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RESEARCH ARTICLE

Race, sex and depression-free life expectancy in Brazil, 1998–2013

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Abstract: Depression brings a great burden of disease to Brazil. This study investigates depression-free life expectancy (DFLE) between 1998 and 2013 in the country. We used data from Brazilian National Household Survey, National Health Survey and Life Tables provided by the Brazilian Institute of Geography and Statistics considering individuals 30 years and older. DFLE by race and sex was calculated using the Sullivan method. We observed improvements in DFLE over time, for all race/color groups. In general, men had a smaller share of years lived with depression when compared to women within the same race groups. Compared to whites, blacks/ browns and people of other races/colors had the highest DFLE for both men and women. White women had the lowest percentage of DFLE. Blacks displayed better estimates of DFLE and lower number of years living with depression than whites, despite the evidence of worse health outcomes depicted in the literature. Further research is needed to understand the lower depression prevalence found for blacks that reflects directly into a higher DFLE.

Keywords: race; health inequalities; healthy life expectancy; depression-free life expectancy; Brazil

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1. Introduction

Brazil has witnessed a rapid and accentuated process of demographic transition. Mortality in Brazil declined significantly since 1940. This reduction in mortality levels was much more rapid than that experienced by developed countries. In Brazil, life expectancy has increased by 30 years between 1940 and 2000 (Carvalho and Garcia, 2003). Brazilian Demographic Census in 2010 indicated that life expectancy reached 73.8 years (IBGE, 2010).

Simultaneously, a process of epidemiological transition was also verified, characterized by the increase in the contribution of chronic and degenerative illnesses to the total number of deaths, which to a certain extent, substituted the contribution of infectious diseases. This new situation resulted in important changes in the profile of the Brazilian population, characterized by a greater prevalence and incidence of chronic-degenerative diseases.

Race plays a key role in determining health. Race as a social definition that captures the reflexes of historical and cultural processes that ultimately translate themselves into different aspects of people's health and even in health disparities observed

(Keppel, 2007). The importance of the relationship between health and race has been demonstrated through continuous investigation and inclusion of race and skin color as study variables in a plethora of studies (Barr, 2008; Williams and Mohammed, 2009). As a matter of fact, racial inequalities in different health outcomes are persistent, especially in countries where Afro descendants have experienced the disadvantages and burden of injustices derived from historical structural processes in societies, such as slavery and racism (LaVeist, 2005). As an example, in the United States, the life expectancy at birth for whites was 3.4 years higher than for African Americans in 2014. This racial difference was even higher in men, 4.2 years (CDC, 2016).

Brazil has an intense race mixing. The Brazilian Demographic Census in 2010 showed a country divided between whites and non-whites, with 47.7% whites skin color, 7.6% blacks, 43.1% brown (pardos), 1.1% Asians, and 0.43% indigenous (IBGE, 2010).

In Brazil, race is directly associated with the individual's socioeconomic situation. Non-whites face severe socioeconomic disadvantages when compared to whites (Souza, Ribeiro, and Carvalhaes, 2010). Brazilian black and brown populations are poorer and have a lower educational attainment. In the latest census, approximately 66.7% of blacks and browns did not receive any education, whereas only 31.3% of whites did not have any years of schooling; whites earned an average higher monthly income than blacks: about 54.8% of blacks and browns did not have income compared to 43.6% of whites (IBGE, 2010).

Racial disparities as measured by different health indicators exist and persist in the country. Nevertheless, understanding the role of different diseases and pathways in the disparities is still a major research gap in Brazil. Methodological limitations have been cited as obstacles to studies on race and health. For example, in disease-specific mortality rates by race, the fact that the numerator and denominator come from different data sources purportedly limits the results accuracy (Chor, 2013). Furthermore, difficulties emerge in the measurement of race. Although death certificates contain a question about the race of the individuals, it is generally poorly completed, thus failing to provide a faithful account of deaths by race. For that reason, it is difficult to estimate life tables for different race categories. Among studies with relatively completed race data, a city-specific study, using data with up to 81% of completeness of race/color categories, showed the existence of unequal mortality by race, with higher mortality from mental disorders and external causes in blacks (Fiorio, Flor, Padilha *et al*., 2011). Furthermore, in Brazil, another alleged problem is the race variability with which some individuals classify themselves. As in other countries, racial identity in Brazil is not immutable, and its validity and reliability are low (Chor, 2013).

Depression is a common mental disorder affecting people's mental health worldwide. It has a great burden of disease also in Brazil, especially for women where is the leading cause of burden of disease (Leite, Valente, Schramm *et al*., 2015). The under-diagnosis of depression is a serious health problem, particularly in countries such as Brazil in which many residents lack adequate access to healthcare services for diagnosis and treatment (Andrade, Wu, Lebrão *et al*., 2016). One study found that depressive symptoms affect one in seven Brazilian adults, that one in 12 people over the age of 18 have a major depressive disorder, that the pooled prevalence of depression, considering a recall period of one year was 8%, and that the prevalence of depressive symptoms, including different recall periods for each study, ranged from 5% to 28% (Silva, Galvao, Martins *et al*., 2014). Results from the 2013 Brazilian National Health Survey (PNS), a nationwide household population-based survey, whose data were obtained through in-home visits, indicated that the prevalence of self-reported diagnosis of depression in adults was 7.6% (Stopa, Malta, de Oliveira *et al*., 2015). The prevalence of depressive symptoms in women is estimated to be twice as high as in men (Silva, Galvao, Martins *et al*., 2014). Depression can be a serious condition and could impact several dimensions of a person's quality of life, work, functioning, and even lead to suicide in more severe cases (WHO, 2016).

There is no consistent pattern among international studies about which race has a higher prevalence of depression and which has a lower prevalence (Riolo, Nguyen, Greden *et al*., 2005). Moreover, few studies have focused on race differences in specific chronic diseases, such as depression, especially in developing countries.

Healthy life expectancy is a measure that combines morbidity and mortality information into a single index. It presents a similar concept to life expectancy, but refers to the average number of years of life that a person of a certain age can expect to live healthy, given prevailing morbidity and mortality rates in a particular age (Jagger, Hauet, and Brouard, 2001). Bone *et al*. (1998) point out that healthy life expectancy can be used to observe population health trends and to monitor the impact of health and social policies, and allow comparison between different populations and subgroups.

There is growing body of literature about healthy life expectancy in Brazil (Alves and Arruda, 2017; Andrade, Wu, Lebrão *et al*., 2016; Camargos, Perpétuo, and Machado, 2005; Campolina, Adami, Santos *et al*., 2013; Romero, Leite, and Szwarcwald, 2005; Tareque and Saito, 2017; Zimmer, Hidajat, and Saito, 2015), however, we have not identified studies that explore race differences in health expectancy considering depression (depression-free life expectancy) and no studies

have estimated the length of life with depressive symptoms by race over time in the population. The goal of this study is to investigate racial disparities in the trend of depression-free life expectancy over a 15-year period (1998–2013).

2. Data and Methods

The study used the cross-sectional household data from 1998, 2008 and 2013. Data came from two surveys, *Pesquisa Nacional por Amostra de Domicílios* (PNAD – Brazilian National Household Survey) and *Pesquisa Nacional de Saúde* (PNS – National Health Survey), and also from *Tábuas de Mortalidade* (Life Tables) from IBGE (Brazilian Institute of Demographic Geography and Statistics) (IBGE, 2014). PNAD is a population-based survey with national representativeness, held annually, to obtain information about the household, the individuals residing in the household, migration, education, labor and fertility characteristics. In 1998, PNAD included a health supplement in its questionnaire that is collected every five years, and the 2008 wave was the most recent available information. In 2013, the National Health Survey (PNS), also a nationally representative household-based survey was carried and collected health information. It also replaced PNAD's health supplement (IBGE, 2014).

We used prevalence data from the 1998 and 2008 PNAD and from the 2013 PNS. The prevalence of depression was estimated based on self-reported depression (as diagnosed by a health professional). The demographic variables were: age, sex, and race (white, blacks and browns collapsed as a single category, and others). The decision to collapse blacks and browns comes from the fact the differentiation between the two categories is difficult given the level of miscegenation encountered in Brazil. Another factor we considered in our analysis is the fact that the word used for Blacks is "pretos" and it is sometimes used as a racial slur (Chiavegatto Filho, Beltrán-Sánchez, and Kawachi, 2014). This connotation may lead people to self-declare themselves as "pardos" instead of "pretos".

We estimated the depression-free life expectancy (DFLE) for the Brazilian population in 1998, 2008, and 2013 by constructing life tables which combine mortality information and prevalence of chronic diseases, in this case, depression, as proposed by the Sullivan method (1971). The Sullivan method is the most widely one to estimate healthy life expectancy (Imai and Soneji, 2007) or disease-free life expectancy (Alves and Arruda, 2017).

The expected years with and without depression were calculated by applying the age- and sex- specific cross-sectional prevalence rates of the disease, respectively, to the person-years lived in different age categories derived from period life tables (Jagger, Hauet, and Brouard, 2001), as follows:

$$DFLE_x = \frac{\sum [1 - {}_n\pi_{xi}]_n L_x}{l_x} \quad (1)$$

and

$$LED_x = \frac{\sum [{}_n\pi_{xi}]_n L_x}{l_x} \quad (2)$$

where $DFLE_x$ is the average number of years that an individual will live without depression (healthy), starting from exact age x; whereas life expectancy with depression (LED_x) is the average number of years that an individual will live with the disease given the current age-specific prevalence and mortality scheme, starting from exact age x. ${}_n\pi_{xi}$ is the proportion with depression in age group x to $x+n$, which is the prevalence obtained based on the PNAD and PNS. ${}_nL_x$ is the number of person-years lived in age interval and l_x is the numbers surviving to age x. Both are obtained from the life table generated based on estimates provided by Mortality Reporting System. $1-{}_n\pi_x$ is a proportion without depression in age group x to $x+n$. $[1- {}_n\pi_x] * {}_nL_x$ is the number of person-years lived in age interval without depression. $[{}_n\pi_x] * {}_nL_x$ is the number of person-years lived with depression in age interval x to $x+n$. $\Sigma[1- {}_n\pi_x] * {}_nL_x$ is the total years lived without depression from age x onward. It was obtained by the sum of the all $[1- {}_n\pi_x] * {}_nL_x$ from age x until the last age group (e.g., 80 years or more in the present study). $\Sigma[{}_n\pi_x] * {}_nL_x$ is years lived with depression from age x onward (Andrade, Corona, and Lebrão, 2014; Jagger, Hauet, and Brouard, 2001).

The total life expectancy (TLE) at each age x, e_x , is calculated by dividing the total number of years lived from that age by the numbers surviving at age x. Life expectancy with and without depression was estimated by race and sex. All statistical analyses were performed with the aid of the STATA/MP for Windows version 15.0 (STATA Corp., Inc., College Station, TX) and Microsoft Excel 2016.

3. Results

Table 1 shows the prevalence of depression by race among the Brazilian population in 1998, 2008, and 2013. These data reveal that the prevalence of depression increased for total population in the period, regardless of sex and race. On the

Table 1. Prevalence of depression among adults in Brazil by race: 1998, 2008 and 2013

Sex	White			Black and Brown			Other Races and Colors		
	1998	2008	2013	1998	2008	2013	1998	2008	2013
Total	5.4	5.1	9.0	4.6	3.4	6.5	3.7	4.5	5.2
Men	3.2	2.8	5.2	2.7	1.8	2.9	2.7	3.1	2.7
Women	7.4	7.1	12.3	6.5	4.9	9.8	4.8	5.6	6.9

Source: PNAD, PNS, IBGE, 1998, 2008, and 2013.

other hand, there was a slight decrease in depression in 2008 for all groups, except for the other races category. For men of other races category, there was a decline in the proportion of depression between 2008 and 2013. Depression was most prevalent among whites over the period 1998-2013 for both sexes, followed by blacks and browns. It was observed that women had a higher frequency of depression than men for all races. Moreover, white women had the highest proportion of depression when compared to men and other color categories, in all the years. For white women, the prevalence of depression increased significantly from 1998 to 2013 (7.4% vs 12.3%, respectively).

In **Tables 2 and 3**, we present results for Total Life Expectancy (TLE) and Depression-free life expectancy (DFLE) - the estimated number of years lived without depression, by race/color categories and broken down by sex. TLE has increased for the total Brazilian population from 1998 to 2013 as well as for men and women, separately. Since we did not have reliable life tables for each race category separately, the life expectancy used in our calculations was the same for all race categories. Overall, we observed improvements in DFLE in the 15-period covered in our analyses, for all race/color groups.

Among white women (**Table 3**), at age 30, the life expectancy (LE) was 47.1 years in 1998 compared to a DFLE of 40.6 years in the same year, which means that, on average, they lived 6.5 years with depression disability (86.2% of the years were depression-free). If we consider the 15-year period from 1998 to 2008 and then to 2013, the percentage of DFLE, went from 86.2% to 87.8% and then down to 86.3%. When we consider their black and brown counterparts, the percentage of DFLE was higher and rose slightly from 87.3% in 1998 to 88.7% in 2013.

When we consider men at age 30, those of other races/colors had the highest percentage of DFLE in 1998, 95.9%, while blacks and browns had 94.2% of the life-expectancy free of depression. This result means that white men at age 30 in 1998, could expect to live 38.4 years free of depression; the corresponding figures were 38.6 years for blacks and browns and 39.3 years for "others"(**Table 3**).

Among older adults at age 60, white women had the lowest DFLE, which was 84.1% of the TLE in 1998; whereas black and brown men and men of other races/colors had the highest percentage of DFLE, which were 98.0% and 99.5%, respectively, in 2013. In general, men had a smaller share of years lived with depression when compared to women within the same race groups, except for the category of others in 2008. In that race/color category, women were expected to live 95.1% of their TLE free of depression, as opposed to men, 92.1% (**Table 3**).

Table 2. Total life expectancy (TLE) by sex in Brazil: 1998, 2008 and 2013.

Age	Total			Men			Women		
	1998	2008	2013	1998	2008	2013	1998	2008	2013
30	44.0	46.3	47.5	41.0	43.3	44.6	47.1	49.3	50.4
40	35.1	37.3	38.5	32.5	34.7	35.8	37.8	39.9	41.0
50	26.8	28.7	29.7	24.5	26.4	27.4	28.9	30.9	31.9
60	19.2	20.8	21.7	17.4	19.0	19.9	20.8	22.5	23.4
80	7.6	8.6	9.2	6.9	7.8	8.3	8.2	9.2	9.8

Source: PNAD, PNS, IBGE, 1998, 2008, and 2013.

Table 3. Depression-free life expectancy (DFLE) and percentage of years with depression-free years by race and sex among adults in Brazil: 1998, 2008 and 2013.

Age	White						Black and Brown						Other Races and Colors					
	1998		2008		2013		1998		2008		2013		1998		2008		2013	
	DFLE	%	DFLE	%	DFLE	%	DFLE	%	DFLE	%	DFLE	%	DFLE	%	DFLE	%	DFLE	%
Total																		
30	39.4	89.5	42.1	90.9	42.6	89.7	39.8	90.5	43.3	93.5	44.0	92.7	41.5	94.3	43.3	93.5	45.3	95.4
40	31.0	88.3	33.5	89.8	34.3	89.1	31.5	89.7	34.7	93.0	35.4	91.9	33.2	94.6	34.8	93.3	36.7	95.3
50	23.4	87.3	25.6	89.2	26.5	89.2	23.9	89.2	26.6	92.7	27.5	92.6	25.2	94.0	26.8	93.4	28.3	95.3
60	16.7	87.0	18.6	89.4	19.5	89.9	17.1	89.1	19.4	93.3	20.2	93.1	18.1	94.3	19.6	94.2	21.0	96.8
80	6.6	86.8	7.7	89.5	8.6	93.5	6.8	89.5	8.1	94.2	8.9	96.7	7.2	94.8	8.3	96.5	9.2	100.0
Men																		
30	38.3	93.4	41.1	93.6	41.9	94.0	38.6	94.2	41.7	96.3	43.3	97.1	39.3	95.9	41.3	95.4	44.3	99.3
40	30.1	92.6	32.7	94.2	33.6	93.9	30.4	93.5	33.2	95.7	34.8	97.2	31.4	96.7	32.7	94.2	35.7	99.7
50	22.6	92.2	24.7	93.6	25.5	93.1	22.8	93.1	25.2	95.5	26.8	97.8	23.5	96.0	24.7	93.6	27.3	99.7
60	15.9	91.4	17.8	93.7	18.4	92.5	16.1	92.5	18.1	95.3	19.5	98.0	16.7	96.0	17.5	92.1	19.8	99.5
80	6.2	89.9	7.2	92.3	7.8	94.0	6.3	91.3	7.4	94.9	8.2	98.8	6.9	100.0	7.3	93.6	8.3	100.0
Women																		
30	40.6	86.2	43.3	87.8	43.5	86.3	41.1	87.3	44.9	91.1	44.7	88.7	43.9	93.2	45.4	92.0	46.6	92.5
40	32.1	84.9	34.5	86.5	35.0	85.4	32.6	86.2	36.1	90.5	36.0	87.8	35.2	93.1	36.7	92.0	38.0	92.7
50	24.4	84.4	26.5	86.8	27.4	85.9	24.9	86.2	27.9	90.3	28.1	88.1	26.9	93.1	28.6	92.6	29.4	92.2
60	17.5	84.1	19.3	85.8	20.4	87.2	18.0	86.5	20.5	91.1	20.8	88.9	19.4	93.3	21.4	95.1	21.9	93.6
80	7.0	85.4	8.0	87.0	9.1	92.9	7.1	86.6	8.5	92.4	9.4	95.9	7.6	92.7	8.9	96.7	9.8	100.0

Source: PNAD, PNS, IBGE, 1998, 2008, and 2013.

DFLE: Depression-free life expectancy; %: percentage of depression-free years.

4. Discussion

This study estimated the depression-free life expectancy for Brazilian adults, in the years of 1998, 2008, and 2013 by age, sex and race. In fact, improvements in DFLE were observed over time for all race/color groups. Our study corroborates with previous research in Brazil whose findings show that from 2000-2010, life expectancy without depression increased among older adults in São Paulo (Andrade, Wu, Lebrão *et al*., 2016). This may reflect living more years with higher quality of life, less disability, and better health status (Reynolds, Haley, and Kozlenko, 2008). Whites generally displayed the lowest DFLE.

Our results showed that depression was much more pronounced among white middle-aged women (between ages 40 and 60). Depression occurs most frequently in women aged 15 to 45 (Patten, Wang, Williams *et al*., 2006; WHO, 2017). At ages older than 65 years, both men and women show a decline in depression rates, and the prevalence becomes similar between them (Bebbington, Dunn, Jenkins *et al*., 2003; Patten, Wang, Williams *et al*., 2006). This age pattern is likely linked with the higher rate of antidepressant use among mid- or old-age adults, which suggests that young adults with depression may not always receive antidepressant treatment until many years after the onset of illness (Albert, 2015).

Depression has a great burden of disease in Brazil, especially for women. Our finding that the lower DFLEs were found in women than in men across all race/color groups supports such an argument. Gender is a critical determinant of mental health and mental illness. Depression is not only women's most common mental health problem but may be more persistent in women than men (WHO, 2017). Women had a higher prevalence of most affective disorders and non-affective psychosis and men had higher rates of substance use disorders and antisocial personality disorder (Kessler, McGonagle, Zhao *et al*., 1994). Women also have significantly higher rates of post-traumatic stress disorder (PTSD) than men (Kessler, Sonnega, Bromet *et al*., 1995). A comprehensive review of general population-based studies in the United States of America, Puerto Rico, Canada, France, Iceland, Taiwan, Korea, Germany, and Hong Kong, reported that women predominated over men in lifetime prevalence rates of major depression (Piccinelli and Homen, 1997).

Many elements in women may contribute to depression, including genetic and, biological factors, premenstrual dysphoric disorder, postpartum depression, postmenopausal depression, and anxiety that are associated with hormonal changes and could contribute to the increased prevalence in women. The fact that increased prevalence of depression correlates with hormonal changes in women, particularly during puberty, prior to menstruation, following pregnancy and at perimenopause, suggests that female hormonal fluctuations may be a trigger for depression (Albert, 2015). Social factors may also lead to higher rates of clinical depression among women, including stress from work, family responsibilities, economic pressures, unemployment, the roles and expectations of women and increased rates of sexual abuse and poverty. Another argument widely cited to explain gender differences is that women would be more likely to identify symptoms and seek help than men (Andrade, Viana, and Silveira, 2006).

In Brazil, race/color is directly associated with the individual's socioeconomic situation. As blacks and browns face severe socioeconomic disadvantages when compared to other racial categories, it is possible that they seek and use healthcare services less frequently and are less likely to be diagnosed. On the other hand, evidence suggests that blacks are somewhat more likely to be in better health than whites in advanced ages because blacks have a higher mortality rate at younger ages, leaving behind a heartier group of survivors (Jackson, Hudson, Kershaw *et al*., 2011). According to Albert (2015), the differential risk may primarily stem from biological sex differences and depend less on race, culture, diet, education and numerous other potentially confounding social and economic factors.

When compared to white men, black and brown men and men of other skin colors had higher average time of depression-free survival for all ages and in the entire period we studied. This result may be due to lower levels of depression diagnoses among them. This issue has been brought up in the literature in the United States, where studies have identified that black men do not usually seek routine medical care and could, in many instances, not be fully aware of any health issues, including depression (Ware and Livingston, 2004). Socioeconomic disparities are at the heart of racial inequalities in health in Brazil. Furthermore, racial discrimination and its impact on health are intimately related to these inequalities (Chor and Lima, 2005). Therefore, lower levels of health care seeking behavior could be related to racial discrimination. A comparative study between Brazil and the United States has shown that in both countries, black men report more discrimination than white men/women or black women (Bugard, Castiglione, Lin *et al*., 2017).

One big limitation of the present study is the application of cross-section data, which does not include the exposure time in the status of depression and dynamics in transitions of depression. Longitudinal datasets may improve this methodological issue. Also, the limited availability of research about race and depression at the population level in Brazil hinders the comparison of findings in other studies. Furthermore, we acknowledge that not using race-specific life tables (as they do not exist for Brazil) may have created biased estimates in results. We classified people into one of three mutually exclusive racial/ethnic groups, which may prevent comparisons with studies involving other categorizations. The small

sample size of other races and colors may be also a concern about the reliability of their low depression prevalence at high ages. Another difficulty is to compare this study with international studies that present a quite different definition and classification of race given their historical and contextual factors. An additional limitation refers to the use of secondary data, which may affect our results. Depression prevalence rate estimates could be biased, especially for small populations as other colors categories in Brazil, by underreporting of self-reported depression, age misreporting, lack of race-specific depression prevalence information and race misclassification, considering the problem of the classification variability of race/skin colors in Brazil. Finally, it is important to emphasize that our data from two different surveys (PNAD and PNS), which may affect comparability of depression prevalence due to different sampling method. However, we are confident that such an issue should be minor as both are nationally representative and questions related to depression in these two surveys are similar.

The present study contributed to a better understanding of depression by race in the Brazilian population using of the last three nationally representative household surveys and reveal areas where advances still need to be made to achieve the goal of reducing disparities. Our study has implications for policy and for future research. Regarding research, the method applied here can be used in subsequent studies to shine light on the factors producing gaps between races and depression within Brazilian regions as well as between races and other chronic diseases groups in the country.

5. Conclusions

This study demonstrated changes in HLE related to depression in the period between 1998 and 2013. For the most part, LE and DFLE increased and the difference between the two estimates decreased, indicating that the number of years lived with depression went down in the study period. We observed differences between men and women and among race groups. Paradoxically, blacks displayed better estimates of DFLE than whites, which goes against our expectation that blacks would be far worse than whites, granted that they have worse health outcomes than whites in a variety of other indicators in Brazil. Further study is needed to understand the lower depression prevalence found in blacks that reflects directly into a higher HLE.

Authors' Contributions

LCA and CP originated the study and contributed to the study design, analysis, writing and revisions of the article. This final version was approved by both the authors.

Ethics

This paper used publicly available data (PNAD and PNS) with no personal identifiers and therefore is in compliance with the Brazilian Research Ethics Resolution 466/12 (CEP/CONEP) that deems this kind of research exempt from human subjects review.

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Conflict of Interest

The authors declare that they have no competing interests.

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RESEARCH ARTICLE

Four decades of transition to first marriage in China: Economic reform and persisting marriage norms

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Abstract: This study draws on three waves (2012, 2013, and 2015) of pooled data from the China General Social Survey to examine two major dimensions of the transition to first marriage among four cohorts of youths, i.e., the transition tempos and the homogamy patterns. Key findings include: (1) There is no evidence of systematic delays in family formation among cohorts coming of age after reform, albeit moderate cross-cohort heterogeneity. Two cohorts are identified for their unique trajectories: The Cultural Revolution cohort with a relatively protracted transition process and the late reform cohort with a rather condensed marriage formation pattern, (2) respondents who belong to older cohorts, who are men, who have received higher education and hold urban *hukou* have lower risk in entering first marriage by a certain age, and (3) I recorded steady growing strengths of homogamy over cohorts, with the Φ parameters rising from 0.42 for the Cultural Revolution cohort to 0.56 for the late reform cohort. The overall message is that four decades of rapid economic development in post-reform China have failed to weaken persisting marriage norms and practices among young people, contrary to well-documented empirical evidence from many other national contexts. I ruminate on potential institutional and cultural mechanisms underlying such an intriguing phenomenon.

Keywords: China; economic reform; marriage timing; homogamy; transition to adulthood; norm

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1. Introduction

The tension has never been higher in Chinese youths' transition to marriage since the economic reform initiated in the late 1970s, due to entanglement of and contradictions in modernization of individual pursuits, dramatic social changes, shifting state policies and remaining Confucian familist traditions. First, rapid urbanization and industrialization have restructured the economic profile of the population, where individuals spend longer years on skills training or formal education before entering the labor market. A notable trend is women's increasing educational attainment and formal employment in the context of educational expansion (Treiman, 2013; Yeung, 2013), which exerts a considerable shock to the Confucian patriarchal, patrilineal, and patrilocal family ideal. Second, with the state's retreat from welfare provision for a large segment of the population, the social function of the family in childcare, elderly care, and other pragmatic areas has been strengthened, hence the revival of traditional gender discourses and family values (Jacka, 1997. p. 42). Third, despite sporadic evidence showing growth in divorce rate (Wang and Zhou, 2010) and higher personal autonomy in marriage decisions as stipulated by successive marriage laws (Davis, 2014), liberalization of social attitudes toward sexuality in "a sex revolution" (Pan, 1994), near universal, and early marriage still holds as the norm in the Chinese society (Ji and Yeung, 2014).

How do young adults in China navigate their transition to marriage among interweaving social, structural, and cultural forces as described above? What are the implications of

their trajectories for the society at large? In this paper, drawing on pooled data from the 2012, 2013, and 2015 waves of the China General Social Survey (CGSS), I examined two major dimensions of youths' transition to first marriage, namely the tempo (i.e., "when do they marry?") and the status composition between couples (i.e., "who marry who?"). By contextualizing the marriage transition patterns of different birth and marriage cohorts in China's broad social, institutional, and economic changes, I analytically unpacked the heterogeneity of marriage contracted over four decades to unfold the changes and continuities in youths' entry to first marriage.

The reminder of this paper is structured as follows. The second section portrays the broader social context of the study, where I focused on major historical events that could shape young people's lives. This is followed by a literature review section. Successive sections present the data and key findings. Finally, I concludes the paper with a discussion of social and policy implications and suggestions for further research.

2. Research Context

I created four birth cohorts to examine the tempo of Chinese youths' transition to first marriage, which largely corresponds to four marriage cohorts for the analysis of marriage homogamy trends.

2.1. The Cultural Revolution cohort

Born between 1946 and 1955, this cohort experienced a considerable interruption in their life course transitions by turbulent political and economic experiments in the Mao era. Their childhood years were characterized by political instability and severe material deprivation in the Great Leap Forward and Great Famine. Their adolescence and early adult years were swept by the 10-year Cultural Revolution where the national education system was nearly stalled, over 17 million urban teenagers were sent down to rural areas for "reeducation," and their economic life, to a great extent personal life, was controlled by collective organizational units such as work units or communes (Bernstein, 1977). While the new marriage law released in 1950 and progressive state propaganda exemplified in the slogan of "women holding up half of the sky" brought progressive elements to their marriage contraction in terms of gender dynamics, the turbulent political and economic environment disrupted the transition-to-adulthood processes for this cohort (Hung and Chiu, 2003).

2.2. The early reform cohort

The second cohort, born between 1956 and 1965, spent their childhoods at least partially during the Cultural Revolution and came of age as the country shifted the gear toward economic liberalization. During their young adult life, the state ideology experienced a drastic shift, from the excessive political repertoire of class struggle to the more pragmatic depoliticization of ordinary life (Jacka, 1997. p. 40). Economic development was held as the "hard truths" (*ying daoli*), and the educational system resumed its normalcy. Two family policies that could potentially affect their transition to adulthood were promulgated, i.e., the one-child policy and the revised marriage law which lifted the minimal legal marriage age to 20 for females and 22 for males.

2.3. The mid-reform cohort

The mid-reform cohort (1966–1975) reached adolescence and early adulthood when China fully adopted the export-oriented economic model after Deng Xiaoping's famous southern tour in 1992. Economic development was fast, mass education was promoted (i.e., the promulgation of the 1986 Compulsory Education Law), and a growing private economy attracted a small segment of skilled professionals and massive migration flows of low-skilled laborers from rural hinterland to coastal cities. Although this period was featured with general improvement of living standards and economic opportunities, social inequalities such as regional disparities induced by the "coastal development strategy" (Yang, 1991), urban-rural divide induced by urban-biased developmental policies (Yang and Cai, 2000), and income inequality (Xie and Zhou, 2014) rose rapidly. This could have tremendous implications for youths' marriage formation patterns.

2.4. The late reform cohort

Born in greater economic prosperity since the late 1970s, the last cohort, some still in their 20s, simultaneously enjoyed greater opportunities and faced heightened pressure in adolescence and young adulthood. Growing up in a relatively low fertility context induced by the stringent anti-natal one-child policy, they are well provided for and with better educational chances, given that higher education has been expanded since 1999. Statistics from the UNESCO show that, between 1990 and 2015, youth literacy rate (aged 15–24) in China almost reached 100%, with a convergence for both the

genders (Huebler and Lu, 2012). As the country becomes more integrated in the global economy after the World Trade Organization (WTO) access in 2001 and consumerism takes root in everyday life, youths meet unprecedented economic pressure to tick their adulthood markers such as marriage and childbirth. Steeper social stratification along the lines mentioned above could create differential levels of stress for different youth groups in their marriage formation.

3. Literature Review

3.1. Entry into first marriage

During the past two decades, in a general trend of a "less orderly and more protracted" transition to major milestone events of adult life for youths in Western industrialized societies (Furstenberg, 2010), researchers have documented increasing rates of delayed marriage or non-marriage (e.g., in Goldstein and Kenney [2001] and in Billari and Liefbroer [2010] for European countries). Some researchers attribute such social changes to macro-level structural constraints that impose barriers for youths to acquire the otherwise aspired marriage formation, including lengthy formal education and skills training, unstable labor market, and growing financial needs to settle down among popular consumerism. Others turn to shifting gender dynamics as an explanation. According to Becker's (1981) gender role specialization model, better-educated women with more employment opportunities find marriage less appealing than their lower-educated counterparts. Oppenheimer's (1988) preference entry theory posits that higher-educated women could afford more time to choose ideal partners. Scholars of the second demographic transition, however, underscore the ideational changes that lead to deinstitutionalization of marriage and decoupling of marriage and childbirth in these societies (Lesthaeghe, 2010). Sociologist Cherlin (2004) famously declared "the deinstitutionalization of American family," where the meaning of marriage has been redefined with a focus on emotional satisfaction, personal choice, and self-development, due to long-term cultural and material trends in America.

Although scholars observe an overall "delayed but orderly" pattern in transition to adulthood (Furstenberg, 2013), given diverse economic, cultural, and institutional contexts in this region, paths of Asian youths' transition to marriage are heterogeneous. For example, Japan has seen a steady rise of delayed marriage and non-marriage to a level comparable to that in industrialized Western societies (Raymo, 1998; 2003). In South Asian countries such as India and Nepal, however, the average age of first marriage remains low (Yeung and Alipio, 2013), where the family may play a significant role in facilitating women's negotiation of marriage and education (Ji, 2013). In the case of China, Yeung and Hu's (2013) analysis of five birth cohorts who come of age from early communist years until the post-reform era finds neither substantial delay of nor retreat from marriage. Similarly, Tian's (2013) exploration of CGSS data documents no significant cohort differences (between the 1970s birth cohort and the 1960s cohort) in marriage timing, despite a salient age-specific education effect: Higher education encourages men's but reduces women's marriage odds at older ages. Piotrowski *et al.* (2016) further unpacked the gendered transition patterns by rural/urban divide, revealing that higher education is negatively associated with rural women's marriage chances, while such a relationship does not exist for urban women's marriage transition, probably due to modernizing effects. Ji and Yeung (2014) reported regional variations in marriage prevalence and timing, with those living in the eastern and urban areas entering marriage later, but almost all women and over 95% of men being married by 35–39. Such patterns are accompanied and compounded by the country's unique contours of change and continuity in legal, structural and ideational contexts. First, the 1950 Marriage Law and its revised version in 2001 have brought about a trend of privatization of marriage (Davis, 2014). Second, an unbalanced sex ratio (Poston and Glover, 2005; Trent and South, 2011) and gender discrimination in the labour market (Zhang, Hannum, and Wang, 2008) implicate gendered transitions to marriage. Third, increasing educational homogamy (Han, 2010) and remaining parental involvement in marriage decisions (Riley, 1994) coexist. Fourth, there emerge paradoxical aspirations for traditional family ideals and personal freedom under the joint influence of state regulations, traditional ideals and Westernization among youths (Yeung and Hu, 2016).

3.2. Assortative marriage

Besides the marriage formation tempo, the question of "who marries who" is also an indicator of social dynamics in particular societies. Homogamy, whether measured by socioeconomic status or other ascriptive factors, leads to social closure where boundaries are maintained and inequalities escalate (Mare, 2016). A study by Smits *et al.* (1998) found an inverted U-curve relationship between the level of economic development and educational homogamy. They also reported the higher levels of educational homogamy in Catholic, Muslim, Confucian, and mixed Catholic/Protestant countries. Replicating the above study, Raymo and Xie's (2000) analysis of data from China, Japan, Taiwan, and the United States

partially supports the inverted U-curve relationship theory but disputes the argument that educational homogamy is stronger in Confucian societies. With data from 10 Asian societies, Smits and Park (2009) revealed that, rather than an inverted U-curve relationship, there is a positive linear relationship between educational homogamy and economic modernization.

Scholars report mixed findings on the homogamy patterns in China. For example, Xu, Ji, and Tung (2000) examined the homogamy patterns across three marriage cohorts in two cities, revealing persistent salience of homogamy and trade-off between social and political status characteristics in mate selection. Song's (2009) analysis of a representative data of urban residents, however, shows significant evidence of weaker homogamy among the Cultural Revolutionary marriage cohort. However, Han' s (2010) analysis of the 2000 China Population Census data indicates that, since the early 1980s, homogamy rates have seen steady growths for two decades, albeit fluctuations in the rural sample. This is supported by Xu, Li, and Yu (2014) finding based on China Family Panel Studies data, which documents increasing educational homogamy in China. More recent evidence reveals more nuances if accounting for the effects of gender, educational level, and *hukou* status. According to Qian and Qian (2014), the increasing educational attainment of urban females has a squeeze effect on their marital prospects: While marriage rates for females who received less than college education are higher than those for males, college-educated females have lower marriage rates than their male counterparts.

Below I identify two research gaps in existing literature. First, these two dimensions of the topic, i.e., the timing of marriage and the homogamy patterns could and should be incorporated in a systematic study of youths' marriage behaviors, rather than in two separate bodies of literature. For one thing, considering the relatively low rates of divorce and cohabitation which largely functions as a transition to legal marriage (Yu and Xie, 2015a) in China, I argued that the homogamy patterns of first marriages could approximate the general conditions of all marriages. That is, to study homogamy patterns of first marriages among young adults lends important insights to our understanding of family formation and social stratification in China at large. For another, from the perspective of youth studies, knowledge of both young people's marriage timing and the patterns of their spouse selection yields a holistic picture of the changes and continuities in the institution of marriage for generations of youths, which has ample theoretical and practical implications. Second, as described above, while many previous projects employed cohort study as the method to investigate how sociopolitical contexts affect individual life, in the study of youths' transition to adulthood after reform, with a few exceptions (e.g., Yeung and Hu, 2013), rarely do researchers distinguish different stages of economic reform. With the velocity of social change in post-reform China, lumping all those who come of age after 1978 together could be analytically erroneous. Therefore, a more fine-grained cohort schema to capture different stages of reform is recommended. In this analysis, I drew on three repeated cross-sectional data from CGSS to investigate the marriage formation of four cohorts of young adults in different historical contexts. Specifically, I addressed two major research questions: (1) What are the patterns of marriage timing among Chinese youths over different birth cohorts? And (2) What are the trends of assortative marriage in across different historical periods?

4. Data and Methods

4.1. Data and sample

To address the research questions above, I analyze pooled data from the 2012, 2013, and 2015 waves of the CGSS, which is a national representative household survey with stratified samples of respondents aged 18–69, drawn from 31 provinces/districts (excluding Taiwan, Hong Kong, and Macau) (see details in CGSS, 2010). This second cycle is preceded by an earlier cycle between 2003 and 2008 which yielded four waves of data publicly available. Surveys conducted in this cycle cover about 12,000 households in each wave, collecting comprehensive information on respondents' life history, family composition, education, social attitudes, employment conditions, and social networks, hence allowing systematic analysis of marriage patterns among subgroups across birth cohorts.

Since each of the CGSS 2012, 2013, and 2015 datasets includes detailed information on respondents' life history and marriage behaviors, I pooled these data to systematically examine the patterns of Chinese youths' transition to first marriage. I used the survey year as a dummy variable in the Cox hazard model to control for potential effects of the interview time on the outcome variables. To analyze youths' first marriage timing, I included 27,887 respondents (9,760 from the 2012 wave, 9,202 from the 2013 wave, and 8,925 from the 2015 wave), who were born in 1946–1993 and were at least 22 years old at interview, which is the legal age threshold for all Chinese citizens since 1980 (The National People's Congress, 1980). I excluded an earlier cohort born in 1936–1945 in the analysis due to potential sample selectivity resulted from high mortality rates in elderly populations (Lindenberger, Singer, and Baltes, 2002). As such, the sample covers

four birth cohorts corresponding to the described four social-historical periods, representing those born in 1946–1955, 1956–1965, 1966–1975, and 1976–1993, respectively, with a relatively even distribution of each cohort (Table 1). In data presentation, I showed descriptive statistics of the sample by gender and *hukou* origin. To further explore respondents' age at first marriage, I conducted Kaplan–Meier survival analysis and Cox proportional hazard analysis with the sample restricted to those aged 30 and above (n = 23,253). The rationale behind this sample restriction is that, to be able to observe the full tempo of transition to first marriage of a cohort, we need to have an observation frame including the full range of their marriage active years, which may last from their late teens until late 30s. In the case of China, previous research indicates that, by the age of 30, the majority have married (Ji and Yeung, 2014; Tian, 2013). As such, using age 30 (relative to 35 or 40) as the cutting point in this analysis allows us to not only preserve the biggest sample size but also observe the momentum of entry to marriage among youths, particularly of the youngest cohort.

The data for further analysis of homogamy patterns among married couples were constructed in two steps. First, I coded four first-marriage cohorts based on the reported years of respondents' first marriage formation, excluding those who had never married (n = 1,743, 7.5%), those who were remarried (n = 465, 2%), those who were separated or divorced (n = 628, 2.7%), or those who were widowed (n = 930, 4%). The rationale of focusing on first marriage unions is two-folded. For one thing, the substantive topic in this paper concerns transition to first marriage as a marker of adulthood status attainment. However, in cases of remarriage, divorce, or widowhood, we cannot guarantee valid information pertaining to first marriages. For another, given that the majority of reported marriages in the data are first-time marriages (90.2%), which reflects a relatively low proportion of divorce. This is likely to introduce a moderate but not substantial level of upward bias in the estimates of homogamy patterns (Mu and Xie, 2014). In the second step, I compiled a couple-education profile data using respondents' reports of their own and spouse's educational attainment. After list-wise deletion of missing data (n = 147), we obtain a final analysis sample with 19,340 couples. I performed log-linear and log-multiplicative layer effect analysis (Xie, 1992) to examine the strength of educational homogamy across historical periods.

4.2. Measurement

4.2.1. Dependent variables

In the analysis of marriage timing, the dependent variable is the age at marriage, which was calculated from two variables in the original data: Respondents' year of birth and their reported year of marriage (the latter minus the former). In homogamy analysis, I employed a four-level educational categorization to identify couples' educational profiles: Primary School or less, junior middle school, high school, and college or above.

4.2.2. Covariates

Respondents' birth cohort and marriage cohort are represented as multiple dichotomized variables (1 = yes and 0 = no). The three measures of family background were coded as follows: *hukou* origin (1 = urban *hukou*); father's education (1 = illiterate and primary school, 2 = junior middle school, and 3=high school and above), and employment status during respondents' adolescence (1 = full-time employed, including those who had "stable employment," who held a position in family businesses, who were business owners, and who retired from stable employment with benefits; 2 = farming; and 3 = others, including a variety of vulnerable job situations, such as migrants, temporary laborers, laid-off workers, and those who were economically inactive or lost earning capacities).

Demographic variables include dichotomous measures for gender (male vs. female) and ethnicity (Han vs. non-Han). Dummy variables as indicators of geographic regions (east, central, west. and northeast) were controlled for in Cox models to account for the regional heterogeneity of marriage patterns (Ji and Yeung, 2014). As mentioned earlier, dummy variables of the three survey years were constructed to control for potential effects of survey time on outcome variables.

5. Results

5.1. Summary statistics

Table 1 presents the weighted descriptive statistics for the sample by *hukou* status and gender. Respondents' educational attainment varies greatly by the intersection of their *hukou* status and gender, with rural females receiving lowest education (5.55 years of completed education; 6% attended college or higher), urban males receiving the highest (12.02 years; 37% attended college or above), and a glaring 6.5-year gap between them, reflecting the long-term gender inequality in education among the Chinese population until recent cohorts (Treiman, 2013). If breaking down the educational measure

Table 1. Weighted summary statistics (sample: Aged 22 or above).

Variables	All respondents		By *hukou* and gender			
	n	Mean	Rural female	Rural male	Urban female	Urban male
Age	27,887	46.9 (0.09)	46.8 (0.16)	47.4 (0.17)	46.7 (0.21)	46.4 (0.21)
Ethnicity (Han=1)	27,854	0.92 (0.00)	0.90 (0.00)	0.91 (0.00)	0.94 (0.00)	0.95 (0.00)
Birth cohort	27,887					
1946–1955	6,274	0.25 (0.00)	0.24 (0.01)	0.27 (0.01)	0.25 (0.01)	0.25 (0.01)
1956–1965	6,629	0.25 (0.00)	0.25 (0.01)	0.24 (0.01)	0.25 (0.01)	0.27 (0.01)
1966–1975	7,182	0.24 (0.00)	0.27 (0.01)	0.25 (0.01)	0.22 (0.01)	0.20 (0.01)
1976–1993	7,802	0.26 (0.00)	0.25 (0.01)	0.24 (0.01)	0.27 (0.01)	0.29 (0.01)
Education	27,862					
≤Primary	9,060	0.33 (0.00)	0.56 (0.01)	0.39 (0.01)	0.13 (0.00)	0.09 (0.00)
Middle-high school	14,075	0.49 (0.00)	0.38 (0.01)	0.54 (0.01)	0.55 (0.01)	0.54 (0.01)
≥College	4,727	0.18 (0.00)	0.06 (0.00)	0.07 (0.00)	0.32 (0.01)	0.37 (0.01)
Years of schooling	27,862	9.18 (0.03)	5.55 (0.06)	8.23 (0.05)	11.36 (0.06)	12.02 (0.06)
Family SES						
Urban *hukou*	27,871	0.41 (0.00)	0	0	1	1
Father's education	26,590					
≤Primary	18,867	0.71 (0.00)	0.81 (0.01)	0.82 (0.01)	0.56 (0.01)	0.56 (0.01)
Junior middle	4,294	0.16 (0.00)	0.13 (0.00)	0.12 (0.01)	0.20 (0.01)	0.20 (0.01)
≥High school	3,429	0.13 (0.00)	0.06 (0.00)	0.06 (0.00)	0.24 (0.01)	0.24 (0.01)
Father's employment status	27,468					
Full-time	8,730	0.33 (0.00)	0.14 (0.00)	0.14 (0.00)	0.62 (0.01)	0.61 (0.01)
Farming	15,172	0.53 (0.00)	0.74 (0.01)	0.74 (0.01)	0.23 (0.01)	0.24 (0.01)
Others	3,566	0.13 (0.00)	0.12 (0.00)	0.12 (0.00)	0.15 (0.01)	0.15 (0.01)
Region						
East	10,583	0.38 (0.00)	0.29 (0.01)	0.28 (0.01)	0.52 (0.01)	0.51 (0.01)
Central	6,412	0.23 (0.00)	0.29 (0.01)	0.27 (0.01)	0.16 (0.01)	0.17 (0.01)
West	6,692	0.24 (0.00)	0.30 (0.01)	0.32 (0.01)	0.14 (0.01)	0.15 (0.01)
Northeast	4,200	0.15 (0.00)	0.13 (0.00)	0.13 (0.00)	0.18 (0.01)	0.17 (0.01)
Survey year						
2012 wave	9,760	0.34 (0.00)	0.33 (0.01)	0.33 (0.01)	0.36 (0.01)	0.36 (0.01)
2013 wave	9,202	0.33 (0.00)	0.33 (0.01)	0.33 (0.01)	0.34 (0.01)	0.34 (0.01)
2015 wave	8,925	0.32 (0.00)	0.34 (0.01)	0.34 (0.01)	0.30 (0.01)	0.29 (0.01)

by birth cohort, we see that gender gaps in both rural and urban contexts are increasingly narrowed (results not shown). For example, in the earliest cohort (1946–1955), the gap in average years of education between rural females and rural males is about 2.6 years (3.5 vs. 6.08) and between urban females and urban males is 1.3 years (8.76 vs. 10.08). Among the youngest cohort (1976–1993), the gaps are 0.75 and 0.12 years in rural and urban groups, respectively. Despite the narrowing gender gap in years of schooling, large gaps exist between rural and urban respondents' college attendance rates: About 20% of rural men and women received at least college education, while almost 70% of their urban counterparts were college graduates.

Family background indicators also exhibit pronounced urban-rural divides, due to the deep-entrenched *hukou* system. Regarding father's education, about 80% of rural respondents' fathers only attended primary school or less, a rate 25% higher than their urban counterparts did; the chances of rural respondents' fathers having high school or more education are merely one-fourth of those of their urban counterparts (6% vs. 24%). Regarding father's employment status when the

respondents were 14, urban fathers are 4 times more likely to be full-time employed, while rural fathers are 3 times likely to be engaged full time in farming.

With regard to demographic characteristics, the mean age of respondents is about 47 and 92% of them belong to the majority Han ethnic group. About 40% are urban-*hukou* holders. As mentioned earlier, there is relatively even representation of the four birth cohorts: About 25% of each. Respondents' regional distribution by *hukou* and gender reveals the intricacy relationship between uneven regional development and urbanization: Urban-*hukou* holders are systematically more likely to reside in Eastern provinces or Northeastern provinces, which are regions given policy preferences in the reform and Maoist times, respectively (Fan, 1997; Yang, 1991). Relatively equal numbers of observations are pooled from the 2012, 2013, and 2015 surveys.

5.2. The tempo of transition to first marriage: Changes and continuities

Tables 2 and 3 and Figure 1 show the results of the pace of respondents' transition to first marriage and relevant social factors. As said before, this set of analysis is restricted to respondents aged 30 and above. To add a caveat, our supplementary analysis (results available upon request) based on an alternative sample of aged 25 and above shows that including those aged below 30 could introduce estimation bias that increases the risk of earlier marriage among the youngest cohort (born 1986–1990). This justifies the use of age 30 as a threshold in defining the sample in this article.

Based on statistics in Table 2, the average age at first marriage among the four cohorts under study remains relative stable, which is between 23 and 25 years old, with both the Cultural Revolution cohort and the late reform cohort marrying at slightly older ages. By age 30, <7% of respondents in each cohort remain single and there is no evidence of systematic delays in marriage among the most recent cohort, contrary to the findings reported in Western industrialized societies (Furstenberg, 2010). This is consistent with recent studies in the Chinese context (Yeung and Hu, 2013; Tian, 2013). If anything, the family formation tempo of the Cultural Revolution cohort sees a notable delay. In particular, 14% of urban males in this cohort remain unmarried by age 30, which indicates of the disruptive effect of the "sent-down" campaign on urban youths' life course transition (Hung and Chiu, 2003). There seems to be a gendered pattern, with higher proportions of men (whether with rural or urban *hukou*) marrying later.

The Kaplan-Meier survival graph in Figure 1 displays the percentage of individuals who had not married by a specific age across cohorts.

Generally speaking, the tempo of Chinese youths' transition to first marriage sees no dramatic shifts, despite drastic changes in the sociopolitical context over the four decades that the data could capture. This is shown in similar shapes of the survival lines for each cohort and convergence of lines in the beginning and the end. In other words, a normative age range (ages 20–30, shown by the steepness of all lines in this range) for first marriage seems to reign over the population across cohorts. A closer inspection identifies two outstanding cohorts. Compared with others, the Cultural Revolution Cohort (shown in the red solid line) witnesses a relatively protracted sequence, with a relatively high marriage rate (20%) by the age 20 and also a relatively high singlehood rate (7%) by 30. In contrast, the most recent cohort (born 1976–1985) coming of age in a time of rapid economic development and globalization, we observe a rather condensed transition pattern: A lower proportion (<1/3) is married before 22, the legal marriage age for all Chinese citizens after 1980, but by 30, almost 95% of them have entered marriage. In other words, the temporary delay

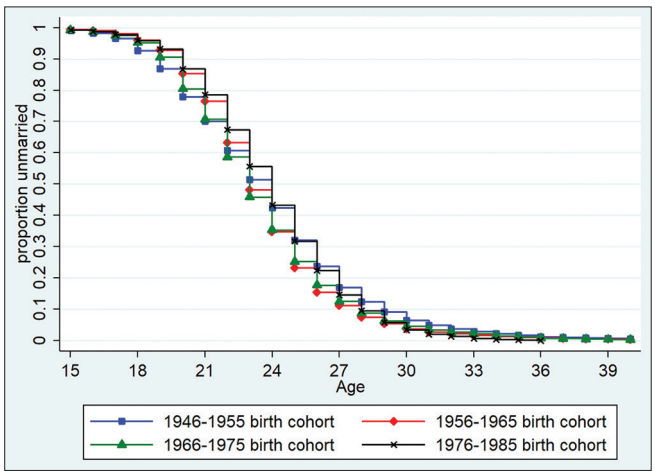

Figure 1. Proportion of the unmarried by age and cohort

Table 2. Tempo of transition to first marriage, by birth cohort, gender, and *hukou* origin (weighted).

Birth cohort	Mean age	By age 30: % married				
		All	Rural female	Rural male	Urban female	Urban male
1946–1955	24.06 (0.07)	93%	0.98 (0.00)	0.92 (0.01)	0.96 (0.01)	0.86 (0.01)
1956–1965	23.74 (0.05)	96%	0.99 (0.00)	0.96 (0.01)	0.98 (0.00)	0.92 (0.01)
1966–1975	23.51 (0.05)	95%	0.98 (0.00)	0.94 (0.01)	0.97 (0.00)	0.90 (0.01)
1976–1985	24.38 (0.06)	95%	0.99 (0.00)	0.95 (0.01)	0.97 (0.01)	0.90 (0.01)

Table 3. Cox hazard ratio for age of first marriage.

	Model 1	Model 2	Model 3
Demographic characteristics			
Birth cohort (ref.=1976–1985)			
1946–1955	0.79(0.02)***	0.83(0.02)***	0.83(0.02)***
1956–1965	0.97(0.02)	0.97(0.02)	0.97(0.02)
1966–1975	0.99(0.02)	0.92(0.02)***	0.92(0.02)***
Male (1=yes)	0.66(0.02)***	0.64(0.02)***	0.62(0.02)***
Han ethnicity (1=yes)	0.94(0.03)	1.03(0.03)	1.03(0.03)
Data wave (ref.=2012 wave)			
2013 wave	0.97(0.02)*	0.96(0.01)*	0.96(0.01)*
2015 wave	1.00(0.02)	0.97(0.02)	0.97(0.02)
Educational attainment (ref.=primary school and less)			
Middle school	0.72(0.01)***	0.87(0.02)***	0.87(0.02)***
Junior college and more	0.47(0.01)***	0.68(0.03)***	0.68(0.03)***
Family background			
Urban *hukou* (1=yes)		0.79(0.02)***	0.75(0.02)***
Father's education (ref.=primary school)			
Junior middle school		0.97(0.02)**	0.97(0.02)**
High school and more		0.96(0.02)***	0.96(0.02)***
Father's employment status (ref.=farming)			
Full-time employed		0.94(0.02)**	0.94(0.02)**
Others		0.89(0.02)***	0.89(0.02)***
Regional location (ref.=east)			
Central		1.21(0.02)***	1.21(0.02)***
West		1.25(0.02)***	1.26(0.02)***
Northeast		1.34(0.03)***	1.34(0.03)***
Interaction effect			
Male*urban *hukou*			1.10(0.03)***
Log-likelihood	−1,83,120.69	−1,72,560.12	−1,28,922.61
Observations	18,984	18,984	18,984

Note: The complete-case analysis shown here is based on a sample after list-wise deletion of missing data on family background variables. *p<0.05. **p<0.01. ***p<0.001

in first marriage age for respondents due to longer time spent in high education is compensated by their expedited transition to marriage within in very short window: 34% of youths get married 3 years after college and another 28% in 5 years after.

Table 3 presents the estimates of the Cox hazard ratios for the age of first marriage in a stepwise analysis. Model 1 estimates hazard ratios by including birth cohort, educational attainment, and demographic controls. Model 2 adds family

background factors such as *hukou* status, father's education, and employment conditions, as well as regional dummies. Model 3 introduces an interaction term between *hukou* and gender.

We can glean the following points from this analysis. First, compared with the youngest cohort (born 1976–1985), older cohorts had a lower risk (meaning starting later) of entering marriage (e.g., by 17% for the Cultural Revolution cohort), if other things being equal; males had a lower risk of getting married than females by over 30%; higher educational attainment was correlated with lower hazard ratios. Second, urban *hukou* respondents had a lower risk of entering marriage by 20% or more; fathers' higher education had similar effects with respondents' own educational attainment on marriage timing.In terms of father's employment status when respondents were at age 14, compared with those whose fathers were farmers (reference group), those whose fathers were full-time employed had a lower hazard of entering marriage by 6% and those whose fathers' employment status categorized as "others" had a lower hazard by 11%. In combination, we observed that urban *hukou*, father's relatively higher education, and stable employment were correlated with youths' lower risk of marriage suggesting some level of modernization of urban middle-class families in their marriage formation patterns. Warranting future inquiry, the puzzle of the significant lower marriage risk of those with fathers categorized as "others" (mostly the marginalized workforce in urban labor market) in employment status, relative to farmers' children, may be related to growing economic pressure for the urban poor to establish a household in cities (e.g., Choi and Peng's [2016] analysis of the undesirable plight of second-generation rural migrant men in urban marriage market).

5.3. Trends of educational homogamy

Table 4 describes the educational homogamy pattern in general and by marriage cohorts. The row variable represents husband's education, and the column variable represents wife's education. The cells on the main diagonal display homogamy statistics. For the whole analytic sample, if summing all the percentages on the main diagonal, we see 56.6% of marriage unions with identical educational levels. Statistics in lower rows of Table 4 and Figure 2 describe educational homogamy patterns across marriage cohorts. As seen, about 60% of marriages contracted during Cultural Revolution era constitute homogamy; this number dropped to 52% in early reform cohort and kept increasing thereafter. The share of educational homogamy among the late reform cohort (married during 2001–2015) reaches 63%. The general scenario seems to suggest that the economic reform in its early era has a liberalization effect on respondents' selection of spouse, as reflected in the steep decrease of homogamy proportion in this marriage cohort.

However, as Xu *et al*. (2014) demonstrated, such reliance on raw statistics from the contingency table (with 3*3*4 cells) could yield misleading results, because China's educational structure has undergone considerable transformations during the past four decades, which may affect the opportunity structures for homogamy. For example, the very high homogamy statistics for the Cultural Revolution cohort might be a result of the marginal distribution of wives' and husbands' education (46% of marriages were between low-educated men and women).

To get more accurate estimation, I fit a series of log-linear models: The conditional independence model (Model 1) as the baseline model and five log-multiplicative layer effect models (Models 2-6) with different design matrices for the Row-Column association. Table 5 presents the goodness-of-fit statistics for each model, including the degree of freedom, the log-likelihood ratio Chi-square statistic (L^2), the Bayesian Information Criterion, and the index of dissimilarity (D).

According to multiple criteria, the log-multiplicative layer effect full interaction model (model 6) fits the data best (L^2 is 81.3; DF = 23; BIC is −146.9; $\Delta = 1.8$, indicating that <2% of observations need to be reclassified to make all observed cell counts exactly equal to the fitted cell counts). Models 1 and 2 are ill-fitted to test the two hypotheses: (1) There is no association between husband's education and wife's education in each cohort and (2) there is no relative association of educational attainments among heterogamous pairings. Likewise, Models 3 and 4, despite relative improvement of model fit by L^2 and Δ scores, are still less satisfactory to support their hypotheses. The quasi-symmetry model (Model 5) significantly improves by all four goodness-of-fit measures. For example, the dissimilarity index shows that only 1.9% of all cases were "Wrongly" classified under this model. However, Model 6 is preferable over Model 5 according to L^2 and Δ scores. For an additional three degrees of freedom, the L^2 reduced by 14.7 ($P < 0.01$). In other words, not only is there a significant association between husband's and Wife's educational levels but also their homogamy patterns vary significantly by cohort.

Figure 3 shows the change of the Φ parameters (denoting the cohort-specific strength of association between husband's and wife's education, with ±1 indicating perfect agreement or disagreement and 0 indicating no relationship) based on estimates from Model 6 in Table 5, which serve as the index of the strength of educational homogamy. Very different from Figure 2, we see steady growths of the strength of homogamy from the Cultural Revolution cohort on, from 0.42 to 0.56 for the most recent cohort. This finding is consistent with some previous research which documented higher levels of homogamy as China's economic development accelerates after reform (Han 2010; Xu, Ji and Tung, 2010; Xu, Li and Yu, 2014).

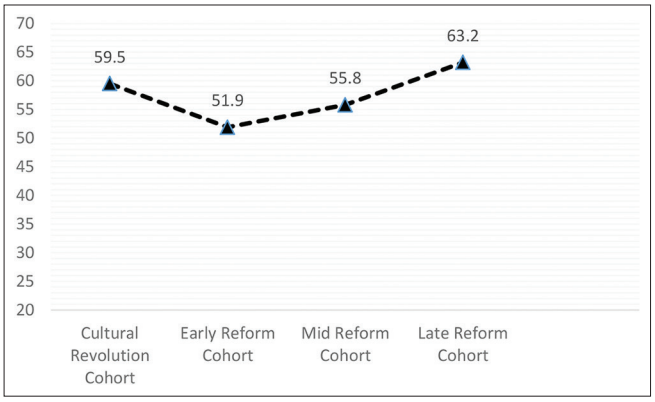

Figure 2. Trends of educational homogamy over four decades

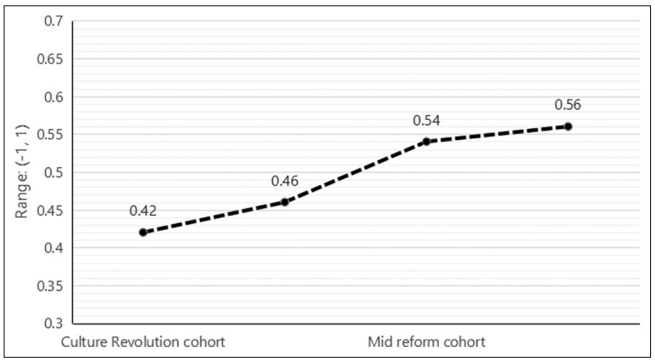

Figure 3. The strength of homogamy over four decades.

6. Discussion

Based on three waves of pooled CGSS data, this study has explored two dimensions of Chinese youths' transition to first marriage over four decades - their transition tempo and the homogamy patterns. Thus far, the analysis has yielded the following key findings in answering the research questions laid out earlier. Regarding the marriage formation tempo, there is no evidence of systematic delays in family formation among cohorts coming of age after reform, although moderate cross-cohort heterogeneity. It seems that, against vicissitudes in sociopolitical contexts, the script of passage to first marriage among youths remains rather stable and normative: By the age of 30, the majority in each cohort have married. However, two cohorts are identified for their unique trajectories, which reflect an intricate relationship despite broader social structures and individual life course patterns. The Cultural Revolution cohort experiences a relatively protracted passage to marriage, simultaneously with a relatively high proportion of marriage by age 20 and high singlehood rate by age 30 (7%, relatively low by international standards). This could be related to younger legal marriage ages before the implementation of the 1980 Marriage Law and political movements such as the "sent down" campaign that disrupted young adults' life course transition. The late reform cohort, born after 1976, witnesses a rather condensed marriage formation pattern, with temporary delay of marriage until tertiary education is completed and expedited entry to marriage thereafter. Respondents who belong to older cohorts, who are men, who have received higher education and hold urban *hukou* have lower risk in entering first marriage by a certain age. Regarding the issue of "who marries who" which reflects the level of social closure in a particular society, rather than seeing a trend of general openness (i.e., decreasing homogamy) with modernization (Smits and Park, 2009; Smits, Ultee and Lammers, 1998), I recorded steady growing strengths of homogamy across marriage cohorts, with the Φ parameter climbing from 0.42 for the Cultural Revolution cohort to 0.56 for the late reform cohort. This adds to the empirical evidence in existing literature which documents the persistence of homogamy as a dominant social norm and practice in China over different historical periods (Han, 2010; Xu, Ji and Tung, 2010; Xu, Li and Yu, 2014).

Contribution of this study to existing literature is three-fold. First, through combining transition to adulthood literature and homogamy literature, this study explores not only the tempo of youths' entry into marriage but also the status composition of marital unions formed in first marriages in contemporary China. Examining these two dimensions of

Table 4. Joint distribution (in percentage) of husband's and wives' education, overall and by marriage cohort (*n*=19,340).

Husband's education	Wife's education				
	Primary school and below	Junior middle	High school	College and more	Total
All respondents					
Primary school and below	22.6	4.7	0.8	0.1	28.1
Junior middle	14.4	16.8	3.9	0.7	35.7
High school	3.8	6.9	8.2	2.0	20.9
College and more	0.5	1.7	4.0	9.0	15.2
Total	41.4	30.1	16.9	11.7	100.0
1966–1979 (*n*=4,080)					
Primary school and below	46.1	4.2	0.6	0.0	51
Junior middle	17.9	9.1	2.2	0.6	29.9
High school	5.4	4.0	2.9	0.7	13.0
College and more	1.1	1.5	2.1	1.4	6.2
Total	70.5	18.8	7.8	2.8	100.0
1980–1991 (*n*=7,437)					
Primary school and below	21.0	5.2	1.0	0.0	27.2
Junior middle	16.3	16.9	4.9	0.4	38.5
High school	5.0	8.0	10.1	1.4	24.5
College and more	0.5	1.7	3.6	3.9	9.7
Total	42.8	31.9	19.6	5.7	100.0
1992–2000 (*n*=4,634)					
Primary school and below	16.2	5.0	0.7	0.0	21.9
Junior middle	14.1	21.6	3.7	0.9	40.3
High school	2.0	7.4	7.9	2.6	19.9
College and more	0.3	1.7	4.8	10.1	17.9
Total	32.7	35.8	17.1	14.4	100.0
2001–2015 (*n*=3,189)					
Primary school and below	5.7	3.5	0.7	0.2	10.0
Junior middle	5.8	19.0	4.2	1.1	30.0
High school	1.6	7.4	10.9	4.3	24.2
College and more	0.2	2.0	5.9	27.6	35.8
Total	13.3	31.9	21.7	33.2	100.0

Table 5. Goodness-of-fit results of log linear models of assortative mating (*n*=20,333).

Model	DF	L^2	BIC	Δ
1. Conditional independence model.	35	10543.5	10196.3	27.6
2. Multiplicative layer, quasi-indep.	28	2397.8	2120.1	9.1
3. Multiplicative layer, uniform assoc.	31	526.0	218.5	6.0
4. Multiplicative layer, R-C II	29	468.6	180.9	5.5
5. Multiplicative layer, quasi-symmetry	26	96.0	−161.9	1.9
6. Multiplicative layer, full interaction	23	81.3	−146.9	1.8

Note: Model terms (number of parameters): DF=Degrees of freedom; L^2=The log likelihood ratio Chi-square statistic; BIC=L^2-(DF) ln (*n*); Δ represents the dissimilarity index between observed and predicted frequencies (in percentage). All models are estimated using the Stata 14 software package

marriage behaviors of youths in one study presents a complete picture of the trends, patterns of their married life, and importantly the social implications thereof. Second, with compelling empirical evidence, this study offers an assessment of the marriage behaviors of youths over four decades in contemporary China. In particular, to the knowledge of the author, this paper provides the first empirical analysis of the post-80 s youths' passage to marriage based on national representative data. Third, this study charters the unique trajectory of Chinese youths' life course transition since reform, which is characterized by a condensed transition within a limited time window and heightened status compatibility between spouses. This is germane to further theoretical discussions of social stratification, life course, and youth identity in a fast-changing society.

The overall assessment suggests that relative to their counterparts in western industrialized societies (Furstenberg, 2010; 2013) or early developed East Asian societies such as Japan (Raymo, 1998; 2003) and Singapore (Jones, 2005; 2010), Chinese youths of recent cohorts do not systematically delay nor fly away from marriage. Considering that since the late 1990s China has expanded college enrollment and joined the WTO, the prolongation in higher education and subsequently career development may postpone youths' marriage timing. The mechanisms to solve the puzzle are not fully understood. Suffice it to say that the relationship between educational attainment and marriage timing remains ambiguous. We may even venture the possibility that higher education institutions or more active social life in college facilitates young adults' courtship with future marriage partners. In selecting first marriage partners, they prioritize compatible educational attainment which may be a proxy for comparable socioeconomic status. Such a pattern goes against established theories which predict lower homogamy with faster economic development (Smits, Ultee and Lammers, 1998). In summary, the four decades of rapid economic development in post-reform China have failed (up to now) to deliver a liberalizing effect on individuals' private life as predicted by the second demographic transition theorists (Lesthaeghe, 2010).

The key to understand China's demographic puzzle may lie in the country's unique institutional and cultural contexts. From the institutional point of view, the *hukou* system, as a fundamental institution regulating the legality of marriage unions and childbirth and choreographing individuals' life course transition, is the only legal route to childbirth and childrearing. Marriage registration, preferably with a separate *hukou* booklet for the new family unit, is functionally and symbolically consequential in marking individuals' adulthood transition: Children's *hukou* registration, tied to parents' legal marital status and *hukou* status, to a large extent determines their life chances, such as their access to school and other public services. In other words, rather than shifting toward "deinstitutionalization of marriage" in America (Cherlin, 2004), China's institutional arrangement based on the *hukou* system makes marriage even more entrenched not only as an adulthood marker but also a socially and legally sanctioned status. From a cultural perspective, post-reform China, characterized by the state's withdrawal in welfare provision, except for a small segment of the population, has seen a comeback of familism as a social support mechanism amidst dramatic social transformations. According to Yan's (2016) longitudinal ethnography in a northern village, there is a rise of descending familism through intergenerational collaboration and a downward flow of tangible or intangible resources toward raising successful children in the third generation. Such an orientation, together with a stronger influence of economic prospects on marriage entry (Yu and Xie, 2015b), may mean that marriage decisions are a family collective endeavor, instead of individual preferences, which explains the lack of systematic changes in marriage behaviors over cohorts.

Limitations of this study and recommended future inquiry are as follows. First, given the nature of cross-sectional data in this analysis, future longitudinal research tracking the processes of dating, cohabitation, and marriage formation in real time is needed to lend a life-course perspective in understanding young people's romantic and family life. Second, limited by the quantitative research methodology which excels in presenting general patterns but wants nuance and contextualization, future research could benefit from qualitative research that delves into the grounded perspectives and meaning-making processes in Chinese youths' family formation to solve the puzzle described in this paper.

Author's Contribution

The sole-author owns the authorship to the development of each section of the paper.

Availability of Supporting Data

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

Conflicts of Interest

No conflicts of interest were reported by the author.

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RESEARCH ARTICLE

Challenges to the integration of Syrian refugees

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Abstract: In this study, we provide an overview of the situation of Syrian refugees and other non-citizens living in host countries. We explored the cases of several countries: Turkey, which is one of the main destinations for refugees, flees the Syrian crisis; Germany and the United Kingdom, which are high-income countries where the public sentiment about refugees has changed over time; Greece and Italy, nations that share a close border with countries experiencing large refugee influxes; and Canada and Australia, which have had different approaches regarding inflows of refugees and do not share borders with countries that have significant outflows of migrants and refugees. Our review of policies suggests that the successful resettlement of Syrian refugees is dependent on political commitment that is coupled with public support and community engagement. Successful social and economic policies to address the refugee crisis demand a combined effort in terms of planning, implementing, monitoring, and assessing initiatives. Most importantly, record-keeping and sharing data with stakeholders need to be improved, which is a joint request of non-profit organizations and academic institutions.

Keywords: refugees; asylum; migration; Syria; civil war; integration

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1. Introduction

Since the Syrian civil war began in March 2011, the United Nations High Commissioner for Refugees (UNHCR) estimates that 13.1 million people are in dire need of humanitarian assistance. As of April 2018, 6.6 million people have been internally displaced, and an estimated 5.6 million Syrians have fled the country (UNHCR, 2018a). The number of refugees and asylum seekers is estimated to be almost 3.6 million in Turkey, one million in Lebanon, 700,000 in Jordan, 250,000 in Iraq, 130,000 in Egypt, and 35,000 in other North African countries (Operational Data Portal, 2018). Out of this total group of Syrian refugees, close to one million have requested asylum in different countries within the European Union (EU) (European University Institute, 2016).

To date, the response to the refugee crisis has focused largely on providing humanitarian assistance for refugees (Médecins Sans Frontières [MSF], 2013; Oxford Committee for Famine Relief [OXFAM], 2016a). Even so, international organizations including OXFAM and Doctors without Borders (MSF) have argued that the international aid response has failed to keep up with the rising needs of Syrian refugees (MSF, 2013; OXFAM, 2016a). Since the crisis started, countries such as Turkey, Lebanon, and Jordan have struggled to offer adequate social protection services, which has led to an increase in vulnerable groups (UNHCR, 2018b). In addition, the arrival of refugees in Lebanon and Jordan has impacted the economy and public service provisions. This population inflow has resulted in thousands of Syrians being stranded at the Jordanian and Turkish borders, unable to enter the host country and reach safety (UNHCR, 2018b). Moreover, the crisis continues to have social, health, and economic effects on the displaced populations as well as on

the host countries, whose national services are facing severe strains. Some host communities have reported decreases in wages and worsening working conditions due to increased competition for low-skilled and unskilled jobs. This process contributes to negative perceptions of refugees and migrants in host countries. Reports have shown that native populations fear migrants mainly because they are concerned with losing their jobs to migrants, as well as due to prospects of decreasing wages for local habitants and the increasing burden on public services (Klugman, 2009).

Given that the Syrian conflict has already lasted for more than seven years and with no short-term solution in sight, we conduct an analysis to address the evolving long-term issues of refugees in their host countries. The severity of the refugee situation is defined not only by displacement duration but also by daily life conditions and the socioeconomic integration of refugees in the host country (UNHCR, 2004). Thus, host countries should establish long-term strategies to help integrate refugees into their economies and societies. Fostering opportunities for refugees to build their livelihoods in host countries are an important component of creating long-term resilience. However, this process is expected to be a complex one. Refugees are usually not allowed to work in the formal economic sector in their host countries, even though participation in economic activities is essential to improve and sustain the well-being of individuals and families.

In this study, our objectives were to provide an overview of the situation of Syrian refugees and other non-citizens living in host countries, as well as to summarize a series of policies and legislation regarding refugees. We explored the cases of seven host countries: (1) Turkey, which is the main destination of refugees from the Syrian crisis; (2) Germany and the United Kingdom, which are high-income countries where the public sentiment about refugees has changed overtime; (3) Greece and Italy, which are countries that share a close border with nations that have large outflows of refugees; and (4) Canada and Australia, which do not share borders with countries that have significant refugee outflows but have been dealing with inflows of migrants and refugees in different manners. To this end, we analyzed national data from the selected host countries to explore attitudes, beliefs, and behaviors toward refugees, as well as to describe labor market integration. Our study also focused on economic activities that individuals reported, including performing paid work, engaging in educational activities, and unemployment. We also provided a review of policies and legislation toward refugees in the selected host countries.

2. Data Sources

This study was sponsored by the Pardee Global Human Progress Initiative within the nonpartisan RAND Corporation and was conducted between late 2016 and early 2017. We reviewed the existing literature in the selected host countries: Turkey, Germany, the United Kingdom, Greece, Italy, Canada, and Australia. We also analyzed statistics on migration flows, attitudes toward refugees, and immigrant integration. The analysis of data on refugees was a challenging endeavor since information on flows, public services available, and integration of refugees is not systematically collected by the International Agencies and Non-Governmental Organizations. As a strategy to address these difficulties, we explored cross-sectional data and reports from several sources, as listed in Table 1.

We also investigated individual level data from the most recent European Social Survey (ESS) for each of our selected European countries: Germany (2014), Greece (2010), Italy (2012), and the United Kingdom (2014). This analysis focused on main economic activities, which report whether individuals were: (1) Performing paid work, even if away temporarily (employee, self-employed, and working for family business); (2) engaged in educational activities, even if on vacation (not paid for by employer); (3) unemployed and actively looking for a job; (4) unemployed, wanting a job, but not actively looking for a job; (5) permanently sick or disabled; (6) retired; (7) in community or military service; or (8) doing housework, looking after children or other persons.

For our review of policies and legislation geared toward refugees, we collected information from several sources, including governmental websites, non-governmental organizations, and the U.S. Library of Congress.

3. Results

3.1. Asylum seekers

Since 2012, Germany has been the primary destination country for asylum seekers in Europe. As a result, we chose Germany as one of the seven countries to focus the analysis [Figure 1]. Between 2012 and 2015, Germany received one of the highest numbers of asylum applications in the region (more than 860,000) (UNHCR, 2015), and the number of applications that were approved was approximately 244,000 during the same period (Eurostat, 2017a). Positive decisions granted to Syrian refugees in Germany were influenced by the country's policy toward accepting Syrian refugees by waiving the EU rules. During this same period, the number of Syrian asylum applicants in Germany increased from

Table 1. Data and links from several sources used for the analysis of refugee integration.

Source	Data	Link
Eurostat	Asylum quarterly report, 2017	http://ec.europa.eu/eurostat/statistics-explained/index.php/Asylum_quarterly_report
	Asylum Statistics, 2017	http://ec.europa.eu/eurostat/statistics-explained/index.php/Asylum_statistics
	Asylum and managed migration, 2017	http://ec.europa.eu/eurostat/web/asylum-and-managed-migration/data/database
ESS	Latest survey for countries: Germany, 2014; Greece, 2010; Italy, 2012; United Kingdom, 2014	http://www.europeansocialsurvey.org
CIDOB and MPG	MIPEX, 2014	http://www.mipex.eu/
UNHCR	Population statistics, 2000–2015	http://popstats.unhcr.org/en/overview
	Resettlement data, 2003–2016	http://www.unhcr.org/en-us/resettlement-data.html
	Situation in Syria, May 24, 2018	https://data2.unhcr.org/en/situations/syria
	Syria Emergency, April 19, 2018	http://www.unhcr.org/en-us/syria-emergency.html
UNOCHA	Syrian Arab Republic, 2018	http://www.unocha.org/syria
Migration Policy Centre at the European University Institute	Syrian refugee project, 2016	http://syrianrefugees.eu/
Pew Research Center	Global Attitudes Surveys, Spring 2016	http://www.pewglobal.org/files/2016/07/Pew- Research-Center-EU-Refugees-and- National-Identity-Report-FINAL-July-11-2016.pdf
Reach - informing more effective humanitarian action	Reports on Syrian conflict	http://www.reach-initiative.org
Turkish Statistical Institute	Main website	http://www.turkstat.gov.tr/
	NESD	https://biruni.tuik.gov.tr/medas/?kn = 130&locale = en
AIDA	Access to the labor market in Turkey	http://www.asylumineurope.org/reports/country/turkey/access-labour-market-0
ORSAM	Main website	http://orsam.org.tr/orsam/anasayfa
TEPAV	Main website	http://www.tepav.org.tr/en

Note: ESS: European Social Surveys, UNHCR: United Nations High Commissioner For Refugees, TEPAV: The Economic Policy Research Foundation Of Turkey, CIODB: Barcelona Centre for International Affairs, MPG: Migration Policy Group, MIPEX: Migration Integration Policy Index, NESD: National Education Statistics Database, AIDA: Asylum Information Database. ORSAM: Turkish Center for Middle Eastern Strategic Studies, UNOCHA: United Nations Office for the Coordination of Humanitarian Affairs

approximately 8,000 to over 160,000 (Eurostat, 2017b), and the number of Syrian asylum applications with positive decisions increased from 7,400 to over 100,000 (Eurostat, 2017c).

3.2. Resettlement of refugees

Resettlement can be an important option for refugees since they can be transferred from an asylum country to another country where they might settle permanently (UNHCR, 2018c). The number of Syrian refugees sent to resettle in other countries (e.g., Australia, Canada, and Germany) is smaller than the number of refugees living in Middle Eastern regions (e.g., Turkey, Lebanon, Jordan, Iraq, and Egypt) as well as those who fled but did not get a formal refugee status (Ostrand, 2015). In 2015, the EU Council approved the European Resettlement Scheme, under which more than 22,000 refugees were offered legal and safe pathways to enter the EU. As of May 2017, over 16,000 refugees had been resettled under the European Resettlement Scheme and the EU-Turkey statement (EU, 2017).

The United Nations has called Canada's refugee effort, a model for the rest of the world (Ditchburn, 2016). Canadians have raised over 110 million dollars to help refugees through private sponsorship. The Government of Canada worked with private citizens (some of whom served as sponsors), as well as international organizations in Lebanon and Jordan to select, screen, and resettle refugees to

cities across Canada. The government has also established various programs for refugee resettlement including orientation sessions, health care, employment counseling, and language training. Newly arrived refugees received government-assisted funding for 12 months, including health care and other services. Public support for the initiative has also increased as the program has progressed. The results of these Canadian initiatives can be seen by the sharp increase in overall resettlement of refugees since 2014 [Figure 2].

Figure 3 illustrates the resettlement of Syrian refugees by country of resettlement between 2013 and 2016. Australia resettled 1,747 Syrian refugees, Canada 17,498, Germany 6,085, Italy 382, and the United Kingdom 4,138 (UNHCR, 2017a).

In 2017, the Australian government pledged to resettle 12,000 refugees from Syria and Iran, in addition to the existing humanitarian program intake of 13,750 refugees from these countries (Australian-Government, 2017). Australia prioritized the settlement of displaced Syrians and Iraqis temporarily located in Lebanon, Jordan, and Turkey. UNHCR data suggest that 1,169 Syrian refugees were resettled in Australia in 2016, a considerable increase from 167 in 2015 [Figure 3]. Refugees from various countries usually reach Australia by boat from Indonesia through a dangerous journey that has caused the deaths of hundreds of people (BBC, 2017). The ruling political parties have been implementing tough

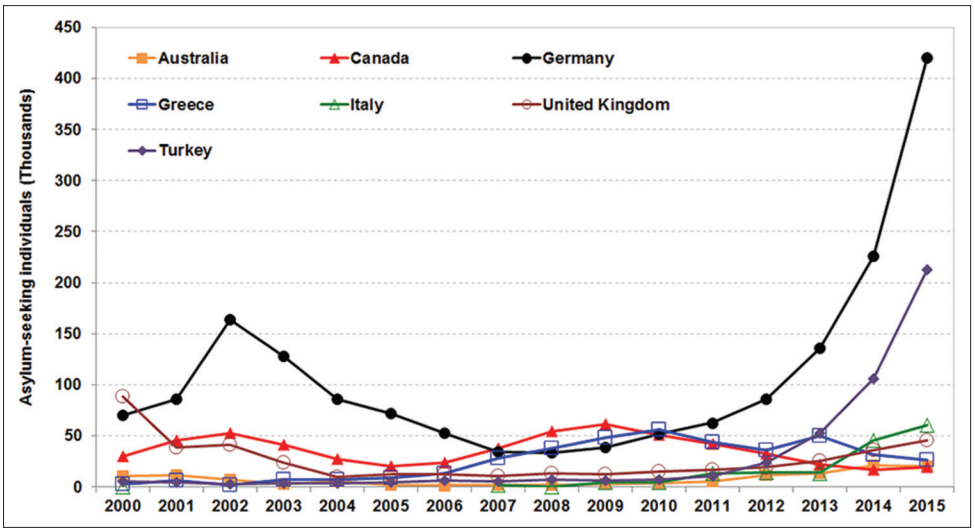

Figure 1. Asylum-seeking individuals by host countries, 2000–2015.
Source: United Nations High Commissioner for Refugees, Population Statistics, 2000–2015 (http://popstats.unhcr.org/en/overview)

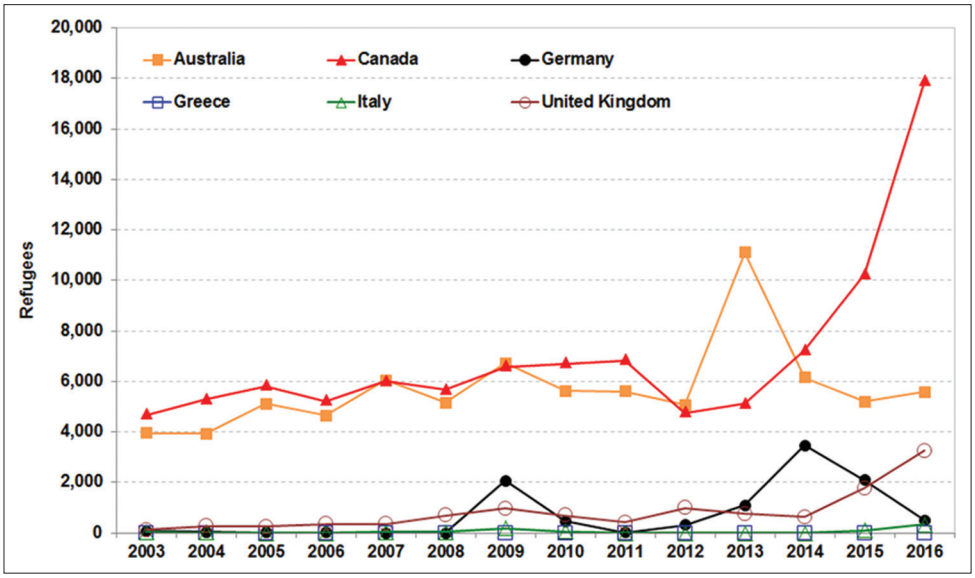

Figure 2. Refugees sent for resettlement by country of resettlement, 2003–2016.
Source: United Nations High Commissioner for Refugees, Resettlement Data, 2003–2016 (http://www.unhcr.org/en-us/resettlement-data.html)

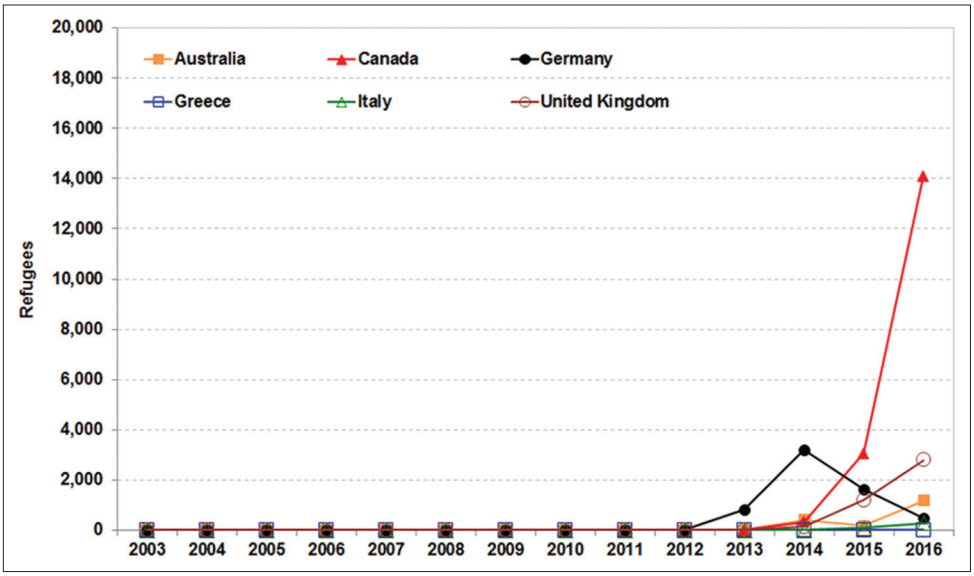

Figure 3. Syrian refugees sent for resettlement by country of resettlement, 2003–2016.
Source: United Nations High Commissioner for Refugees, Resettlement Data, 2003–2016 (http://www.unhcr.org/en-us/resettlement-data.html)

policies to curb these flows with military vessels. When refugees reach Australia, they are usually placed in offshore detention camps (Loewenstein, 2016) with poor living conditions in Nauru and Papua New Guinea (Pearson, 2016).

Canada had a considerable increase in the number of resettled Syrian refugees in 2016 [Figure 3]. The Canadian initiative is primarily due to a commitment by the Liberal Party's Fundraising and Community Engagement (Seidle, 2016). By May 2016, 56.5% of Syrians were resettled as government-assisted refugees, 34.9% were privately sponsored, and 8.6% received federal and private funding. Refugees received 12 months of income support, as well as health care and other services.

Germany has been a major actor in addressing humanitarian aid for Syria and neighboring countries (UNHCR, 2016). The nation has been pushing for synchronized actions to address the Syrian refugee crisis by EU countries. In 2015, the German Government reformed asylum policies to accelerate the asylum process, including the establishment of norms for cash benefits for refugees and the reduction of the financial burden on states and municipalities (Gesley, 2015). However, in 2016, the government sets stricter asylum rules to suspend family reunification in specific cases, reduce cash benefits, and facilitate deportation (Gesley, 2016a). These actions seem to have increased the resettlement of Syrian refugees in Germany between 2012 and 2014 and decreased it between 2014 and 2016 [Figure 3].

Greece has also experienced the impact of the refugee crisis due to its geographical location. In the 1980s, immigration started to increase in Greece as Asians, Africans, and Poles looked for work in construction, agriculture, and domestic services. The political changes of the Central and Eastern European Governments in the second half of the 1980s also increased immigration flows to Greece. A major factor that transformed Greece into a receiving country is its geographical location, which positions the country as the eastern entrance to the EU with extensive coastlines and easy border access. Although Greece has had constant inflows of Syrian refugees, it has not been resettling them (UNHCR, 2017a). Most of these refugees live under difficult conditions on Greek islands (Karakoulaki and Tosidis, 2017).

In Italy, the number of refugees and migrants arriving in the country has been constantly updated by UNHCR: 153,842 people arrived in 2015, including 70,354 people in the first 6 months of 2015 (UNHCR, 2017b). These figures remained almost the same when compared to the 70,222 arrivals between January and June 2016. The vast majority of arrivals to Italy was from Nigeria (17.3%), Eritrea (12.6%), Gambia (8.1%), and Côte d'Ivoire (7.5%). The portion of Syrian (0.3%), Iraqi (0.2%), and Afghan (0.2%) arrivals remained low in 2016.

The United Kingdom offered to resettle 20,000 refugees by 2020 (OXFAM, 2016b). Scotland alone offered to resettle at least 2000 Syrian refugees (Gower and Cromarty, 2016). In December 2017, the Scottish Government celebrated the resettlement of 2000 Syrian refugees, 3 years in advance of their original plan (Nelson and Saltmarsh, 2017). This proposal included children and orphaned children, per the UNHCR recommendations. Full costs of resettlement are expected to be covered from the international aid budget, to ease pressure on local authorities. The organization, Save the Children, insisted that the British government should resettle 3,000 unaccompanied children who were in Europe in 2016 (Dearden, 2016; Gower and Cromarty, 2016; Wintour, 2016).

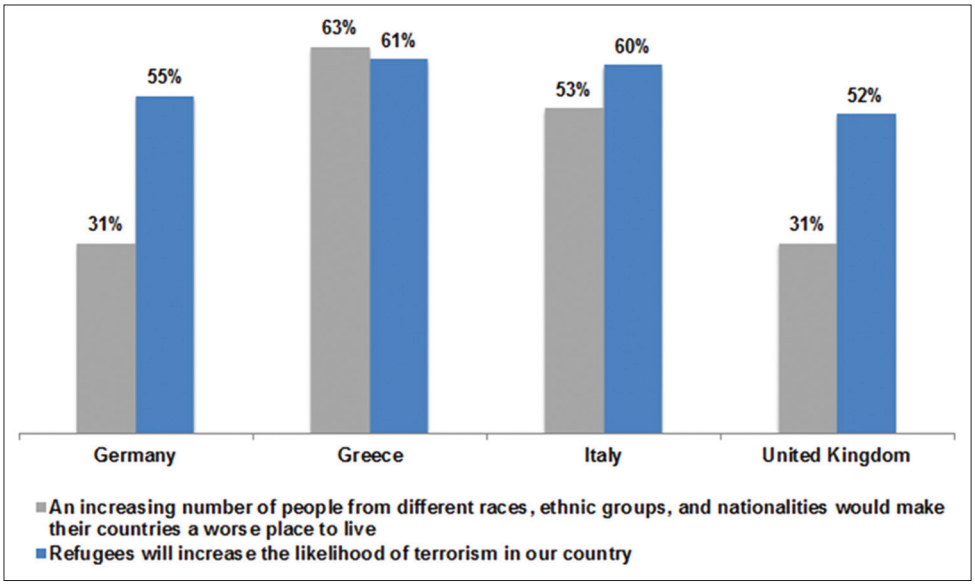

Figure 4. Percentage of Europeans who agreed with specific statements, 2016
Source: Pew Research Center, Global Attitudes Survey, Spring, 2016

3.3. Perceptions toward immigrants

According to the Global Attitudes Survey conducted by the Pew Research Center, multiple countries in the EU seem to believe that the presence of refugees could increase terrorism and take jobs and social benefits away from residents. For instance, in Greece and Italy, most respondents said that their countries would be worse places to live if there was an increasing number of people from different races, ethnic groups, and nationalities [Figure 4]. In Germany and the United Kingdom, this question was also captured by the level of education. Among those with secondary education or below, 39 and 37% agreed with this assessment, respectively. Among those with postsecondary education or above, these numbers were lower (27 and 17%, respectively). Most respondents in Germany, Greece, Italy, and the United Kingdom agreed with the statement that refugees would increase the likelihood of terrorism in their respective countries [Figure 4].

A considerable percentage of the population in the EU, especially in Greece and Italy, wanted less immigration and had negative sentiments toward immigrants (Poushter, 2015). Greeks and Italians were more likely to say immigrants would generate the negative effects to the society because they take jobs and social benefits away from the native population. Italy has faced major integration issues in regard to refugees and migrants. According to doctors without borders, the reception system of migrants and refugees in Italy is extremely slow and has been highly criticized (MSF, 2016).

People in Germany were more likely to say immigrants make their country stronger because of their hard work and talent (Poushter, 2016). In the United Kingdom, reports suggest that the population broadly welcomed Syrian refugees (Gower and Cromarty, 2016). This sentiment might be linked to the pace and scale of migration that increased by double (nearly four million) between 1991 and 2011, which might have created a better attitude of acceptance toward immigrants in the United Kingdom (MWUK, 2016.

Canada has had a significant experience with welcoming refugees from Southeast Asia, Uganda, Hungary, Czechoslovakia, and Chile since the 1950s. Canadians have raised approximately 110 million dollars to help refugees through private sponsorship (Ditchburn, 2016). In 1986, Canada was awarded the Nansen medal by the UNHCR in recognition of its major and sustained contribution to the cause of refugees.

Australia ranks as one of the top three resettlement countries in the world (Karlsen, 2016). A study on social cohesion indicated positive public attitudes toward immigration: 68% of Australians agreed that immigrants made the country stronger (Power, 2010). Political leadership had an important role in shaping national opinion regarding immigrants and refugees. A 2015 poll indicated that 57% of Australians believed that the country should increase the number of Syrian refugees (Taylor, 2015). Moreover, 54% thought that the government response to the Syrian crisis was poor. However, public opinion of Australians toward refugees seemed to be divided. For instance, the 2014 Lowy Institute Poll sought to test the idea that all asylum seekers should be processed onshore whether or not they came by boat (a policy that seems to favor a larger number of refugees). This poll indicated that 47% agreed and 51% disagreed that all asylum seekers should be processed in Australia whether or not they came by boat (Oliver, 2014).

3.4. Integration of immigrants

The migration integration policy index (MIPEX) measures policies to integrate migrants in several host countries, which classifies the indicators as favorable (80–100), slightly favorable (60–79), halfway favorable (41–59), slightly unfavorable (21–40), unfavorable (1–20), and critically unfavorable (zero). Canada presented the highest overall score followed by Australia and Germany [Figure 5]. Considering the different policy areas, Canada had favorable values for labor market mobility and anti-discrimination. Germany had favorable values for labor market mobility. The United Kingdom had favorable values for anti-discrimination. Greece had slightly unfavorable values for health status and education of immigrants, while Italy had slightly unfavorable values for education. These results indicate that Canada, the United Kingdom, and Australia seem to have more favorable integration policies than countries like Greece.

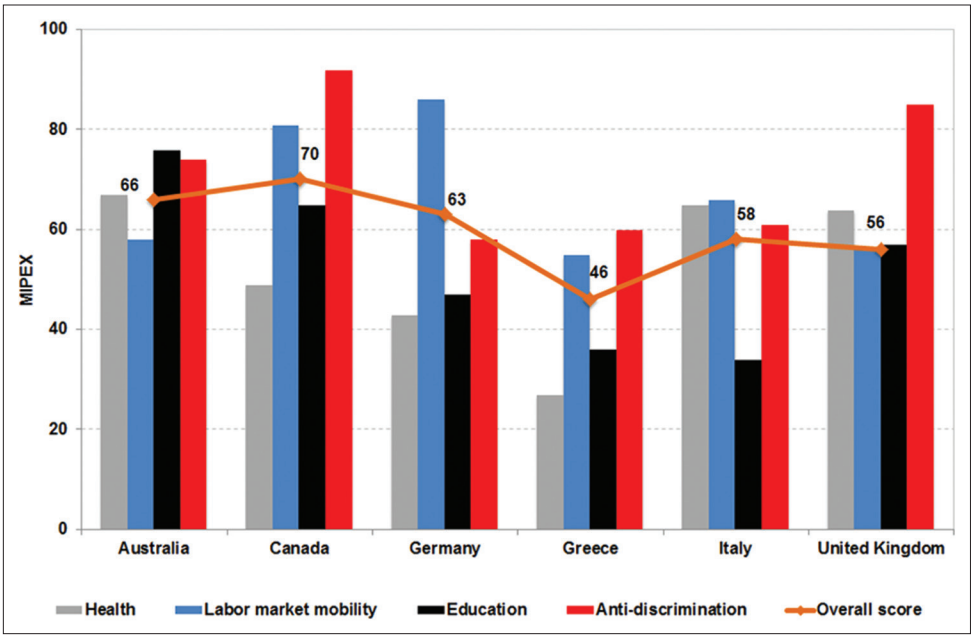

Figure 5. Migration Integration Policy Index across different policy areas, 2014.
Source: Barcelona Centre for International Affairs and Migration Policy Group, Migration Integration Policy Index, 2014 (http://www.mipex.eu/)

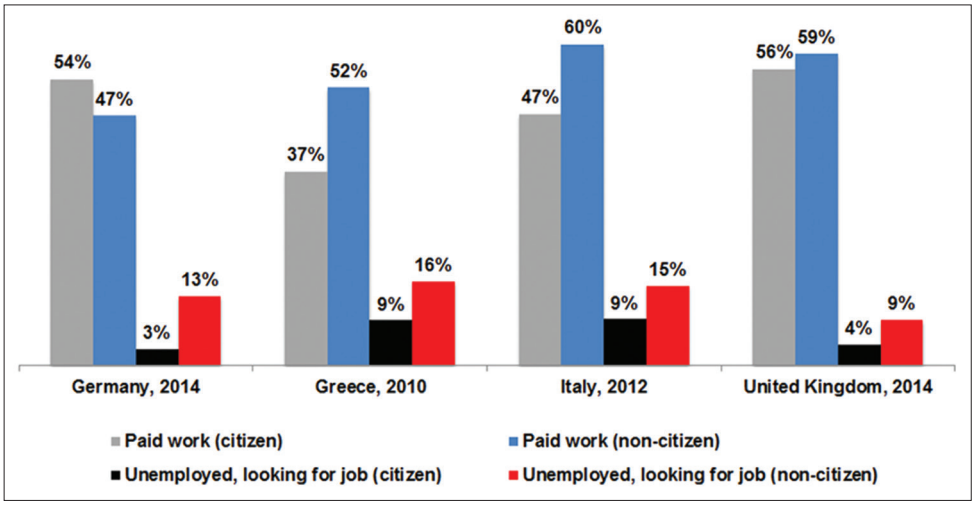

Figure 6. Activity performed during the past 7 days.
Source: European Social Surveys, 2010; 2012; 2014

3.5. Employment among citizens and non-citizens

Challenges to getting a suitable job for first-generation immigrants in the EU included a lack of language skills and inability to transfer qualifications. According to Eurostat, place of origin, religion, and social background were important barriers to getting a job in Greece and Italy in 2014. Perceptions that immigrants might take jobs away from native workers were found to be higher in the United Kingdom than in Germany, based on microdata from the 2014 ESS (listed in Table 1). It is important to note that countries have different requirements in terms of qualifications that are seen as the highest priorities for non-citizens. For instance, Germany puts emphasis on individuals' "willingness to be committed to the way of life in the host country," whereas in the United Kingdom, the highest emphasis was on speaking the official language.

Employment indicators show that residents of European countries who are noncitizens usually performed paid work in higher proportions than citizens [Figure 6]. However, when we looked at those who reported being unemployed and were actively looking for a job, non-citizens had higher levels of unemployment when compared to citizens in Germany, Greece, Italy, and the United Kingdom. These trends are an indication that non-citizens are more likely to be performing paid activities while still looking for jobs, probably due to current low wages and poor-quality work conditions in the informal economic sector.

In Turkey, Turks and Syrians seem to compete for jobs requiring low skills. Regarding educational attainment, 47.5% of the native Turkish population 15 years of age or older had no secondary-school education in 2017, according to the National Education Statistics Database from the Turkish Statistical Institute. This issue more seriously affected women: 6.4% were illiterate and 7.4% were literate without any diploma in 2017. The educational distribution of the Syrian refugee population is not very different from that of natives in Turkey. Consequently, Turks and Syrians are in direct competition for jobs requiring low or no skills.

Similar to other foreigners, Syrian refugees need individual work permits for employment in Turkey. However, the possibility to apply for these work permits was only granted to Syrian refugees in January 2016, as reported by the Asylum Information Database. By February 2018, only approximately 14,000 work permits had been issued. This is in part due to the requirements imposed on employers. To grant a work permit, the employer had to: (1) Prove that no native Turkish worker was available to conduct the same job of the potential refugee worker; (2) pay 138 U.S. dollars for the refugee work permit; (3) pay at least a minimum wage to the refugee worker; (4) contribute to social security; and (5) submit tax reports (Calabia, 2018). In association with these difficulties experienced by employers, most refugee employment is still in the informal economic sector. Syrian refugees tended to be employed in socially and economically inferior positions due to language barriers, low educational attainment or the inability to show proof of completed schooling, and a willingness to work in poor conditions and for low earnings (Calabia, 2018).

The southeast region of Turkey hosts the majority of Syrian refugees and has been among the least economically developed regions of the country. Border provinces in this area have seen their unemployment levels rise in recent years, especially among low-educated males. This increase in unemployment is associated with a quick rise in job losses by citizens, as Syrian refugees tend to be employed illegally, displacing legal incumbents. Job losses experienced by citizens in areas where Syrians were concentrated not only disrupted the local labor market but also led to negative sentiments toward refugees, resulting in heightened social conflict. Non-camp Syrians tended to live in city slums and face social isolation, which exacerbated the cultural rifts between Syrians and Turks.

3.6. Overview of legislation

We summarized a series of legislative initiatives aimed at refugees that were implemented in Australia, Canada, Germany, Greece, Italy, and the United Kingdom (details and sources are presented in Tables A1-A6 of the Appendix). We present this information below highlighting the historical background of laws and regulations.

In Australia, the 2015 Migration Amendment Act revised the previous 1958 Migration Act and created rules to refuse visa applications for those without a form of identification. This amendment also established strict policies regarding unauthorized maritime arrivals. The government had been intercepting vessels with refugees and placing them in offshore detention camps in Nauru and Papua New Guinea. Refugees have been experiencing poor living conditions in these camps.

Our review of policies related to refugees suggests that Canada's successful resettlement of Syrian refugees has been mainly due to political commitment coupled with public support and community engagement, including the private sponsorship of refugees. The involvement of these stakeholders has helped with resettling Syrian families and resulted in their successful integration into Canadian society. Based on lessons learned in Canada, some key factors can be highlighted

for a successful experience with refugees: Policy (legislation and policies have to be in place to allow actions to be taken, while policies must evolve to adapt to changing needs); leadership (it is necessary to have strong leadership within the government and civil society); government structure (formal legislation, as well as coordination and collaboration among different government and civil society groups are important for refugee integration); media (free media outlets play an important role in informing and engaging the public); civil society (government needs to engage ordinary citizens); multistakeholder partnerships (collaboration at local, national, and international levels); implementation on the ground (working with communities to prepare them for integration policies related to refugees); family (keeping families of refugees intact); and intercultural personal contact (direct personal contact between Canadians and refugees) (Alboim, 2016).

Germany has improved active labor market policies and implemented mandatory integration measures, including an increase in funding for language courses and the development of mechanisms to assess previously acquired skills. Germany is one of the several countries to have admitted the largest number of Syrian refugees, more than 25,000, partly due to legislative changes. In October 2015, the German Government introduced several laws related to asylum procedures. The country amended its Asylum Act and Residence Act. The latter provided rules for the admission and handling of refugee claims. Other changes included accelerating the asylum application process, reducing the financial burden on states and municipalities, and improving refugee minors' safety. These laws seem to provide a stimulus for inflows of refugees in Germany. However, the increased number of admitted refugees in Germany could not only be due to changes in laws but also to other countries implementing procedures to reduce inflows of asylum seekers.

A large number of refugees continue to arrive in Greece each year. Over 850,000 refugees and migrants arrived in Greece in 2015. By sea alone, 173,000 refugees arrived in 2016 and approximately 30,000 in 2017 (EU, 2018). Greece has been implementing legislation to address immigration assistance, while the EU has been providing funding to humanitarian partners in the country. The asylum system continues to face deficiencies, such as a lack of reception centers and poor detention conditions (Papademetriou, 2016). These issues are expected to continue in the near future. The large number of refugees arriving in Greece is one of the factors that led to the implementation of the 2016 EU-Turkey statement, as discussed below.

Italy's system of migrant and refugee reception is considered to be slow and has been criticized by international organizations such as Doctors without Borders (MSF, 2016). Due to Italy's geographical location, the country has seen an increase in the number of immigrants from North Africa, which might partially explain the increase in negative sentiments toward migrants and refugees, as shown by a survey from the Pew Research Center (Poushter, 2015).

In the United Kingdom, the initial policy regarding the Syrian crisis focused on providing humanitarian aid and relief. In early 2014, the National Government announced that it would take a more active role in the Syrian crisis and created a program that helped with the settlement of the most vulnerable refugees from Syria. Public reaction to this effort was positive. The favorable environment for refugees in the country led experts to conclude that immigrants might have higher chances of success when policies are coupled with the support of the native population (MIPEX, 2014). However, after the Brexit vote on June 23, 2016, the United Kingdom is on an imminent path to exiting the EU, scheduled for March 29, 2019. Prime Minister Theresa may highlight that this referendum was an indication that the British population wants a reduction in immigration. The country's net migration was 336,000 in the 12 months before the Brexit vote and 230,000 in the 12 months after the vote (Casciani, 2017). The government aims to reduce net migration to below 100,000 per year (Hunt and Wheeler, 2018).

3.7. EU-Turkey statement

We also explored the socioeconomic and political context as experienced by the Turkish population in recent years. On March 18, 2016, the European Council and Turkey formally agreed to put several principles in practice for governing EU-Turkey relations and tackling the migrant crisis: (1) New irregular migrants would be returned to Turkey; (2) for every Syrian returned to Turkey from Greece, another Syrian would be resettled from Turkey to the EU; (3) Turkey would prevent new routes of irregular migration; (4) the EU would increase the resettlement of refugees residing in Turkey; (5) the EU would accelerate visa liberalization for Turkish citizens; (6) the EU would provide financial support for Turkey's refugee population, which would include three billion Euros in 2016 and another three billion Euros by 2018; and (7) improve humanitarian conditions inside Syria (EU, 2016a).

The progress report on the EU-Turkey deal highlighted the significant steps toward implementing the deal (EU, 2016b). Eleven migrant lives were lost in the Aegean Sea since the agreement, compared to 270 during the course of 2015. Returns from Greece to Turkey reached 578, including 53 Syrians. Resettlements to Europe reached 1,614 refugees. Financial support included 2.2 billion Euros in allocations and 1.3 billion Euros in signed contracts but only around 0.5 billion Euros in actual disbursements. Turkey allowed the EU to monitor the status of returned migrants, including access

to camps and centers. This task was combined with granting UNHCR access to centers for monitoring international protection activities. The progress report recommended continued cooperation and effort by Turkish authorities despite changes in law enforcement, military forces, and public administration following the failed coup in July 2016.

3.8. Effects of population inflows on host country economies

Policies related to refugees raise the debate on how population inflows might affect the economy in host countries. There are concerns that native workers might experience negative impacts on their earnings and employment, mainly individuals with lower levels of education. These workers might experience increasing competition with immigrants and refugees for low-wage jobs. The question is whether an increase in labor supply, due to the growing inflows of immigrants, has negative effects on labor outcomes of competing low-skilled native workers.

Several studies have shown the impact of immigration on wages and employment in host countries. There are no definitive answers about the impacts of immigration flows on labor markets due to numerous and concurrent effects related to economic outcomes (Blau and Mackie, 2017). One of the most cited studies indicated that immigration reduces the wage and labor supply of competing native workers: Wages of natives decreased by almost 4% when there was a 10% increase in the labor supply of immigrants (Borjas, 2003). Another study highlighted that immigration had a small effect on the wages of native workers with no high school degree between 1990 and 2006 (Ottaviano and Peri, 2012). This analysis also indicated that immigration had a small positive effect on average native wages. However, these flows had a substantial negative effect on wages of previous immigrants in the long run.

Studies used different approaches to compare employment opportunities between immigrants and natives across regions (Card Dustmann and Preston, 2012; Manacorda, Manning, Wadsworth *et al.*, 2012; Ottaviano and Peri, 2012). Results varied due to different countries being investigated, units of analysis, methodological procedures, and types of data (Card, 2012). Three main aspects were related to the diverse results from these studies, as detailed below.

First, studies can consider that economic production, resources, and goods (e.g., financial assets, cash and funds, machinery, production equipment, and facilities) are considered fixed or adjustable through time in a society (Card, 2012). Analyses that assume this production capacity as fixed, while the number of workers increases with immigration, tend to find the negative effects of migration on labor outcomes. If studies assume that economic production adjusts in the long run (maintaining the ratio between production and number of workers), the effects of immigration on average wages of natives are approximately zero.

Second, researchers can consider different education groups in their analysis (Card, 2012). If they consider four distinct education groups in the labor market (dropouts, high school graduates, people with some college, and college graduates), the relatively high fraction of immigrant dropouts distorts the overall share of dropouts in the economy and lowers their wage relative to other groups. A two-group model (high-school equivalents and college equivalents) is in line with labor economics theory and assumes that the share of high-school equivalents is what matters in the labor market. With two education groups, wage has been largely unaffected by immigration.

Third, analytical models can assume that immigrants and native workers with similar levels of education compete with each other equally in the labor market (Card, 2012). In this case, results tend to indicate the negative effects of immigration flows on wages. However, analyses could consider that native workers with low levels of education have advantages in the labor market, compared to low-educated immigrants (e.g., proficiency in host country language and access to broader social networks). When these differences between immigrants and native workers were considered, the results indicated that immigration had positive impacts on labor outcomes of native workers.

4. Final Considerations

Addressing Syrian refugees' socioeconomic integration in host countries demands solutions in two major areas: (1) Recognizing that social and economic integration are interconnected and (2) increasing refugee employment while minimizing labor displacement and unemployment of the native population.

First, cultural and social issues challenge Syrian refugees' successful economic integration. Immigration might have the negative short-term effects on the earnings of the native population. Job market competition could lead to social conflict with detrimental effects. However, these short-term effects can be surpassed by long-term economic development, as a result of an increasing working-age population and a rising demand for products and services. Thus, a social integration program should be accompanied by an economic integration plan in host countries.

Second, the integration of refugees into host labor markets has conflicting objectives. On the one hand, refugees must be included in the formal economic sector to acquire decent earnings and social benefits. On the other hand, the negative

effects on job opportunities for the native population should be minimized. Otherwise, unemployment and negative attitudes toward refugees may increase. Policies must consider these conflicting objectives and effects, as well as tailor actions according to local socioeconomic and demographic conditions.

Successful social and economic policies to address the refugee crisis demand collaborative efforts in terms of planning, implementing, monitoring, and assessing initiatives at different levels. Interagency cooperation in the public sector is essential. Coordination and empowerment of local offices can help with the implementation of context-specific policies. Partnerships between public agencies and private institutions are important to support activities that improve refugee integration and employment creation. These activities include job provision, language training, and release of work permits. While refugees might be unable to vote, governments should consider the concerns that refugees have in regards to their livelihoods.

This study was limited by the lack of survey data from refugees in host countries. Host governments should consider recording and sharing detailed socioeconomic and demographic information about refugees. Improvements in record keeping and data sharing with stakeholders would provide a better evaluation of existing policies and formulation of new interventions.

Future studies could continue to investigate the long-term effects of population inflows. In the past, population inflows have been shown to increase the labor supply and labor market competition, raise demand for services, and stimulate economic development in receiving areas. These analyses could also examine the economic adjustments experienced by labor markets with high levels of immigration.

Authors' Contributions

Ernesto Amaral reviewed and analyzed the literature related to economic integration, reviewed policies and legislation, as well as coordinated and conducted data analysis. Mahlet Woldetsadik reviewed and analyzed the literature related to policies and legislation aimed at refugees in the selected host countries. Gabriela Armenta searched for publicly available databases and conducted data analysis. All authors contributed to writing the final manuscript.

Ethics

This research only analyzed publicly available secondary databases, which do not require Institutional Review Board (IRB) approval.

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Conflicts of Interest

No conflicts of interest were reported by all authors.

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Appendix. Tables with an overview of legislation toward refugees from selected host countries

Table A1. Overview of legislation toward refugees in Australia.

Australia acceded to the 1951 convention relating to the status of refugees becoming the sixth nation to agree with the convention, according to the timeline provided by the Refugee Council of Australia (https://www.refugeecouncil.org.au/getfacts/timeline/)
1958: Australian Parliament passed the Migration Act 1958, which provided guidance to entry, presence, departure, deportation of foreign nationals, as well as procedures for asylum seekers and refugees
Australia acceded to the 1967 protocol relating to the status of refugees: Expanded the original convention to respond to new refugee situations
1976: First immigration detention center was established
1978: Release of Galbally report: Improved resources and personnel for refugees, but funding remained limited (Langfield, 1996)
1978: Arrival of Southeast Asian refugees led to expansion of federally funded services for new arrivals
1979: Community refugee settlement scheme: A network of volunteer groups was established to provide assistance to humanitarian entrants
1981: Fraser Government introduced the special humanitarian program in response to unrest in Iran
1989: Migration Legislation Amendment Act 1989 was introduced by the Hawke Government to deter and intimidate "illegal entrants," as a response to asylum seekers arriving following the Tiananmen Square massacre and collapse of the Soviet Union (Australia-Government, 2001)
1991: National Integrated Settlement Strategy was established to coordinate and integrate actions across the government related to migrant service needs (Department of Immigration and Multicural Affairs, 2006)
1993: The humanitarian program was separated from the migrant program
1997: Management of immigration detention centers was outsourced to private companies
2002: Australian Government froze asylum seeker applications from approximately 2,000 Afghans
2015: Migration Amendment (protection and other measures) Act 2015 revised the Migration Act 1958, including the creation of rules to refuse visa applications from those who fail to provide identity and the amendment of a framework related to unauthorized maritime arrivals (Australian Government, 2015)

Table A2. Overview of legislation toward refugees in Canada.

Canada has a complicated history before the 1950s, especially with Jewish refugees during the World War II. This report started compiling analyses from the mid-1950s
1951: The federal government issued the "Assisted Passage Loan Scheme" to help immigrants from Europe to pay for their transportation. These immigrants still have to pay the government back after 2 years, which is a rule still used today The Canadian Government resettled over 37,000 Hungarians between 1956 and 1957
1960: The Canadian Bill Of Rights was passed by the parliament, which established that every person has the right to life, liberty, and security
1968: Canada changed its laws to allow deserters from foreign armies to receive landed immigrant status
1969: Canada acceded to the 1951 convention relating to the status of refugees
1970: Canada issued a "guideline for determination of eligibility for refugee status" for use by immigration officers selecting refugees overseas
1972: The federal government accepted 7,000 Ugandan Asians
1976: A new immigration act was the first immigration legislation to recognize refugees as a special case of immigrants, which came into force in April 1978
1978: The CCR was formed, which has historical information of the country's responses to refugees (CCR, 2009)
Between 1978 and 1981, refugees made up 25% of all immigrants to Canada. Private sponsorship of refugees program was launched between 1979 and 1981, during the resettlement of 50,000 Southeastern Asian refugees
1987: Canada ratified the convention against torture
1989: Establishment of the guidelines on women refugee claimants fearing gender-related persecution. This action made Canada the first country in the world to implement these guidelines
2002: Immigration and refugee protection act came into force
2004: Safe third country agreement between the U.S. and Canada came into effect Newcomer's pathway to becoming a Canadian citizen is a straightforward process through the government settlements services The country has no anti-immigrant federal political parties (Seidle, 2016)
Canada is recognized as a world leader in protecting refugees, in which immigration and acquisition of citizenship are closely linked

Note: CCR: Canadian Council for Refugees

Table A3. Overview of legislation toward refugees in Germany.

Germany is a signatory to the Geneva Convention relating to the status of refugees of 1951 and has implemented it into the country's law, according to the timeline of migration history in Germany (DOMiD, 2016)
2005: A new immigration law came into effect, and integration was defined as a legal duty September 2008: A naturalization test was introduced as a step to receive citizenship. Applicants have to answer at least 17 of 33 questions correctly to receive naturalization
2008–2013: The Asylum Act and Residence Act are two important immigration laws in Germany which provide rules for the admission and handling of refugee claims. Several amendments have been made to these laws due to the current Syrian refugee crisis (Gesley, 2016b)
2014: The government convened the "Conference on the Syrian Refugee Situation: Supporting Stability in the Region" and called on European Union member states to significantly expand their contributions (https://www.icvanetwork.org/system/files/versions/141028-BerlinConferenceDeclaration.pdf)
August 2015: An Act to redefine the right to stay and the termination of residence entered into force. This act grants a residence permit to persons who can prove that they are "well-integrated" after a period of 8 years (4 years for minors)
October 20, 2015: Germany passed the Act on the Acceleration of Asylum Procedures, which aimed to: Accelerate the asylum process; substitute in-kind benefits for cash benefits; reduce the financial burden on states and municipalities; reform integration policies for refugees; and designate Albania, Kosovo, and Montenegro as safe countries of origin (Gesley, 2015)
November 2015: An act entered into force to improve the housing, care, and treatment of foreign minors and adolescents, as a strategy to enhance the situation of unaccompanied refugees
February 3, 2016: The German Government implemented the Asylum Package II with several objectives: To accelerate the asylum application process; suspend family reunification for refugees with subsidiary protection status for 2 years; decrease Asylees' monthly cash benefits; facilitate deportation; establish a new Federal Police unit to help procure replacement documents; improve the safety of refugee minors; and designate Algeria, Morocco, and Tunisia as safe countries of origin (Gesley, 2016a)

Table A4. Overview of legislation toward refugees in Greece.

First wave of emigration from Greece to other countries was stimulated by the economic crisis of 1893 (Kasimis and Kassimi, 2004)
More than one million Greeks emigrated between 1950 and 1974. Most of them went to western Europe, the U.S., Canada, and Australia
Immigration to Greece grew at the beginning of the 1980s when a small number of Asians, Africans, and Poles arrived and found work in construction, agriculture, and domestic services
The collapse of the central and eastern European regimes in 1987 transformed immigration to Greece into a massive and uncontrollable phenomenon
In the 1990s, Greece received the highest percentage of immigrants in relation to its labor force
A major factor that transformed Greece into a receiving country is its geographical location with extensive coastlines and easily crossed borders
The formation of a special control guard in 1998 in the northern border improved the situation in that area
2001: Act 2910 established a regularization program that dealt with "the admission and residence of foreigners in Greece and the acquisition of Greek nationality through naturalization." Due to their illegal status, a good number of immigrants escaped census registration, while still others entered the country specifically to take advantage of regularization
2002: Action Plan for the Social Integration of Immigrants for the period 2002–2005: Included measures for the labor market integration and training of immigrants; improved access to the health system; established emergency centers for immigrant support; and delineated measures for the improvement of cultural exchanges among the various ethnic communities (Magliveras, 2011).
2011: The European Court of Human Rights and the Court of Justice of the EU indicated that the asylum system in Greece has deficiencies, a lack of reception centers, and poor detention conditions, among other issues (Papademetriou, 2016)
2015: Greece implemented legislation to address immigration assistance, but problems remained, as noticed during the Syrian refugee crisis

Table A5. Overview of legislation toward refugees in Italy.

Italy has a complex system for assistance to asylum seekers and has signed international agreements for the protection of refugees (Figueroa, 2016)
2002: Art. 32 of Law #189 mandated the Protection System for Asylum Seekers and Refugees: Indicated direct participation by local authorities (municipalities) on a voluntary basis; established activation and management of reception projects across the country; and coordinated by the Central Service, a technical body managed by the National Association of Italian Municipalities (ANCI). Interior Ministry carries out monitoring, support, and information activities addressed to the same territorial projects (MSF, 2016).
Main law regulating the field of asylum and migration in Italy is the Consolidation Act on Immigration, partially modified in 2002 (EMN, 2012).
2009: The Security Package established issues relating to migration since 2009; entailed changes to the length of detention and imprisonment of irregular immigrants; funding for return of aliens; a 200 Euro fee for citizenship applications; an 80–200 Euro fee for stay permits (first issue and renewal); and stricter family reunification regulations
2009: The Second Security Act (Law 94/2009) denoted as criminal offense being without proper permit of stay in the country and increased the maximum period that migrants can be detained in Centers for Identification and Expulsion (OSF, 2012)
2010: The Integration Agreement regulates the "point-based permit of stay," which has to be signed by all adult foreigners applying for a residence permit in Italy and is valid for 2 years (EMN, 2012)
February 12, 2011: The DPCM declared "the state of emergency on the national territory due to the exceptional influx of citizens coming from North African countries" and gave civil protection to its management through the ordinance #3933 (MSF, 2016)
December 2011: The EU Blue Card (https://www.apply.eu) is a residence permit for highly qualified foreign workers and is designed to make Europe more attractive for professionals from other countries. All EU member states participate in the system, except the United Kingdom, Denmark, and Ireland
2014: Three-quarters of appeals resulted in the recognition of some form of international or humanitarian protection September 30, 2015: The Legislative Decree #142 recognizes asylum seekers' rights to protection at least until the first tier of the jurisdictional appeal is completed
2015: Under the SPRAR, the Interior Ministry established an increase in ordinary places for first reception to the amount of 15,550 by the end of 2016, as well as secondary reception to the amount of 32,000 in the 1st month of 2016, and at least 40,000 in 2017 (MSF, 2016)
April 1–30, 2016: The number of arrivals in Italy was approximately 9150 people, according to the European Union (FRA, 2016)

Note: EMN: European migration network, OSF: Open Science Foundations, DPCM: Decree of the President of the Council of Ministers, SPRAR: System for the Protection of Asylum Seekers and Refugees, FRA: Agency for Fundamental Rights

Table A6. Overview of legislation toward refugees in the United Kingdom.

The United Kingdom implemented several acts related to asylum and immigration, which are detailed by the ICAR, such as the ones detailed below (Ward, 2004)
1993: Asylum and Immigration Appeals Act was incorporated into law, which included the creation of more categories of applicants that could appeal for failed asylum applications, the permission to detain asylum seekers, while their claims were under consideration and the introduction of fingerprinting of asylum seekers
1996: Asylum and Immigration Act introduced a list of countries to be safe and their nations to have little risk of persecution, as well as established that housing and welfare benefits were restricted to applicants at the port of entry
1999: Immigration and asylum act introduced several guidelines to extend possibilities of claiming asylum by undocumented immigrants, established penalties for transporting undocumented immigrants to the country, and introduced the NASS to coordinate support for asylum seekers
2002: Nationality Immigration and Asylum Act implemented changes to asylum law and processes, which included the intention to better track asylum seekers in the national system and integrate refugees into the country
2004: Asylum and Immigration (Treatment of Claimants, etc.) Act established several provisions, including: People entering the United Kingdom without proper documents are subject to fine or prison for up to 2 years; people who traffic individuals for forced or coerced labor are subjected to fine or prison for up to 14 years; withdrawal of asylum support for unsuccessful asylum seekers who do not leave the United Kingdom voluntarily; connection of asylum seekers with local authorities to access housing; implementation of integration loans for refugees; regulation of the appeal system for refused asylum seekers; and electronic monitoring can be requested for people subject to immigration control
2012: Home office introduced temporary concession allowing Syrians already in the United Kingdom to apply for an extension to their visa or switch into a different visa category without having to leave the country (Gower and Cromarty, 2016)
January 29, 2014: the Syrian VPR Program was implemented. Even though the United Kingdom accepted asylum applications from Syrian refugees, the country focused on providing humanitarian aid to countries neighboring Syria, but not to offer resettlement to refugees (Feikert-Ahalt, 2016)
VPR initially prioritized most vulnerable Syrian refugees (sexual violence survivors, elderly, victims of torture, and disabled people). This program is separate but consistent with UNHCR's Syrian refugee resettlement program (HO/UK, 2017)
There was a call to extend the scheme, but the government approach remained to prioritize spending aid in countries neighboring Syria, rather than offering large-scale resettlement
September 2015: VPR was extended to receive up to 20,000 refugees

Note: VPR: Vulnerable Person Resettlement, ICAR: Information Centre about Asylum And Refugees, NASS: National Asylum Support Service, HO/UK: Home Office/United Kingdom

Author Guidelines

Before submitting for publication, please ensure that your paper and other supplementary files have been prepared and formatted in accordance with the guidelines below.

Submission structure, general style and format

Advanced Neurology requests that every new submission should be made and accompanied by 3 separate core files, namely manuscript, title page and back matter, and cover letter, whereas resubmission of revision file should be accompanied by 4 separate core files, namely manuscript, title page and back matter, cover letter, and response/rebuttal letter (collectively known as the revision file). Provision of supplementary files and/or confidential accessory files is optional or dependent on the nature of study and findings relevance. The table below briefly summarizes the type of files in a submission, their respective requirements and included items:

Type of file	File format	Requirements	Included items
(1) Manuscript	DOC or DOCX	- Use 1.5-spacing and format text in one column - Use page numbers and continuous line numbers - Font and size: Times New Roman, 12 - Insert tables and figures at the back of manuscript	- Manuscript title - Abstract (for original research article, review article and perspective article) - Keywords - Text - References - Tables (including caption and legend) - Figures (including caption and legend)
(2) Title page and back matter *	DOC or DOCX	- Use 1.5-spacing and format text in one column - Font and size: Times New Roman, 12	**<u>On the first page (title page):</u>** - Manuscript title - Authorship list (first and last names must be spelled out) - Author's affiliation, including department, institution, city, state, postal code, and country (indicated with superscript number) - Corresponding author information, including asterisk indication, mailing address and email - Indication of equally contributing authors (if any) with dagger symbol **<u>On the second page (back matter):</u>** - Acknowledgments - Funding - Conflict of interest (mandatory) - Author contributions (formatted as per CRediT) - Further disclosure about presentation of essential findings in conference(s) and/or upload of the paper to a preprint server
(3) Cover letter	DOC or DOCX	- Use 1.5-spacing and format text in one column - Font and size: Times New Roman, 12	- A brief explanation of what was previously known, the conceptual advancement with the findings and its significance to broad readership - A statement that "neither the manuscript nor any significant part of it is under consideration for publication elsewhere or has appeared elsewhere in a manner that could be construed as a prior or duplication of the same work" with author confirmation - If any, associated accession numbers or DOIs of the corresponding preprint version of the submission - [Optional] Name, affiliation and email address of up to 4 academically qualified (recommended) reviewers and/or name and affiliation of individuals who should be excluded from reviewing the submitted works on the grounds of conflict of interest
(4) Supplementary files		- Supplementary files should **not exceed 20 MB** in total (15MB individual file limit)	

- Supplementary tables or figures	DOC or DOCX	- Use 1.5-spacing and format text in one column - Use page numbers and continuous line numbers - Font and size: Times New Roman, 12 - Include both supplementary tables (editable) and figures (in JPEG, PNG or TIFF format) in the same file	- Supplementary tables - Supplementary figures
- Data set	XLS or XLSX	- All data should be neatly presented using consistent fonts	
- Videos	MP4	- If necessary, trim the video clip to focus only on essential parts, such as experimental procedures and findings or observation that can only be demonstrated using video(s) - Avoid unnecessary narrations that can be presented in written form	
(5) Confidential accessory files			
- Sample consent form (for human research only)	DOC, DOCX, PDF, JPEG, PNG or TIFF	- This is a sample, unsigned consent form that should bear the institution letterhead	
- Research ethics proof (for human and/or animal research only)	DOC, DOCX, PDF, JPEG, PNG or TIFF	- Ideally, this document should contain the essential research ethics information, such as ethics approval identifiers and the name of Institutional Ethics Review Board or Institutional Review Board - The research described in **original research article** should match the proposed research or significantly fit within the framework of the specification stipulated in the research ethics proof	
(6) Response/rebuttal letter (only applicable to revisions)	DOC or DOCX	- All comments/feedback and responses/rebuttals must be clearly and concisely presented	- Reviewers' comments and feedback - Authors' responses

* Ideally, all information given in the title page and back matter file, except for the manuscript title, should remain the same from the point of submission to paper acceptance. Thus, authors are responsible to ensure that all information therein is accurate before making submission. Refer to **Authorship and Author Information** section on **About the Journal** for more information about *Advanced Neurology*'s authorship policy.

Submitting authors should refer to the relevant sections in the following for more detailed information.

Author metadata during submission

During the submission process, the submitting author must ensure that all particulars of author information, including full name, affiliation, and email address, are given in the author metadata column of the submission system. These particulars must exactly reflect those on the title page of the submission; this includes the author order of the authorship list. Provide authors' ORCID ID, if available.

Article types

(1) Original research article

An original research article is based on original, basic and applied research and/or analysis. This type of article aims to describe significant and novel research. Authors of original research articles must confirm that the essential findings presented have never been published or under consideration elsewhere.

This article type typically has at least 5 tables and/or figures in total, approximately 40 references, and 7,000 words (inclusive of Abstract and References).

(2) Review article

A review article provides scholarly survey as well as balanced summarization and highlights of recent developments in a research field or emerging/future trends. Authors should ensure that all perspectives from different works are linked in balanced and cohesive manner, taking into consideration different schools of thought.

This article type typically has at least 5 tables and/or figures in total, approximately 70 references, and 7,000 words (inclusive of Abstract and References).

(3) Perspective article

A perspective article contains the author's scholarly opinions on a particular subject area or topic. Unlike a review, a perspective article covers a more specific part of the field, aiming to provide new insights into the subject matter. However, these perspectives or opinions should be objective in line with the spirit of academia. A good perspective piece should stimulate further discussions and initiate novel experiments.

This article type typically has 5 tables and/or figures in total, approximately 70 references, and 7,000 words (inclusive of Abstract and References).

(4) Case report

A case report serves to communicate new observations or findings such as an unexpected or rare diagnosis, complication of a known disease, treatment outcome, or clinical course in the human patients, that have been learnt from the clinical practice. The case as described in a case report must involve an important area of health and the report should present a clear and clinically useful message.

This article type typically has 1-3 tables and/or figures in total, approximately 15 references, and 2,000 words (inclusive of Abstract and References). In *Advanced Neurology*, the abstract of a case report is unstructured and should be in the length of 100-150 words. The main text should contain 4 main sections: Background, Case presentation, Discussion, and Conclusion.

(5) Letters

This article type is a collection of unsolicited letters from the readers who wish to comment on specific articles published in *Advanced Neurology* or another field-related journal. Alternatively, a letter can be written on an unrelated topic of interest to the journal's readership.

Ideally, a letter should present an in-depth, scholarly re-analysis of a previously published article in *Advanced Neurology* or in another field-related journal, accompanied by the reader's constructive insights and comments. Letters containing new ideas, supporting data or data criticizing the indicated article may be subjected to peer review at editors' discretion. Authors should specify the intended recipient of the letters, i.e., Editor or specific author(s).

This article type typically has no more than 3 tables and/or figures in total, no more than 20 references, and 2,000 words (inclusive of References). No Abstract is required.

(6) Editorial

An editorial piece is a solicited, concise commentary that highlights prominent topics in particular issue. Alternatively, an editorial represents the official opinions of the editors on the journal or special issue.

An editorial piece should not exceed 1,000 words (inclusive of References). Typically, an Abstract is not required and only 1 figure or table is allowed.

(7) Special feature article

Special feature articles are invited papers highlighting the following aspects:

- hot topics in the field encompassed by *Advanced Neurology*;
- new guidelines, recommendations, etc. in the diagnosis and therapeutic management of neurological diseases; and
- policies that are of interest to the researchers and physicians of clinical neurology.

Discussion outcomes stemming from meeting reports can be published in special feature articles, as long as they are relevant to the above-mentioned aspects.

Special feature articles containing new ideas, data and/or perspectives may be subjected to peer review at editors' discretion.

This article type typically has 5 tables and/or figures in total, approximately 70 references, and 7,000 words (inclusive of Abstract and References).

(8) Erratum

Authors should contact the editors of *Advanced Neurology* (editor.an@accscience.com) if certain errors made by the journal are found. The editors will evaluate the impact of the errors and decide on the appropriate course of action. Any corrections to a paper are published at the sole discretion of the editors.

(9) Corrigendum

Authors should contact the editors of *Advanced Neurology* (editor.an@accscience.com) if certain errors made by the authors are found. The editors will evaluate the impact of the errors and decide on the appropriate course of action. Any corrections to a paper are published at the sole discretion of the editors.

Language

All submissions must be written entirely in good American English. Spelling and use of punctuations should conform to conventions in American English. Clarity and conciseness are critical requirements for publications; therefore, submissions that are not clearly written will be returned to authors. Authors must ensure that their manuscripts are submit-ready or publish-ready before making submission. The articles published in *Advanced Neurology* are in adherence with the publishable standards of academic and scientific writing.

Please note that utilizing a language editing service is not a guarantee of acceptance.

Letter capitalization

Use sentence case capitalization in all aspects of the submission. In sentence case, most major and minor words are lowercase (proper nouns, including name of organizations and name of guidelines, are an exception in that they are always capitalized for the first letter of each word, except for minor words, such as conjunctions and short prepositions). The first letter of the first word should always be uppercase.

Manuscript title

The title should capture the conceptual significance for a broad audience. The title should not be more than 50 words and should be able to give readers an overall view of the paper's significance. Titles should avoid using uncommon jargons, abbreviations and punctuation.

Abstract

The purpose of abstract is to provide sufficient information and capture essential findings and/or messages of the paper. For full-length article, the length of an abstract should be in the range of 200-300 words. The abstract should be **unstructured**. Abstract is needed in original research article, review article, perspective article, case report and special feature article.

Keywords

Each submission should be accompanied by 3-6 keywords. Avoid using abbreviations and acronyms in keywords, unless they are established standard keywords. Separate keywords with semi-colons (i.e, term1; term2; term3).

Abbreviations and acronyms

Define abbreviations and acronyms upon their first appearance, **separately**, in the abstract, main text, table legends, and figure captions and legends.

Sections in article

(1) Section headings

Section headings should be in boldface. Examples of section headings of different levels are shown in the following:

Primary level : **1. Heart disease**

Secondary level : **1.3. Risk factors for heart disease**

Tertiary level : **1.3.2. Hypertension**

Authors are suggested **NOT** to introduce further sub-sections after the tertiary level section (e.g., **1.3.2.1. High-salt diet**).

(2) Special sectioning requirements for an original research article

- The introduction should provide a background that gives a broad readership an overall outlook of the field and the research performed. It tackles a problem and states its important regarding with the significance of the study. Introduction can conclude with a brief statement of the aim of the work and a comment about whether that aim was achieved.

- **Materials and Methods.** This section provides the general experimental design and methodologies used. The aim is to provide enough detail to for other investigators to fully replicate the results. It is also required to facilitate better understanding of the results obtained. Protocols and procedures for new methods must be included in detail for the reproducibility of the experiments. Informed consent should be obtained from patients or parents before the experiments start and should be mentioned in this section. For human and/or research, research ethics information, such as ethics approval identifiers and the name of Institutional Ethics Review Board or Institutional Review Board, should be indicated in this section.

- This section focuses on the results and findings of the experiments performed. After (statistical) analysis, all results, including tables and figures, must be neatly presented. If necessary, this section can be sub-divided into multiple topical sub-sections.

- This section should provide the significance of the results and identify the impact of the research in a broader context. It should not be redundant or similar to the content of the results section.

- Use this section for interpretation only, and not to summarize information already presented in the text or abstract.

It is acceptable to merge both Results and Discussion as a single section.

Data and image processing

Post-acquisition processing of images, photos and figures should be kept minimum to ensure that the final figures accurately reflect the original data as it was captured and/or produced. Any alterations should be applied to the entire image. Any kind of alteration, including but not limited to brightness, contrast and color balance, has to be clearly stated in the figure legend and in Materials and Methods section. For simulated or model figures, the software used for production, editing, and/or processing should be mentioned. Presenting images in the same figure must be made apparent and should be explicitly indicated in the appropriate figure legends.

Data comparisons should only be made from comparative experiments (or data from the same experiment). Same piece of data or figure should not be used in multiple instances, unless the images/data describe different aspects of the same experiment (reasons must be stated, wherever appropriate, in this regard). If inappropriate image/data manipulation is identified after publication, the editors reserve the right to ask for the original data and, if that is not satisfactory, to issue a correction or retract the paper, as appropriate.

Unit of measurements

Use SI units.

Nomenclature of genus and species

Write in italics (e.g. *Escherichia coli*). The full genus and species names must be mentioned both in the manuscript title at the first appearance of an organism in an article. The abbreviation (e.g. *E. coli*) is allowed after first mention.

Nomenclature of genes, mutations, genotypes, and alleles

Write in italics. *Advanced Neurology* highly encourages the use the recommended names found in the gene nomenclature databases, for instance, **HUGO Gene Nomenclature Committee**.

Chemical compounds

Advanced Neurology requires authors to fulfill the requirements below while reporting and/or describing a chemical compound in articles:

Scenario	Requirements
Naming chemical compounds	Use either IUPAC conventions or common names such as cholesterol and cephalosporins
Reporting a new chemical compound	Provide the exact structure of the compound as well as sufficient data regarding the purity and identity of the compound
Reporting the use of a known chemical compound	Provide sufficient data regarding the source, purity and identity of the compound

Figures

Include all figures, including photographs, scanned images, graphs, charts and schematic diagrams, at the back of manuscript. Avoid unnecessary decorative effects (e.g., 3D graphs) and minimize image processing (e.g., changes in brightness and contrast applied uniformly for the entire figure should be avoided or minimized). All images should be set against white background.

All figures should be numbered (e.g., **Figure 1**, **Figure 2**) in boldface. Label all figures (e.g., axis, structures), and add caption (a brief title) and legend as a description of the illustration below each figure. Explain all symbols and abbreviations used. Each figure should have a brief title (also known as caption) that describes the entire figure without citing specific panels, followed by a legend, which is either the description of each panel or further description about the single image. Identify each panel with uppercase letters in parenthesis (e.g. (A), (B), (C), etc.) Figures must be cited in chronological manner in the text.

The preferred file formats for any separately submitted figure(s) are JPEG, PNG and TIFF. All figures should be of optimal resolution. Optimal resolutions preferred are 300 dots per inch (dpi) for RBG colored, 600 dpi for grayscale and 1,200 dpi for line art. Although there is no file-size limitation imposed, authors are highly encouraged to compress their figures to an ideal size without unduly affecting the legibility and resolution of figures.

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Include all tables at the back of manuscript. Editable tables created using Microsoft Word are preferred. A table should be accompanied by a caption on top of it. Captions and legends (which are placed beneath table) should be concise. All tables should be numbered (e.g., **Table 1**, **Table 2**) in boldface. Explain all symbols and abbreviations used. Tables must be cited in chronological manner in the text.

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Lists and math formulae should be properly aligned and included within the main body of the manuscript. List them using Roman numerals in parenthesis (e.g. (I), (II), (III), (IV), etc.) Lists and math formulae must be cited in chronological manner in the text.

Lists and math formulae should be given in editable text and not as images. Use the solidus (/) for small fractional terms, e.g., X/Y. In principle, variables should be italicized.

Footnotes

Do not use footnotes.

In-text citations

Reference citations in the text should be numbered consecutively in superscript square brackets. Some examples:

- Negotiation research spans many disciplines[3,4].
- This result was later contradicted by Becker and Seligman[5].
- This effect has been widely studied[1–3,7].

Do not include citations in the Abstract.

Personal communications and unpublished works can only be used in the manuscript and are not to be placed in the References section. Authors are advised to limit such usage to the minimum. These should be made identifiable by stating the authors, year of personal communications or unpublished works, and the words “personal communication” or “unpublished” in parenthesis, e.g., (Smith J, 2000, unpublished).

References

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(1) Journals

Journal article (print) with 1-3 authors:

Younger P, 2004, Using the internet to conduct a literature search. *Nurs Stand*, 19(6): 45–51.

Journal article (print) with more than 3 authors:

Gamelin FX, Baquet G, Berthoin S, *et al*., 2009, Effect of high intensity intermittent training on heart rate variability in prepubescent children. *Eur J Appl Physiol,* 105(1): 731–738.

Journal article (online) with 1-3 authors:

Jackson D, Firtko A, Edenborough M, 2007, Personal resilience as a strategy for surviving and thriving in the face of workplace adversity: A literature review. *J Adv Nurs*, 60(1): 1–9. http://doi.org/10.1111/j.1365-2648.2007.04412.x

Journal article (online) with more than 3 authors:

Hargreave M, Jensen A, Nielsen TSS, *et al*., 2015, Maternal use of fertility drugs and risk of cancer in children — A nationwide population-based cohort study in Denmark. *Int J Cancer*, 136(8): 1931–1939. http://doi.org/10.1002/ijc.29235

(2) Books

Book with 1-3 authors:

Schneider Z, Whitehead D, Elliott D, 2007, *Nursing and Midwifery Research: Methods and Appraisal for Evidence-based Practice*, 3rd edn, Elsevier Australia, Marrickville, NSW, 112–130.

Book with more than 3 authors

Davis M, Charles L, Curry MJ, *et al*., 2003, *Challenging Spatial Norms*, Routledge, London, 12–30.

Chapter or article in book

Knowles MS, (eds) 1986, Independent study, in *Using Learning Contracts*, Jossey-Bass, San Francisco, 89–96.

(3) Preprints

Preprint article with 1-3 authors:

Ulgen A, Gurkut O, Li W, 2019, Potential Predictive Factors for Breast Cancer Subtypes from a North Cyprus Cohort Analysis. *medRxiv*. https://doi.org/10.1101/19010181

Preprint article with more than 3 authors:

Wu S, Sun P, Li R, *et al*., 2020, Epidemiological Development of Novel Coronavirus Pneumonia in China and Its Forecast. *medRxiv*. https://doi.org/10.1101/2020.02.21.20026229

(4) Others

Proceedings of meetings and symposiums, conference papers:

Chang SS, Liaw L, Ruppenhofer J, (eds) 2000, *Proceedings of the twenty-fifth annual meeting of the Berkeley Linguistics Society, February 12–15, 1999: General session and parasession on loan word phenomena*. Berkeley Linguistics Society, Berkeley, 12–13.

Conference proceedings (from electronic database):

Wang T, Cook C, Derby B, 2009, Fabrication of a glucose biosensor by piezoelectric inkjet printing. *Proceedings of the Third International Conference on Sensor Technologies and Applications, 2009 (SENSORCOM-M'09)*, 82–85.

Online document with author names:

Este J, Warren C, Connor L, *et al*., 2008, Life in the clickstream: The future of journalism, Media Entertainment and Arts Alliance, viewed May 27, 2009, http://www.alliance.org.au/documents/ foj_report_final.pdf

Online document without author name:

Developing an argument, n.d., viewed March 30, 2009, http://web.princeton.edu/sites/writing/Writing_Center/WCWritingResources.htm

Thesis/Dissertation:

Gale L, 2000, The relationship between leadership and employee empowerment for successful total quality management, thesis, *Australasian Digital Thesis database*, University of Western Sydney, 110–130.

Standards:

Standards Australia Online, 2006, Glass in buildings: selection and installation, AS 1288-2006, amended January 31, 2008, *SAI Global database*, viewed May 19, 2009.

Government report:

National Commission of Audit, 1996, *Report to the Commonwealth Government*, Australian Government Publishing Service, Canberra.

Government report (online):

Department of Health and Ageing, 2008, Ageing and aged care in Australia, viewed November 10, 2008, http://www.health.gov.au/internet/main/publishing.nsf/Content/ageing

No author:

Guide to agricultural meteorological practices, 1981, 2nd ed, Secretariat of the World Meteorological Organization, Geneva, 10–20.

Note: When referencing an entry from a dictionary or an encyclopedia with no author there is no requirement to include the source in the reference list. In these cases, only cite the title and year of the source in-text. For an authored dictionary/encyclopedia, treat the source as an authored book.

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Contributor role	Definition
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Authors are advised to follow *Advanced Neurology*'s preferred style of writing the Author Contributions statement. See an example below:

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Investigation: Ali Jackson, Tom Lewis-Hans, Han Xiang

Formal analysis: Han Xiang

Writing – original draft: Ali Jackson

Writing – review & editing: Helen Meyer, Joshua O'Brien

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This section is optional and contains all materials and figures that are excluded from the manuscript. These materials, figures or additional information are relevant to the manuscript but remain non-essential to readers' understanding of the manuscript's main content. All supplementary information should be submitted as a separate file during submission.

Supplementary figures and tables should be submitted in a single, separate supplementary file, and must be numbered, for example, **Figure S1** and **Table S1**. All tables must be editable (preferably created from Microsoft Word). The acceptable formats of images and illustrations used in figures are JPEG, PNG and TIFF. Citations of these items must be appropriately referenced in the manuscript in chronological manner, for instance, "Additional information can be found in **Table S1**." Note the additional letter **S** helps distinguish the normal from supplementary items.

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If the editorial decision for a submission is major revision or minor revision, authors are advised to revise the manuscript (and possibly, the supplementary files) as per the review reports and resubmit the revision file, including the manuscript, title page and back matter, cover letter, and response/rebuttal letter, before the due date.

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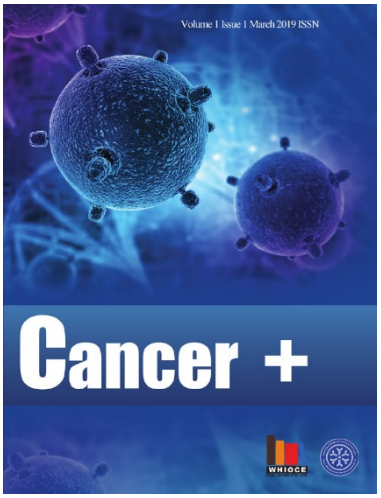

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