promote gender equality at the global level.

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CONFLICT OF INTEREST STATEMENT

No potential conflict of interest was reported by the authors.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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