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Female education equity in China: An exploratory analysis of quantitative data between 2009 and 2016

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Abstract

Reported findings on female education equity and development in China seem to diverge with one another especially with quantitatively national reported data. The questionable claim that [female education inequality in China is gendered and practised procedurally and substantively]—is examined using a quantitative synthesis based on the MoE and NBSC databases between 2009 and 2016. The generated outcome showed convergence evidencing covert gender inequality represented by power and authority under representation as compared to the relative gaps between females and males—attributed to a number of factors like population difference. Hence, the presented data and arguments credit the presence of covert gender inequality vice versa overt gender equality—discrediting the presence of procedural and substantive gender inequality. Put together, female education equity and development is undoubtedly relative.

Introduction

There is no doubt about the intentions of the Chinese government to achieve equal access to education for both females and males. The Outline of China's National Plan for Medium and Long-term Education Reform and Development 2010–2020 (hereafter The National Plan) states clearly "making equal access to education" as "a basic state policy" which "always has been a government responsibility, but it cannot be done without concerted public efforts" (Ministry of Education, People's Republic of China, 2010, p. 8). Conversely, Gul and Lu (2011, p. 151) state "a number of socioeconomic problems related to education still exist" including "gender imbalances in educational opportunities". Further, it is argued that women education has been "primarily a means to modernize the role of virtuous wives and mothers in the service of family harmony, social order and national prosperity" (Chiu, 2016, p. 134). The emerging conflict among these views: the National Plan, the educational statistics reported by the Ministry of Education (MoE) and National Bureau of Statistics of China (NBSC), the conducted research by Chinse researchers (insiders), and the conducted research by non-Chinese researchers (outsiders)—could possibly allow generating a unique output about the female education development in China controlled by divergence, convergence, divergence by degree and uniqueness among the reported findings by the above four sources. We approach gender education in this paper where it could be either overtly or covertly equal. In the former it is quantitatively realised through equal numbers for men and women in all educational sectors and levels. In the latter, it is realised through authority. In this regard, Unterhalter (as cited in Fennell & Arnot, 2007, p. 31) asserts "many continue to see the achievement of gender equality simply in securing equal numbers of girls and boys" in comparison to the realisation of gender equality "through policy that is deeply compromised by the inequalities of economic and political

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power". It should be also noted that the factors impacting female education could be attributed to other factors including but not limited to population difference which is not within the scope of this study.

Literature Review

Gender inequality is still a major issue in developing countries with variable levels ranging from highest in the Middle East and Africa, moderate in South Asia countries and average in Asia Pacific and East Asia. Although China is not reported among the low level countries, it was not reported among the countries establishing "women-only" universities; although they have done so (e.g. China Women's University, established in 1949) (Lee as cited in Neubauer, Shin, & Hawkins, 2013, p. 166). In China, "the appearance of public schools for girls during the last decade of the Qing dynasty represents one of the most dramatic social and cultural changes of the period" (Bailey, 2007, p. 34). The first admission to Chinese girls in universities was in 1919 and the first girls' school, in 1998 (Bailey, 2007). It is also asserted "women did not become part of the mainstream education system until the last sixty years" due to the Confucian ideology (Liu & Carpenter, 2005, p. 266) and only "when the entire population becomes conscious about gender discrimination and willing to share wealth, power, and opportunity, women's education will be accomplished to its full extent" (Liu & Carpenter, 2005, p. 280). Historically certain ethnic groups were discriminated in China such like "Kazakhs in Xinjiang, China" (Hakim as cited in Joseph, 2007, p. 235) or being generally treated as goods for selling and slavery in the whole country until 1949—being internationally illegal (Reid as cited in Joseph, 2007, p. 504). Missionary schools themselves were enhancing the traditional view of women as housewives "the primary motivation for establishing these early schools was to train girls to serve as the future wives of Chinese pastors" (Bailey, 2007, p. 12). If not, they were then religion biased leading to a social parity in a society like China where religion has no role to play "…as Bible women" (Bailey, 2007, p. 12). Additionally, a study on the impact of protestant missionary girls education in north China between 1872 and 1924 added about missionary schools "leave[ing] a lasting impression on education for girls in China" (Lear, 2009, p. ii).

The Present Study

We examined the claim that *female education inequality in China is (not) practised procedurally and substantively* through the following hypotheses:

H_0/H_a: There will be (no) statistically significant difference in (educational attainment) for:

1. …the total number of higher education, senior secondary education, junior secondary education, primary, special, correctional and preschool educations—variables between 2009/2010 and 2015/2016 at a 7-year interval; and
2. …the total number of female personnel for higher education, junior and secondary educations, primary, special, correctional and preschool educations between 2009/2010 and 2015/2016 at a 7-year interval.

Methodology

Sample

The study is mainly based on secondary data analysis. That said, our theoretical population are female education population; the study population is female education community in China; the sampling frame includes all types of female students and staff at all educational levels; and the sample includes educational attainment as in total numbers of enrolled students in the higher education, school education, preschool, special, and correctional educations along with female educational personnel between 2009/2010 and 2015/2016. Thus, with the above retrieved data, we aim to synthesise the development of female education in China between 2009/2010 and 2015/2016 with reference to the National Plan. Although these examined variables and used indicators might help examining our claim, the output remains limited to the quantitative features of female education equity, other than the quality of these indicators which should be examined more closely though different research methods.

Measures

The researchers used unobtrusive measures, namely, secondary analysis of census bureau data to examine the proposed hypotheses on female education development in China between 2009/2010 and 2015/2016 with reference to the National Plan 2010–2020.

Design

A non-experimental design is used; it can be depicted in notational form as:

$X_1 O_1 \quad X_2 O_2 \quad X_3 O_3 \quad X_4 O_4 \quad X_5 O_5 \quad X_6 O_6 \quad X_7 O_7$

where:

X = the unobtrusive measure (i.e., census data for 7 years, each (X) for one year)

O = female education in China between 2009 and 2015 (MoE) and 2010 and 2016 (NBSC), each (O) for one year

With reference to the above design, it is assumed that it will be possible to refute or consolidate the claim that female education inequity is practiced procedurally and substantially in China. Although the design is quantitative and the above claim requires qualitative evidence too, the proposed hypotheses should help generating quantitative-based implications in regard to the above claim.

Procedure

In December 2017, we used two official websites to access data about female education in China, namely, the Website of the Ministry of Education (http://en.moe.gov.cn/) and National Bureau of Statistics of China (http://www.stats.gov.cn/english/). The generated data was based on screening the available data which provides male to female data of all the educational levels in the case of the first website. After checking the second website, it was observed that different variables could be generated about female education, and for this reason,

the two websites were used for the sake of more data from different sources. These generated indicators were mostly consistent with those in the Gender Statistics Database (http://eige.europa.eu/gender-statistics/dgs). Generally the data was about the enrolled students at all educational levels and the staff, both administrators and academics. The data from the MoE database included 44 variables for the students and 18 variables for educational personnel. However, the later shows only the percentages of the females for the 18 variables and that data was available only for 2009–2012 as compared to the students' data 2009–2015. Also it should be considered that the data is always one year ahead according to the two databases. For example, if the database mentions 2017, so the data represents 2016 and so on. For the NBSC, 12 variables were generated for the year 2016—showing different variables that are not available in the MoE database.

Results

Data analysis included two steps: first time series analysis and second descriptive and inferential statistical analyses. The time series analysis displayed variable patterns for the data reflecting female education in China. Figure 1A–C shows three samples of these patterns. The first pattern in Figure1A shows a normal pattern of normal increase in the numbers over the 7 years. The second pattern in Figure 1B shows a pattern where the numbers are moving reversely with high numbers in the first comparison year instead of the last comparison year. The third pattern in Figure 1C shows a pattern for high differences between female versus male in addition to a trend where the increase goes again from high to low.

As for the second step, the dependent variable is represented by the educational attainment (i.e. divided into 44 variables; the independent variable is represented by the gender (i.e. female and male). For the educational personnel, only 18 variable are presented between 2009 and 2012. 2016–2017 years are not provided but we included 2016 data using another database, namely NBSC. Minitab 18 and SPSS 20 were used to analyse the collected data. First, thirteen interval plots were generated to show possible differences between females and males in higher education attainment in thirteen variables and the results included:

1. Absolute differences between the means of males and females across 2009–2015 in favour of males as in the doctor's degree, master programs on job personnel, and short cycle courses in the web-based programmes;

2. Absolute differences in means in favour of the females as in short cycle courses in undergraduate programmes, normal courses, short cycle courses, and normal course; and

3. Exchangeable differences impacted possibly by the year as in the postgraduates, master's degree, undergraduate regular HEIs, normal courses, undergraduates in adult HEIs, and web-based undergraduates.

Second, thirteen main effects plots were generated to compare the differences among the means of senior secondary education attainment for thirteen variables and eight variables for the junior level and the results included:

1. Higher means for males in comparison to females as in the secondary education, senior secondary education, 12–year schools, secondary vocational education, adult specialized secondary schools, vocational high schools, and skilled workers schools;

2. Higher means for females in comparison to males as in regular specialized secondary schools;

3. Exchangeable ups and downs in means between males and females as in senior secondary schools, regular senior secondary schools, combined secondary schools, regular (high) schools, and adult (high) schools;

4. In most of the variables, the means of the male students are higher than those of the females with the exception of adult junior secondary schools yet only for the year 2010, a higher mean for females was recorded; and

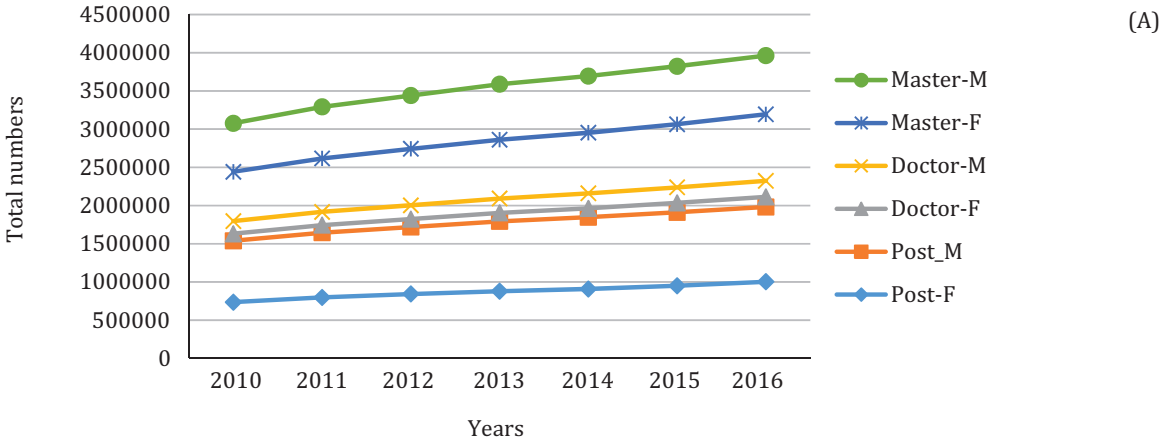
5. For the year 2016, using the NBSC database, 12 variables analysis indicated relatively equal means for both males and females with the exception of two variables for the migrant workers at both levels of enrolment, primary and junior—having higher means for the males.

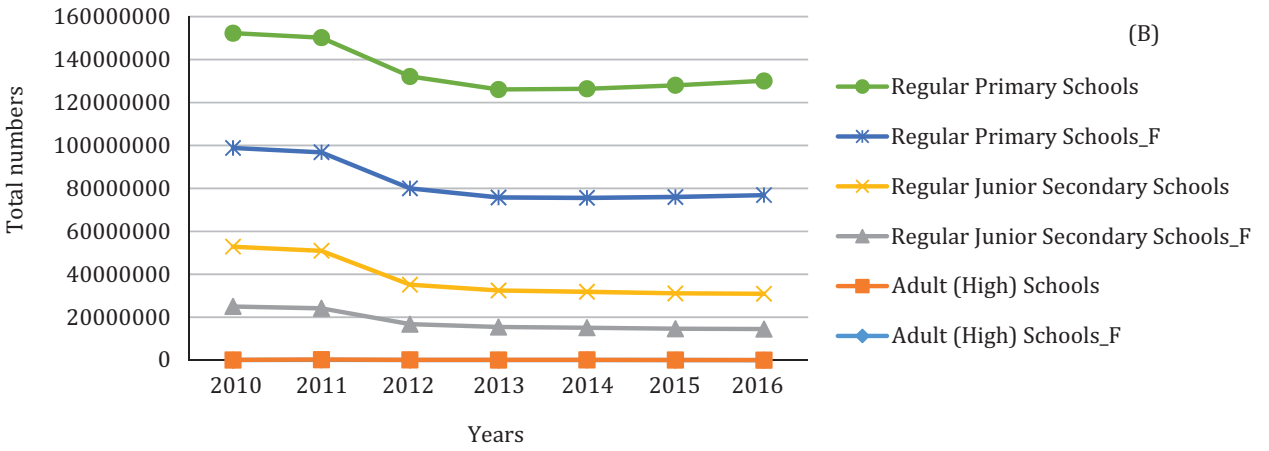
Third, to decide on whether the above reported differences were statistically significant or not, an independent t-test was run and the results showed four patterns of variances in terms of differences and significance (Table 1): either variables with significant differences for females/males, or insignificant difference for females/males with more frequency for males in both cases.

Discussion

The results of this study were clearly in agreement with the initial assumptions. Quantitatively reported indicators on female education equity and development in China between 2009 and 2016 showed variable statistical significant and insignificant differences between females and males in educational attainment. This variability among the indicators enhances the view that female education equity and development in China is neither 'gendered' as in (Zhang, 2009, p. i) nor is procedurally and substantively practiced as in (Wang, 2016).

Four findings can be presented supporting the above claim. First, quantitatively reported indicators showed inconsistent distribution of educational equality between females and males. In this regard, there are some female education indicators showing significant inequality like higher numbers of students in the vocational schools. Second, several indicators in the quantitative synthesis showed significant difference in favour of females (e.g. master's degree graduates, special education staff and preschool education staff). Third, relatively different numbers like indicated larger numbers of employed females in higher education (e.g. special education, preschool education, regular primary school). Forth, contradictory numbers were recorded. For instance, special education has larger number of male students but larger number of female staff. Consider also studies mentioning "Chinese women are significantly disadvantaged in returning to school compared with Chinese men" (Fan, 2017, p. 64) in relation to the Chinese Cultural Revolution; and another study stating "subtle and implicit mode of the participating teachers' contributions to gender socialization featured a male-centered hidden curriculum" (Chen & Rao, 2011, p. 115).





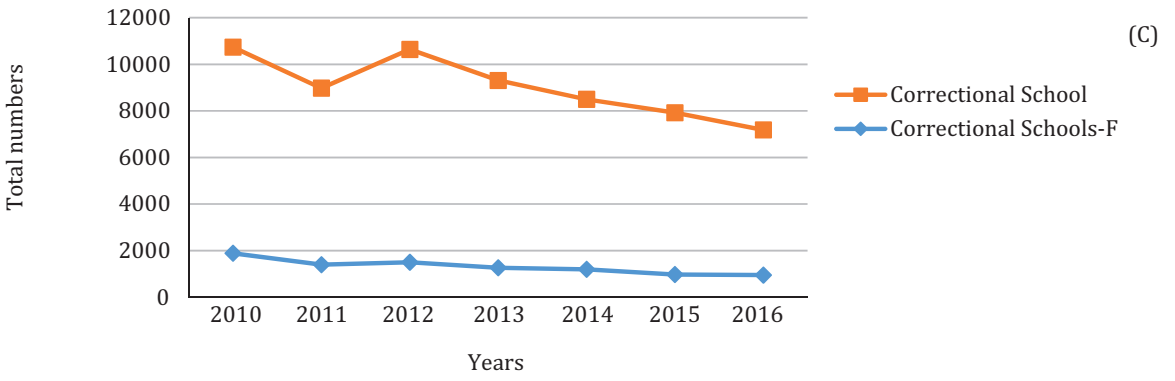


Figure 1 Time series analysis, selected samples for female education female versus male in China

Table 1 Two sample t-test results for female versus male educational attainment in China

Educational attainment variable	n	Minimum		Maximum		M		SD		*t*	DF	*p*
		F	M	F	M	F	M	F	M			
Postgraduates	7	736230	802186	1003110	977941	873742	903141	90826	63633	-0.70	12	.496***
Doctor´s Degree	7	91887	167063	132132	209895	110665	188435	14247	15828	-9.66	12	.000**
Master´s Degree	7	644343	635123	870978	768046	763077	714706	76704	48072	1.41	12	.183*
Undergraduate Regular HEIs	7	11350981	6369152	14161004	7509969	12772283	11897044	1029615	654590	1.90	12	.082****
Normal Courses	7	6286980	4586196	8619566	5287460	7597662	7070193	851153	413100	1.48	12	.166****
Short-cycle Courses	7	4998527*	2468517	5541438	2866346	5174621	4826851	214376	272147	2.66	12	.021*
Undergraduate in Adult HEIs	7	2847671	1014973	3664866	1197315	3298260	2653892	319646	155305	4.80	12	.000*
Normal Courses	7	1235484	1397486	1629977*	1669031	1465266	1105387	161106	70132	5.42	12	.000****
Short-cycle Courses	7	1612187	2348070	2064264*	3375544	1832994	1548505	176813	93529	3.76	12	.003*
Master Programs On-job Personnel	7	153908	266386	214335*	381751	187091	340911	25569	46889	-7.62	12	.000**
Web-based Undergraduates	7	2183373	1540259	3080818*	2245596	2795907	2969131	373295	385240	-0.85	12	.410***
Normal Courses	7	832592	11691562	1209322	12481477	1073369	997209	154569	125939	1.01	12	.332****
Short-cycle Courses	7	1350781	3672440	1883036*	4202943	1722538	1971922	221085	260326	-1.93	12	.077***
Secondary education	6	39195428*	44078975	46401245*	51677295	42074673	46925123	2899622	3072423	-2.81	10	.018**
Senior secondary education	6	18990049*	20710539	22245911*	24620149	20572473	22477877	1346281	1608287	-2.23	10	.050**
Senior secondary schools	6	11974052*	11714882	12259599*	12639629	12108088	12187287	112724	376877	-0.49	10	.633****
Regular Senior Secondary Schools	5	11939547*	7542012	12190235*	12524660	12043806	12045336	106109	321156	-0.01	8	.992****
Combined Secondary Schools	5	3668899*	333194	4075921*	477110	3822532	3884489	171502	216260	-0.50	8	.629****
Regular (High) Schools	7	7842760*	23320	12023567*	114969	9050596	9119069	1956335	2312579	-0.06	12	.953****
12-Year Schools	5	271554	8995657	378598	11980520	315442	393463	43767	58262	-2.39	8	.044**
Adult (High) Schools	7	20676*	3521849	149564*	4154588	65820	61791	41595	30458	0.21	12	.840***
Secondary Vocational Education	6	6994470*	823068	10072780*	1398017	8457753	10297223	1235579	1244138	-2.57	10	.028**
Regular Spec. Secondary Schools	7	3624837*	2344907	4622553*	3859569	4151863	3730467	380500	253259	2.44	12	.031*
Adult Specialized Secondary Schools	7	588612*	2271310	1144730*	3050904	902277	1145697	204838	208061	-2.21	12	.048**
Vocational High Schools	7	1820808*	23276221	3403763*	25535068	2560096	3002502	620818	600820	-1.35	12	.200****
Skilled Workers Schools	7	910091*	16403978	1253328*	27850604	1088646	2682378	136734	349557	-11.23	12	.000**
Junior Secondary Education	5	2018029*1	2880110	22726346*	3330035	20971573	23925266	1046477	925367	-4.73	8	.001**
Junior secondary schools	6	20034849*	23084651	24155334*	27057146	21334206	24249763	1638003	1577747	-3.14	10	.011**
Regular Junior Secondary Schools	7	14478394*	375152	24908523*	554375	17818565	19957913	4557484	5082321	-0.83	12	.423****
9-Year Schools	5	2376171*	2917473	2681814	3480524	2507027	3071253	113807	178899	-5.95	8	.000**
12-Year Schools	5	258597	2118	389444	17900	314894	450357	52788	72568	-3.38	8	.010**
Combined Secondary Schools	5	2534437	160457	3062562*	334926	2754899	3149025	215916	227612	-2.81	8	.023**
Vocational Junior Secondary Schools	6	1616*	45893652	16273*	53519318	6343	6996	5557	5968	-0.20	10	.849****
Adult Junior Secondary Schools	7	119674*	50292799	299061*	53454347	226419	254630	71564	65309	-0.77	12	.456****
Primary education	6	43979484*	45893652	46754987*	53519318	45438240	51162876	1108451	2761868	-4.71	10	.001**
Regular Primary Schools	7	43312688*	45521537	45964114	47436194	44942890	52171081	1090111	1260561	-11.48	12	.000**
Primary Schools	5	39477287*	4281088	41187775	5324977	40357169	46480355	804791	885507	-11.44	8	.000**
9-Year Schools	5	3497346	387286	4378713	560266	3870304	4733818	374135	440022	-3.34	8	.010**
12-Year Schools	5	265649	353306	397626	913179	323304	460466	54163	71212	-3.43	8	.009**
Adult Primary Schools	7	479377*	153283	1033394*	515462	710258	634489	205290	205502	0.69	12	.503***
of Which: Literacy Classes	7	1400*	6227	565345*	9138	281739	288440	172920	121603	-0.08	12	.935****
Correctional Work-Study Schools	7	954*	235536	1890*	314996	1313	7723	325	1034	-15.65	12	.000**
Special Education Schools	7	132490*	16240664	176744	23577181	146221	268059	16040	27088	-10.24	12	.000**
Preschool Education Institutions	7	13526031	635123	20561449	768046	17639488	20519046	2421641	2570654	-2.16	12	.052****

Note. Minimum= The minimum number doesn't represent the earliest comparison year (i.e. 2009/2010).*
Note. Maximum= The maximum number doesn't represent the latest comparison year (i.e. 2015).*
Note. p-value= Statistically significant for females. **= Statistically Significant for males. ***=Statistically insignificant for females. ****=Statistically insignificant for males.*

That said, there are four possible explanations for the above outcomes. First, female education should be approached in terms of relativity other than total equity. In other words, among 74 variables in the quantitative synthesis with different variables, no consistent agreement about the level of female education was recorded. There are some variables where equity is achieved, some males are more and some others where females are more. The call for [emancipation] or "elimination of the commercially based menarchal education of young girls" Morgan (as cited in Hufnagel, 2012, p. i) seems to be over exaggeration of the gender role and playing with social and cultural capitals be it in the East or West. This goes alike with stereotypes like over representation of men in sciences vice versa—making an intergenerational dimension of educational inequality with lower levels of education for women (Li, Sato, & Sicular, 2013).

Second, with reference to the National Plan 2010–2020 which proposes an equal development of education for all genders and society members by 2020, at least the analysed quantitative data indicates that there seems to be a progress on female education development in China between 2009 and 2016 towards the realisation of equal access to education to all citizens regardless of gender, ethnicity or geographical differences. We have seen in our quantitative synthesis that some variables were reported where either men are excelling women or women are excelling men. Nevertheless, this view doesn't seem to be fair for those who view educational equality as visible and invisible as in (Blumberg, 2009). In this regard, Unterhalter (as cited in Fennell & Arnot, 2007, p. 31) asserts "many continue to see the achievement of gender equality simply in securing equal numbers of girls and boys" in comparison to the realisation of gender equality "through policy that is deeply compromised by the inequalities of economic and political power". This last view particularly about the covert equality was observed during our data analysis. Put differently, (Ma, 2010) reported realised gender equity at the tertiary education level in 2009 as compared to 1999, which diverges with the claim that "differences in treatment disproportionately favored minority females over Han females in urban areas" (Ding, Li, & Myers, 2011, p. 700) and Han, Basu, & Chengdu, 2011) who reported impact of education earnings convergence in urban China between males and females with recorded impact by higher education degrees for females but for physical strengths for males. On the other hand, Wang (2013) reported fluctuating rates between males and females in terms of return to private investment in education in urban China. This argument keeps on where studies reported job dissatisfaction by women due to favoritism and being treated unfavorably (Ngo, Foley, Ji, & Loi, 2014). We also consider the view indicating "more educational investment should be allocated to disadvantaged groups and lower income groups; especially eliminating some institutional barriers such as the hukou system, unequal distribution of good quality educational resources" and ascertain "the greatest contributing factors to educational inequality involve the urban– rural and social stratification divisions" (Yang, Huang, & Liu, 2014, p. 2).

Third, comparative education studies support refuting the claim of procedural and substantive practice of educational inequality in China. Besides, these studies also support the reached findings in the quantitative synthesis for female education equity in China between 2009 and 2016, albeit, a fair number of indicators implied unequal numbers in favour of males that cannot be judged as procedural and substantive. For instance, when comparing Syria, India, and Romania as countries that need gender bias elimination of gender bias in textbooks (GBIT), China was reported as the highest in terms of Gender Parity Index for 2008 (0.98) for primary education and (1.01) for secondary education (Blumberg, 2009). Another study claimed with presented data from 1999–2007 "the gender ratio for primary school education in mainland China, Taiwan region and Turkey, is almost the same… the ratio of females in higher education is markedly lower than for males in both States" (Durak, Chang, Wang, & Zhao, 2011, p. 69).

Fourth, educational equality should normally yet reasonably fluctuate between odd and even numbers. Consider in relation to our results, the total population of females vice versa males in China. The population of females and males ranged from (648.03–674.56) for females and (686.47–708.15) for males between 2009 and 2016 (Statista, 2016). The gap between females and males has remained over 30 million. On one hand, this gaps gives an interpretation for the recorded higher numbers of male students in some variables. On the other hand, it raises the issue of whether this gap is biological and natural to have this difference between the two sexes. In this regard, Zhou, Wang, Zhou, and Hesketh (2012) raised the issue of sex-selective abortion, yet further investigation of this factor needs to be evidenced. If the one child policy was very strict, leading some people to preferably select this child to be a male, then no concrete evidence is available supporting this view, albeit, some studies attributed educational inequality to social and cultural factors among which is male preference. Further, when comparing the reported outcome, there seem to be supporting evidence for the progress of female education development. For instance, the reported statistics according to Human Development Reports, China is ranked 90 in the 2015 Human Development Index (HDI), Group 2 (medium to high equality achievements between men and women) Gender Development Index (GDI), and 37 for Gender Inequality Index (GII), with High Human Development. Considering the closest country to China in terms of population, India, the former seems significantly performing better than India—being ranked 131 for the HD, Group 5 (low equality), and 125 for the GII among the Medium Human Development countries. It will be certainly beyond logic to compare China—a country representing the highest population—to some developed nations in the Very High Human Development category (e.g. Norway, HDI=1, GII=6; Germany, HDI=4, GII=9; US, HDI=10, GII=43; UK, HDI=16, GII=28), or even to countries which are among the developing nations, yet, among the top richest countries and with very small population sizes (e.g. Qatar, HDI=33, GII=127; Oman, HDI=52, GII=54; Saudi Arabia, HDI=38, GII=50; United Arab Emirates, HDI=42, GII=46; Kuwait, HDI=51, GII=70; Singapore, HDI=5, GII=11) (United Nations Development Programme, 2016).

Conclusion and Recommendation

We conducted a quantitative synthesis based on census bureau data retrieved from two national databases, namely, the MoE and NBSC, to examine the claim that female education in China is (not) gendered and procedurally yet substantively practiced. The retrieved data for 7 years between 2009/2010 and 2015/2016 which included 76 indicators of female education—representing educational attainment in addition to female education personnel indicated variable results. The variability of these results helped to refute the claim that female education could be gendered—at least according to the presented evidence in this study. For instance, the statistical significance results showed four patterns: significance for male, significance for females, insignificance for males and insignificance for females. Although, the number of significant variables was relatively more for males, there were possible reasons for this including population, learners' preferences and so on. Thus, female education is relative and absolute equity might certainly hinder normal social, cultural and intellectual capitals, albeit, this might not please researchers who view female education in terms of visible and invisible female education inequity. Future research could benefit from the limitations encountered in this study to reach more plausible findings on female education equity in China. For instance, a systematic review could bring more detailed views on the nature of the reached quantitative findings on female education equity. Another solution could be conducting focused studies on variables representing either visible or invisible gender equity separately. However, epistemological approaches should be carefully selected to avoid both feminism-based and anti-feminism-based outcomes.

Conflict of Interest

There is no conflict of interest.

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