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Original Research Article

Sleep Change of English, French and Chinese speaking Immigrants in Ottawa and Gatineau, Canada

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ABSTRACT

Objectives: This multicultural study aimed at examining sleep change of English, French and Chinese speaking immigrants in Ottawa and Gatineau, Canada, and identifying demographic factors that impact the change.
Materials and Methods: 810 immigrants of the three language sub-groups were recruited by purposive-sampling. Using self-reports, respondents answered questions of sleep change (sleep behavior change and sleep belief change) and demography in Multicultural Lifestyle Change Questionnaire of English, French or Chinese version. Data were analyzed statistically.
Results: Immigrants of different gender, language and category sub-groups exhibited different Sleep Time Change Rates, Sleep Time Increasing Rates, Sleep Time Decreasing Rates, Sleep Quality Change Rates, Sleep Quality Improving Rates, Sleep Quality Declining Rate and Sleep Belief Change Rates, but no statistical difference between the rates. Sleep Change (Sleep Behavior Change + Sleep Belief Change) and Sleep Behavior Change were correlated negatively with Mother Tongue, and positively with Age and Primary Occupation. Age and Primary Occupation significantly impacted Sleep Change. Gender significantly impacted Sleep Behavior Change. Mother Tongue significantly impacted Sleep Belief Change.
Conclusion: Immigrants of different sub-groups in Canada experienced different sleep changes. Age and Primary Occupation were main impacting factors. Gender was a sleep behavior influencing factor. Mother Tongue was an important sleep belief affecting factor. Culture was a significant contributing factor. Acculturation was a relating impacting factor. Data may provide evidence and implication for immigrant health policy-making and policy-revising in Canada.
Key words: Immigration, Culture, Acculturation, Sleep Change, Difference, Impacting Factors.

INTRODUCTION

Immigrants can have changes of sleep duration and quality after immigration, [1] and immigrant status impacted sleep duration. [2] A studyexhibits that first generation Korean-American older adult immigrant men and women reported sleep interruptions and dissatisfaction with the quality of their sleep. [3] Other studydisplays that time and quality of sleep were severely affected among women immigrated to Canada. [4] Indeed, immigration could impact differently women of various ethnic backgrounds. For example, it was shown

that Chinese immigrant women had more sleeping problems than women belonging to other racial groups. [5] Similarly, some of studies demonstrate that Chinese immigrants, in particular elderly Chinese immigrants, had more sleeping problems (i.e. lose sleep, many dreams and nightmares, and waked up early) compared to Canadian counterparts. [5-8] Nevertheless, no research has directly compared difference between male and female immigrant sub-groups, between Chinese and other immigrant language sub-groups (i.e. English and French speaking immigrant sub-groups), and between different immigrant category sub-groups in sleep time change, sleep quality change and sleep belief change in related academic literatures.

English speaking immigrants represent one of the largest ethnic or cultural immigrant sub-groups in Canada and are the largest immigrant sub-group in the Ottawa (Ontario)- Gatineau (Québec) region, [9,10] while French speaking immigrants are one of principal ethnic immigrant groups in Québec and the second largest immigrant sub-group following English speaking immigrants in the Ottawa- Gatineau region. [9-11] Chinese speaking Canadians have constituted the largest ethnic immigrant sub-group entering Canada, one of the fastest-growing sub-groups in Canada since 1987 and the fourth largest sub-group following Arabic speaking immigrants in the region. [10,11,13]

The main objectives of this study were to explore the differences in Sleep Change among different sub-groups of immigrants as well as to explore the correlations and relationships between Sleep Dependent Variables (Sleep Behaviour Change and Sleep Belief Change) and Demographic Independent Variables (Mother Tongue, Age, Gender, Category of Immigration, Employment Status, Primary Occupation and etc). The explorations show far-reaching significance in multicultural health research, health care, health policy-making and health promoting program in Canada and other immigrant countries.

Ethical Approval

The immigrant sleep change study was part of a multicultural lifestyle change research project that was approved by Social and Behavioural Research Ethics Committee, Flinders University in Australia in 2010 and by Office of Research Ethics and Integrity, University of Ottawa in Canada in 2014.

MATERIALS AND METHODS

Survey Method:

English, French and Chinese speaking immigrants at Adult Educational Centres/Schools, Christian Community Churches and Communities in Gatineau and Ottawa of Canada were identified as the target population of this multicultural cross-sectional study. Random sampling was impracticable for the study and could be biased because immigrant status of these three ethnic sub-groups could not be identified effectively according to the sampling criteria. Purposive-sampling method was applied in the multicultural study to recruit qualified immigrant participants. [14,15] The participants must have been 18 years or older, have resided in Ottawaor Gatineau one year or more, and had been 16 years or older when they arrived in Canada. In total, 810 qualified English, French and Chinese speaking volunteering immigrant participants were recruited to the study. All participants answered questions relating to sleep change (sleep behavior change and sleep belief change) and demography in a trilingual (English, French and Chinese) Multicultural Lifestyle Change Questionnaire developed by the authors, with all responses self-reported. The Multicultural Lifestyle Change Questionnaire was demonstrated by

a pilot-test in the three immigrant sub-groups to have high validity (Pearson correlation coefficient r= 0.435 > satisfactory value 0.40), [16,17] and reliability (alpha coefficient α=0.754 > satisfactory value 0.70) before the multicultural study. [18,19]

Sleep Change consists of Sleep Behavior Change and Sleep Belief Change (dependent variables). Sleep Behavior Change included Sleep Time Change and Sleep Quality Change. Sleep Time Change was identified based on response choices of two sleep time questions in the Multicultural Lifestyle Change Questionnaire –"Before arrival in Canada, on average, how many hours of sleep did you get each day?" (question one) and "Since arrival in Canada, on average, how many hours of sleep do you get each day?" (question two). The same alternatives of two questions were "A. 6 hours or less", "B. 7 – 8 hours", "C. 9 hours", "D. 10 hours or more" and "E. Do not know". The respondent was identified experiencing Sleep Time Change if there were different choices in the alternatives of two questions except alternative "E" (i.e. picking "A" in the alternatives of question one and choosing "B" in the alternatives of question two).Meanwhile, the respondent was identified experiencing Sleep Time Increase if choosing alternative "C" in the alternatives of question one and alternative "D" in the alternatives of question two. On the contrary, the respondent was identified experiencing Sleep Time Decrease if choosing alternative "C" in the alternatives of question one and alternative "B" or "A" in the alternatives of question two.

Sleep Quality Change was identified according to response choices of two sleep quality questions in the Questionnaire– "Before arrival in Canada, how was your quality of sleep each day?" (question one) and "Since arrival in Canada, how is your quality of sleep each day?" (question two). The same alternatives of two questions were "A. Excellent", "B. Very good", "C. Good", "D. Fair(neither good nor bad)", "E. Bad", "F. Very bad, "G. Extremely bad" and "H. Do not know". The respondent was identified experiencing Sleep Quality Change if there were different choices in the alternatives of two questions except alternative "H" (i.e. picking "A" in the alternatives of question one and choosing "B" in the alternatives of question two).Meanwhile, the respondent was identified experiencing Sleep Quality Improvement if choosing alternative "C" in the alternatives of question one and alternative "B" or "A" in the alternatives of question two. On the contrary, the respondent was identified experiencing Sleep Quality Decline if choosing alternative "C" in the alternatives of question one and alternative "D" or "E" in the alternatives of question two.

Sleep Belief Change was identified based on response choices of two sleep belief questions in the Questionnaire– "Before arrival in Canada, which of these statements best describes your belief with regards to sleep?" (question one) and "Since arrival in Canada, which of these statements best describes your belief with regards to sleep?" (question two). The same alternatives of two questions were "A. Daily high quality sleep of 7-8 hours contributes extremely to health", "B. … contributes greatly to health", "C. … contributes to health", "D. … contributes somewhat to health", "E. … contributes less than somewhat to health", " F. … not contribute to health" and "G. Do not know". The respondent was identified experiencing Sleep Belief Change if there were different choices in the alternatives of two questions except alternative "G" (i.e. picking "A" in the alternatives of question one and choosing "B" in the alternatives of question two).

Immigrant status of English or French or Chinese speaking subjects was identified by response of "Original Country" question in the Questionnaire– "What is your country of origin?".

Demographic characteristics (independent variables) of the study population were identified according to response choice of the demographic questions relating to "Mother Tongue", "Speaking Language", "Age", "Gender", "Marital Status", "Category of Immigration", "Duration of Residence", "Education", "Employed Status", "Employed Status", "Occupation", "Religion" and "Income" in the Questionnaire.

Data in Sleep Change and Demography were analyzed statistically for the different immigrant sub-groups.

Statistical Methods:

Rates in Sleep Change were calculated respectively, which included Sleep Time Change Rates, Sleep Time Increasing Rates, Sleep Time Decreasing Rates, Sleep Quality Change Rates, Sleep Quality Improving Rates, Sleep Quality Declining Rate and Sleep Belief Change Rates in the Sampled Immigrant Subjects, the Gender (Male and Female)Sub-groups, the Language (English, French and Chinese speaking) Sub-groups and the Category (Principal Applicant Immigrant, Spouse and Dependant Immigrant, Family Class Immigrant, Other / Refugee Immigrant)Sub-groups. Chi-square tests were performed to test if there were significant difference between the rates of Gender Sub-groups, Language Sub-groups and Category Sub-groups in Sleep Change. Following the descriptive analysis, correlation analysis was performed to test if there were correlation between demographic (independent) variables –Mother Tongue, Age, Gender, Category of Immigration, Employment Status, Primary Occupation and etc, and the dependent variables -Sleep Change (Sleep Behavior Change + Sleep Belief Change) and Sleep Behavior Change. The objectives were to measure a relationship between the independent variables and dependent variables. Finally, multiple linear regression analysis was used to determine the overall relationships between these variables or to test if the independent variables had significantly impacted the dependent variables.

RESULTS

Table 1: Rates of Different Immigrant Sub-groups in Sleep Change.

Item		Sleep Change						
		Sleep Behavior Change						Sleep Belief Change
		*Sleep Time Change Rate %	Sleep Time Increasing Rate %	Sleep Time Decreasing Rate %	Sleep Quality Change Rate %	Sleep Quality Improving Rate %	Sleep Quality Declining Rate %	Sleep Belief Change Rate %
Total Sampled Immigrant Subjects (810)		55.43	27.78	27.65	71.48	35.68	35.80	52.35
Gender Sub-groups	Male Immigrants (411)	57.66	32.60	25.79	68.86	37.23	31.63	49.88
	Female Immigrants (399)	53.13	22.81	30.33	74.19	34.09	40.10	54.89
Language Sub-groups	English SpeakingImmigrants (278)	60.43	32.37	28.06	71.58	35.97	35.61	35.97
	French Speaking Immigrants (268)	61.19	20.52	40.67	70.90	24.25	46.64	55.60
	ChineseSpeakingImmigrants (264)	43.56	30.30	14.02	71.97	46.97	25.00	66.29
Category Sub-groups	Principal Applicant Immigrants (193)	58.03	34.72	23.32	69.43	37.82	31.61	55.44
	Spouse and Dependent Immigrants (193)	45.60	26.42	19.17	65.80	33.16	32.64	52.33
	Family Class Immigrants (354)	58.19	26.55	31.64	74.86	37.29	37.57	52.26
	Other (Refugee) Immigrants (70)	61.43	18.57	42.86	75.71	28.57	47.14	44.29

Notes: *Sleep Time Change Rate = sleep time change subjects / sampled subjects x 100%

Rates in Sleep Change:
Rates to be analyzed statistically in Sleep Change were presented in Table1: Rates of Different Immigrant Sub-groups in Sleep Change.

Significance Level:
The results of significant level analysis were presented in Table 2: Significance Level of Sleep Change Rates of Different Sub-groups.

Table 2: Significance Levelof Rates ofDifferent Immigrant Sub-groups in Sleep Change

Item	Chi-square	p-value	*Significant Difference
Rates of Male and Female Immigrant Sub-groups in Sleep Change	14.000	0.374	No
Rates of English, French and Chinese Speaking Immigrant Sub-groups in Sleep Change	42.000	0.302	No
Rates of Principal Applicant, Spouse and Dependent, Family Class, Other/Refugee Immigrant Sub-groups in Sleep Change	84.000	0.388	No

Notes: *Significance Level: P < 0.05

Multivariate Analysis:
Multivariate (correlation and regression) analysis results of Immigrant Sleep Change were presented in Table 3: Multivariate Analysis of Immigrant Sleep Change.

Table 3: Multivariate Analysis of Immigrant Sleep Change

Correlation Analysis					Multiple Linear Regression Analysis			
Dependent Variable	Independent Variable	Pearson's r	*p-value	Correlation between Independent Variable and Dependent Variable	Dependent Variable	Independent Variable	p-value	Impact of Independent Variable on Dependent Variable
Sleep Change (Sleep Behavior Change + Sleep Belief Change)	Mother Tongue	-0.139	0.000	Negative Correlation	Sleep Change (Sleep Behavior Change + Sleep Belief Change)	Mother Tongue	0.000	Significant Impact
	Age	0.193	0.006	Positive Correlation		Age	0.001	Significant Impact
	PrimaryOccupy	0.120	0.001	Positive Correlation		Primary Occupy	0.026	Significant Impact
SleepBehavior Change	Mother Tongue	-0.175	0.000	Negative Correlation	Sleep Behavior Change	Gender	0.038	Significant Impact
	Age	0.246	0.000	Positive Correlation		Age	0.000	Significant Impact
	Primary Occupy	0.171	0.000	Positive Correlation		Primary Occupy	0.006	Significant Impact

Notes: *Significance Level: P < 0.05

DISCUSSION

Rates in Sleep Change

Total Sampled Subjects:

The results of rates in Sleep Change show that most of immigrants changed their sleep time and sleep quality. About half of them increased or decreased sleep time and improved or decline sleep quality. However, their sleep belief had greater change than sleep time and sleep quality, which displayed that some of immigrants changed sleep behavior, but did not change sleep belief. Sleep and sleep change of immigrants could be impacted by various factors. For example, according to American Academy of Sleep Medicine, sleep times are influenced by race, ethnicity and country of origin, [20] and integration of immigrants into a new culture is related to poor sleep quality. [4] However, some of studies show that immigrant sleep was associated with acculturation. [21-24] Acculturation has been broadly described as "the process by which immigrants adopt the attitudes, values, customs, beliefs, and behaviors of a new culture". [25,26] Acculturation is an indication of the cultural change of minority individuals to the majority culture. [27]

Gender Sub-groups:

The results expose that different gender sub-groups had different Sleep Change. Sleep Time Change Rate, Sleep Time Increasing Rate, Sleep Quality Improving rate of male immigrants were higher than those of female immigrants, but their Sleep Time Decreasing Rate, Sleep Quality Change Rate and Sleep Quality Declining Rate were lower. Male immigrants had greater sleep time change and longer sleep time. However, female immigrants had greater sleep quality change and lower sleep quality. A study in Germany shows that sleep quality of Portuguese immigrants was known to be poorer in women than in men. [4] Similarly, other study in US exhibits that female old immigrants from Korea in America had more sleep insufficiency and interruption than male immigrants. [3]

It is known that female immigrants had higher Sleep Belief Change Rate, which seems that they could be influenced more easily by new cultural and social environmental factors, and have higher sleep level of acculturation.

Language Sub-groups:

The results disclose that different language sub-groups showed different Sleep Change. French immigrants had the greatest sleep time change and the shortest sleep time, while English immigrants had the greatest increase of sleep time. However, Chinese immigrants had the least decrease of sleep time. A study in the US exhibits that African/Caribbean immigrants and non-Hispanic white immigrants existed difference in sleep duration. [28] According to American Academy of Sleep Medicine, African-born (French speaking) Americans were more likely to report sleeping six hours or less, [20] which was similar to the study finding for French immigrants in the multicultural sleep change survey.

It is interesting to note that Chinese immigrants had the greatest sleep quality change and sleep quality improvement, while French immigrants had the least sleep quality change and sleep quality improvement.

It is worth to be mentioned that difference of sleep change of different language sub-groups could be associated with acculturation, because language is widely recognized as a dominant factor in the assessment of acculturation level. [29,30] For instance, a study of female immigrants in the US discloses that women with higher levels of language acculturation had greater odds of reporting any sleep complaint compared to those with less language acculturation, and significant mediation effects of acculturation were only found for Hispanic/Latina and Japanese women, but not for Chinese women. [24] Meanwhile, other study in the United Sates reveals that Mexico-born immigrants increased acculturation correlated to an increased risk of poor sleep compared to America-burn Mexicans. [22] Additionally, highly acculturated Hispanic males in the US had significantly more prevalence of poor sleep quality compared to Non-Hispanic Whites. [31]

It is known that Chinese immigrants had the greatest Sleep Belief Change, which appears to be due to cause of greater cultural difference between original country and host country. Nevertheless, English immigrants had the least Sleep Belief Change, which seems to be owing to reason of cultural similarity between the native countries and the host country.

It is inferred that difference of acculturation level of English, French and Chinese immigrants could contribute difference of their sleep change. For example, Chinese immigrants had greater sleep change, which could be due to their higher level of sleep acculturation as

compared to English and French immigrants.

Category Sub-groups:

The results display that different category sub-groups also showed different Sleep Change. Principal Applicant Immigrants had the greatest Sleep Time Increase and Sleep Quality Improvement, while Spouse and Dependent Immigrants had the least Sleep Time Change, Sleep Time Decrease and Sleep Quality Change. Family Class Immigrants had greater Sleep Time Change and Sleep Time Decrease than Principal Applicant and Spouse and Dependent Immigrants, greater Sleep Quality Change, Sleep Quality Improvement, Sleep Quality Decline than Spouse and Dependent and Other (Refugee) Immigrants. However, Other (Refugee) Immigrants had the greatest Sleep Time Change, Sleep Time Decrease, Sleep Quality Change and Sleep Quality Decline.

It is known that Principal Applicant Immigrants had the greatest sleep belief change, which seems that they could accept new culture more possibly or have the highest level of acculturation. Spouse and Dependent Immigrants and Family Class Immigrants had similar sleep belief change, which appears that they could have resembling sleep acculturation level. Nevertheless, Other (Refugee) Immigrants had the lowermost sleep belief change rate, which seems that they could hold steady original sleep belief and have lower sleep belief acculturation.

It is deduced that immigrants of different category sub-groups could have different level of sleep acculturation, which contributed difference of their sleep change.

Significance Level:

Though there was no statistical significance difference between rates of different sub-groups in Sleep Change, percent comparisons exhibit that there were greater or very great differences between some of the rates.

Multivariate Analysis:

The results of correlation analysis show that Sleep Change (Sleep Behavior Change + Sleep Belief Change) and Sleep Behavior Change were correlated negatively with Mother Tongue and positively with Age and Primary Occupation. Mother Tongue, Age, Primary Occupation were correlated with Sleep Behavior Change and Sleep Belief Change. Culture was correlated with Sleep Change. Immigrants of different language, age and occupation sub-groups exhibited different sleep change.

Furthermore, the results of regression analysis disclose that Mother Tongue, Age and Primary Occupation significantly impacted Sleep Change (Sleep Behavior Change + Sleep Belief Change), and Gender, Age and Primary Occupation significantly impacted Sleep Behavior Change. Therefore, Age and Primary Occupation significantly impacted both Sleep Behavior Change and Sleep Belief Change, and were their determinants. Gender significantly impacted Sleep Behavior Change and its determinant. Immigrants of male and female sub-groups displayed significant difference of Sleep Behavior Change. Mother Tongue significantly impacted Sleep Belief Change and was its determinant, because it significantly impacted Sleep Change, but did not significantly impacted Sleep Behavior Change. Immigrants of different language sub-groups had significant difference of Sleep Belief and Sleep Belief Change. Culture could significantly impact Sleep Belief and/or Sleep Belief Change.

Believably, the results of this sleep change study can provide evidence for making and/or revising policies related to immigrant health in Canada, which may regulate or adjust health care and service for immigrants, make more effectively health

promotion program in sleep, lessen risk of diseases, and reduce health inequality and inequity for immigrants. The data may help Health Canada policy makers to source and consider evidence of sleep change for the vulnerable andmarginalized population in decision-making and policy-modifying process, and to adapt appropriately evidence, prior to and during formulating new health policy or revising previous health policy. Therefore, Canadian immigrants can improve their sleep and experience healthier status to contribute Canadian economic and social development.

CONCLUSION

The English, French and Chinese speaking immigrants in Canada experienced sleep change. However, immigrant sub-groups of different gender, language and category exhibited different changes. Different factors contributed to the changes. Age and Primary Occupation were main factors to impact Sleep Change. Gender was one of factors to influence Sleep Behavior Change. Mother Tongue was an important factor to affect Sleep Belief Change. Culture was a significant factor to contribute Sleep Change because cultural factor influenced sleep of immigrants [Voss and Tuin 2008]. Acculturation was a relating factor to impact Sleep Behavior Change and Sleep Belief Change. Data may provide evidence and implication for health policy-making and policy-revising in Canada.

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Conflict of interests: All of the authors declare that they have no conflict of interests.

Contributorship:

Ning Tang was principal researcher in the multicultural study and responsible for research proposal, sampling survey, statistical analysis of data and paper writing. Colin MacDougall was responsible for supervision of study. Dr. Danijela Gasevic was a research advisor of the study.

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