

# Age and Gender Variations in Healthy Immigrant Effect: a Population Study of Immigrant Well-Being in Canada

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**Abstract** The *healthy immigrant effect* (HIE) is the phenomenon in which immigrants show better health than their native-born counterparts but this healthier condition declines with length of residence. This study investigated whether (1) immigrants also show better adaptation than non-immigrants as well as better health, (2) length of residence affects their health and adaptation differently, and (3) differential outcomes are found for different age and gender groups. Utilizing the Canadian Community Health Survey (2011–2012) data, immigrants ( $N = 17,555$ ) and non-immigrants ( $N = 103,579$ ) were divided into *adolescents* (15–19 years old), *adults* (20–49), *older adults* (50–64), and *seniors* (65–74) to examine their subjective general and mental health, diagnosed chronic and psychological illnesses, and self-reported daily stress, life satisfaction and sense of belonging. After controlling for key demographics, HIE was found to be more robust in health than adaptation. In general, recent immigrants reported better health conditions than long-term immigrants; however, the two did not differ with daily stress or life satisfaction. The *older adult* immigrants were the only segment of the immigrant population who did not display HIE; within the immigrant population, working-aged long-term *adult* immigrants were those experiencing negative well-being in both health and adaptation compared to the same-aged recent immigrants. Regarding diagnosed psychological illnesses, immigrants yielded no difference by age, gender, or length of residence, indicating ‘reluctant’ views on seeking professional help for mental health were persistently held by both recent and long-immigrants. The findings suggest that health policy needs to take into consideration age-related life stages, and enhancement of mental health awareness for immigrant well-being.

**Keywords** Immigrant well-being · Health · Adaptation · Healthy immigrant effect · Age · Gender

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The *healthy immigrant effect* (HIE) is defined as advantages in health status displayed by immigrants over native-born counterparts that diminish as their length of residence increases (e.g., De Maio 2010), and has been an important focus in the studies of immigrant population and public health. Even though this phenomenon has been found across several immigrant receiving countries (e.g., Ali et al. 2004; Constant et al. 2015; Kennedy et al. 2015; Vang et al. 2015), investigating and reporting it have been based on narrowly attended age populations, and its magnitude and prevalence have been understood in a limited manner as different studies examine a single or a few health conditions only (De Maio 2010; Vang et al. 2015).

One key domain of well-being HIE research needs to calibrate is the role of immigrant adaptation. As one's well-being is considered 'a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity' (World Health Organization 2006), and its assessment should encompass both indicators of objective health and subjective adaptive experiences (Diener et al. 1999), it is critical to investigate immigrants' health and adaptation together.

For this study, the concept of health consists of subjective as well as objective components which can be combined for a comprehensive understanding of one's health. Subjective health is formed by individuals' beliefs and perceptions of health conditions, while objective health is estimated based on measureable means through examinations and testing by medical professionals. For instance, symptom reporting of health conditions may be more influenced by individuals' personal background and personal interpretations, whereas objective diagnostic information are not likely to vary by personal opinion or bias. The notion of adaptation is the process of change by which an individual becomes more suited to different conditions and is better able to function in a new or different environment with adjustments of behaviour or ideas; however, the effectiveness of such a process can be also time-related since one may show gradually weakened responses by becoming accustomed to the constant presence of sustained surroundings. These two aspects of well-being, health and adaptation, can be affected by various factors. Keeping in mind that people's experiences vary at different ages in relation to their social position and personal goals, the present study concentrates on age and gender.

## Age, Gender, and Life Transitions

With respect to life transitions, people at different ages likely undergo differential life experiences. In general, adolescents with schooling develop self-concept through family and peer relations and acceptance. Younger adults prepare their future with certain personal goals while making a living, and for the construction of own family aiming to increase family resources and social network. Older adults may start experiencing health problems and loneliness as their offspring leave home for own independence which lead to reflections of own individual life achievement. Elderly seniors gradually reduce social boundaries to maintain manageable life style and health. These life-transitional progresses are largely common for everyone. However, as immigrants have life-changing experiences as a result of immigration and subsequently possess fewer advantages and occupy relatively lower social positions than their native-born counterparts in the same society, their individual lives are influenced by newly

shaped social development. In particular, age-guided socialization patterns, and gender-related experiences are the bases of life development which will affect their health and adaptation.

For immigrants at certain older ages, their individual responsiveness and life choices to sociocultural boundaries can have negative consequential impacts on their health and adaptation. Depending on how strongly one's norms and practices for sociocultural resources adhere to the country of origin, and the extent of transnational interactions with the new settlement society and acculturation processes is limited (Levitt 1998), the psychological and emotional aspects of one's well-being can be adversely affected, especially for those experiencing social isolation.

The roles of members in immigrant families are also being redefined as characteristics of the family as a social unit change. For example, two distinctive domains are the self-concept formation showing clear variations between generations in terms of individualism and collectivism (Kwak 2003), and the negotiation of women's roles in the family setting being influenced by the experiences beyond their home where practice of sociocultural rules from the country of origin persist (Levitt 1998; Levitt and Glick Schiller 2004). Thus, immigrants' experiences are being reformulated by each individual member's social positions and surrounding contexts at different phases of the lifecycle as their concept of family, community, and society are developed and altered for social acceptance.

So, the relevant question is how easily immigrant acculturation processes can be reformulated as they encompass the boundaries of their life events. As such, the existence of social networks and the flexibility of personal choices of belonging with them will be observed in different degrees across age groups. Examples include older immigrants who may be experiencing harder transitions to a new society, and adolescent immigrants who may experience easier transitions as they are helped by institutional support from their schooling and broader social contacts with peers of diverse backgrounds.

Turning to the findings on immigrant health and adaptation, the current literature shows two trends in HIE. One camp finds that immigrants have good health and adaptation despite their disadvantage in social positions within the society, with the relevant findings being reported as the "*immigrant paradox*" (e.g., Salas-Wright et al. 2015; Sam et al. 2008) and the "*epidemiological paradox*" (e.g., Beiser 2005). This set of studies on immigrants' superior well-being does not specify or verify the timeline of change related to length of residence. The second camp finds that the health of immigrants deteriorates with lengthening residence. These findings are explained by the cumulative theory, that immigrants have less favourable current health condition as a result of the accumulative impact of immigrants' less affluent social status (e.g., Blane 2006; Dannefer 2003; Gubernskaya 2014; Nazroo and Williams 2006; Wakabayashi 2010; Willson et al. 2007). Even though this explanation may account in part for health declines in the immigrant population, it is difficult to argue that all at different ages would go through the same life transitions, and further, to predict to what extent the length of residence differentiates the immigrant population in terms of their adaptation and in turn how their health conditions are related to it.

As Wolff et al. (2010) demonstrated, people most often perceive their health in comparative terms with those whom they consider to meet the standards of proper health held by the majority in the national society. As such, long-term immigrants are

more likely familiar with and accustomed to the societal norms and national standards of health than recent immigrants who are adapting to the variety of occurrences in their new settlement society; subsequently, the two may have different sets of criteria to evaluate their well-being. Moreover, an individual's sense of community belonging was strongly related to both self-reporting of subjective physical and mental health as well as to reporting of favourable health (Statistics Canada 2014a). If long-term immigrants are to have a stronger sense of belonging than recent immigrants, will this difference also be reflected in the health variation of the two? The aim of this study was, accordingly, to investigate HIE to contribute to our understanding of immigrant well-being by examining the timeline and patterns of changes in health and adaptation at various ages in conjunction with gender.

### Comparisons of Immigrants Versus Non-immigrants

Social determinants may have differential effects on well-being for different segments of the population. As some variables interact and influence individuals' experience and perceptions of well-being, controlling them is crucial in studies comparing immigrant experience to that of non-immigrants, i.e., for the examination of HIE (Rudmin 2009; So and Quan 2012). For example, socioeconomic gradients in self-reported health tend to be less pronounced among the foreign-born population than the native-born, and among recent immigrants than long-term immigrants (Acevedo-Garcia et al. 2010; Karraker 2014; Kobayashi and Prus 2007; Kwak 2016; Ward 2012). While racial/ethnic differences have been found in the assessment of health (Almgren et al. 2009; Karraker 2014; Markides and Eschbach 2005; Rudner and Orpana 2012) including negative impacts by a visible minority status (De Maio and Kemp 2010; Paradies 2006; Veenstra 2009), experiencing discrimination had no effect on physical health when high levels of instrumental social support were offered for immigrants (Finch and Vega 2003).

Further, in comparison with non-immigrants, little evidence has been found for the effects of socioeconomic status (SES) and behavioural patterns on racial/ethnic health variations (Wu and Schimmele 2005), and health differences generally converge in the comparisons of foreign-born and native-born of the same ethnic group members if SES and health behaviours are controlled (Kobayashi et al. 2008). Since people tend to make food choices based on accessibility and availability in their immediate neighbourhood, individuals' health also depend on the built environment which plays a critical role in choices of healthy food and diet; in impoverished areas relating to neighbourhood composition of racial minority and immigrants, the selections are limited for variety and quantity for the adequate prices (Walker et al. 2010). On the other hand, although income level is strongly associated with people's overall life satisfaction (Diener et al. 2010; Robert and Gilkinson 2012), family is the most important and income is the least important determinant among the main domains of life satisfaction (Kapteyn et al. 2010).

What follows is a brief review of relevant HIE findings comparing foreign-born versus native-born populations to elucidate the outcomes related to age group, gender, and length of residence. The focus is mostly on Canadian studies with a few related US studies because the bulk of the HIE research has been carried out in these two countries (see De Maio 2010 and Vang et al. 2015 for the general review of Canadian studies),

and understanding of the literature is comparable, as the two share similarities as immigrants receiving nations and characteristics of societal surroundings (OECD Statistics 2016). Due to a dearth of studies investigating a large range of age groups in a single study, the review is divided into sections on adolescents, adults, and seniors.

First, the literature on adolescents and HIE is sparse in part because adolescents are the least studied population (De Maio 2010; Vang et al. 2015). Nonetheless, on health, *immigrant adolescents* in Canada were in better conditions than their non-immigrant peers for subjective assessment of general and mental health as well as numbers of diagnosed chronic and psychological illnesses (Kwak 2016). However, regarding the influence by length of residence differentiating recent and long-term immigrants, adolescents aged 12–19 of the former did not experience more adaptation problems than those of the latter in terms of life satisfaction, daily stress and sense of belonging (Kwak and Rudmin 2014). On the other hand, possible interplay of social contexts, length of residence, and gender affecting the health of immigrant adolescents has also been reported, since vulnerabilities on mental health were shown with long-term immigrant girls and recent immigrant boys in 2009 when the broader society underwent the negative impacts of global financial crisis, while no such differences were detected in 2007 and 2011 (Kwak 2016).

The question of how length of residence influences health of immigrant adolescents has focused on changes occurring in their life style, mainly leading to deteriorations of health. Immigrant adolescents in the US were engaging in externalizing behaviours much less, especially among those who immigrated at a later age and with shorter length of residence (Salas-Wright et al. 2015). On the other hand, immigrant adolescents had a more sedentary lifestyle than their white non-immigrant peers, although they consumed healthier diets (Allen et al. 2007). Such behavioural disparities in diet and activity level between immigrant and non-immigrant adolescent populations also exist within the same ethnic immigrant group with lengthening residence; as a result of rapid lifestyle changes, Hispanic immigrant adolescents showed greater increase in becoming overweight than their US-born counterparts (Gordon-Larsen et al. 2003).

Second, *immigrant adults* are reported in better health, particularly for mental health and chronic conditions, when compared to their non-immigrant Canadian-born counterparts (Vang et al. 2015). HIE had been found more consistently in physical health domains than in self-rated health measures (Ali et al. 2004), and regarding mental health, immigrants are also healthier, being, for example, less likely to suffer depression (Stafford et al. 2011). Pertinent to length of residence and age at migration, some researchers observed that length of residence was related to immigrant adults' chronic conditions without differences by age at immigration (e.g., McDonald and Kennedy 2004); others in the US showed a differential decline in general health relating to the age at time of migration (e.g., Gubernskaya 2014). However, the differences between recent and long-term immigrants were irrespective of their health behaviours and country of origin (Ali et al. 2004).

To examine the degree of persistency in recent immigrants' health advantage, several studies have looked into the longitudinal data of new immigrants' initial settlement years in Canada. During the first 4 years, women showed a more rapid decline in self-rated general health than men (Fuller-Thomson et al. 2011; Kim et al. 2013; Newbold 2009), despite support from ethnic social networks (Zhao et al. 2010). The stress levels reported by men and women were similar; however, age affected them

differently, as younger immigrant males (20–34 years old) reported more problems than older males, while no variations were found for women (Robert and Gilkinson 2012). As well, in terms of general health, declines were seen in greater rates for middle-aged (35–44) than young adults (15–24), indicating the relation of older age at time of migration to negative health changes (Newbold 2009). In contrast to such findings with a relatively short settlement period, the 10-year trajectory of immigrant health did not show deteriorations in their perceived health or chronic condition compared to native-born counterparts in Canada (So and Quan 2012). Further, international comparisons of four immigrant receiving countries, Australia, Canada, the UK, and the USA, also supported HIE for the 10-year timeline across all immigrant groups in terms of chronic conditions, as well as smoking habits and obesity level (Kennedy et al. 2015).

Another research issue on factors affecting immigrant health has been whether the difficulties and barriers immigrants face in accessing health care systems contribute to their health decline. While the great gap in access to health services between immigrants and non-immigrants had been reported in the US (Lasser et al. 2006), studies have noted that immigrants in Canada, regardless of their length of residence, do not experience problems in accessing medical care systems (Laroche 2000; McDonald and Kennedy 2004; Setia et al. 2011). So, the issue of access to health care is less likely to be related to the decline in health of immigrants in countries where universal health care programs are offered.

Third, the findings with *immigrant seniors* have shown less clear HIE (Gee et al. 2004; Kobayashi and Prus 2007; Rudner and Orpana 2012; Vang et al. 2015). Seniors reported their health positively regardless of immigrant status, although the majority had chronic illness (Newbold and Filice 2006), especially women (Arber and Cooper 1999) in spite of having functional impairments substantially more than men (Liang et al. 2008), disadvantaged trajectories of daily life activities (Wakabayashi 2010), poorer self-rated general health, as well as a greater number of chronic conditions (Newbold and Filice 2006). Immigrant seniors, despite healthier lifestyles and fewer chronic conditions, had less positive mental health and their life satisfaction declined with age, a trend not found with non-immigrant seniors (Rudner and Orpana 2012).

Inconsistencies of HIE with senior populations may be explained by the institutional policy for universal health care in the broader society (Kaplan et al. 2010). In terms of chronic conditions among those aged 65 and over, Canadians were healthier than Americans (LaPierre and Hughes 2009). Pertinent to the migration history, long-term immigrants are more likely to have migrated at a young age for work-related prospects, whereas recent immigrants are more likely to join family members already settled in the country under family-reunification programs (Gee et al. 2004). As a result, these two cohorts could have encountered different experiences in health and adaptation (Ng et al. 2012; Treas and Batalova 2009). Long-term Chinese immigrant residents, for example, showed higher life satisfaction and better mental health, as they had stronger social supports and a more stable financial status than those with shorter residence (Chow 2010; Lai 2012). These increasing differences in health over length of residence were related more to SES than to ethnic Chinese cultural values (Lai et al. 2007), and as well, to the lifestyle led by different family size and marital status affecting the well-being of recent and long-term immigrant seniors (Ng 2012).

In sum, the above literature review points out some critical extensions to be investigated in future HIE studies: (1) Immigrants' adaptation has been mostly absent in HIE studies in spite of the fact that they often deal with mental health and subjective self-reporting of health conditions. Broader aspects of well-being beyond health are needed in consideration of close interconnections between one's health condition and adaptation level in daily life. (2) The magnitude and prevalence of the HIE are still understood in a limited manner due to the varying health domains measured in the different studies. Accordingly, this tendency necessitates multiple measures, which involve subjective and objective assessments of individuals' well-being, preferably within a single study with a wider range of age group.

Regarding hypotheses, although HIE is expected to be found in general, it is uncertain how consistently it will be observed in different age groups between men and women for both subjective and objective measures. Adaptation of immigrants is to be related to their health; however, its associations to particular health domains have yet to be examined directly to explain HIE. Recent immigrants are predicted to show more robust HIE than their long-term counterparts as the health of the latter converge to the level of non-immigrants, but differential influences by length of residence are also assumed for adaptation and health. Overall, the differences by gender and age variations will not be observed in the same patterns between immigrant and non-immigrant populations.

## Methods

### Data Source

The data for this study were derived from the Canadian Community Health Survey (CCHS) 2011–2012, a representative national population data collected by Statistics Canada (2014b). Random sampling was carried out from all the regions with a target number in each area in relation to the general population size. Participants were living in private dwellings, and were interviewed either in person or over the telephone. Their participation was voluntary. The author of this study was not involved in designing of the Survey or data collection; it was not the author's responsibility to obtain ethical approval or consent from the participants.

### Participants

Canadian native-born non-immigrants ( $N = 103,579$ ) and foreign-born immigrants ( $N = 17,555$ ) were selected and each population group was divided into four age groups of *adolescents* (15–19 years old), *adults* (20–49), *older adults* (50–64), and *seniors* (65–74).

Table 1 shows the demographic information of the non-immigrant and immigrant populations. Gender ratios were similar for each age group in the two populations, but proportions of visible minorities were greater among immigrants, although gradual decreases were observed in older age groups for both populations. Immigrants lived in a larger household, but had lower income, especially for

**Table 1** Demographic information of non-immigrant and immigrant populations by age group

Immigrant status	Age group (N)	Gender (N; %)	Marital status (N; %)	Visible minority (N; %)	Household income (M; SD)	Household size (M; SD)
Non-immigrants (N = 103,579)	A1 (N = 7822)	m	4032 (52%) M/CL	87 (1%) 1452 (19%)	3.74 (1.35)	3.63 (.92)
		f	3790 (48%) S/S/D/W	7684 (99%)		
	A2 (N = 37,396)	m	17,220 (46%) M/CL	20,308 (54%) 4464 (12%)	3.81 (1.34)	2.80 (1.26)
		f	20,176 (54%) S/S/D/W	17,010 (46%)		
	A3 (N = 28,081)	m	12,450 (44%) M/CL	17,749 (63%) 1622 (6%)	3.44 (1.39)	1.83 (.76)
		f	15,631 (56%) S/S/D/W	10,261 (37%)		
	A4 (N = 14,191)	m	6162 (43%) M/CL	8572 (60%) 565 (4%)	2.77 (1.26)	1.68 (.58)
		f	8029 (57%) S/S/D/W	5590 (39%)		
Immigrants (N = 17,555)	A1 (N = 677)	m	344 (51%) M/CL	6 (1%) 493 (74%)	3.23 (1.40)	3.81 (.97)
		f	333 (49%) S/S/D/W	667 (99%)		
	A2 (N = 6507)	m	2972 (46%) M/CL	4264 (66%) 4288 (67%)	3.59 (1.35)	3.05 (1.31)
		f	3535 (54%) S/S/D/W	2223 (34%)		
	A3 (N = 4105)	m	1815 (44%) M/CL	2802 (69%) 1387 (34%)	3.44 (1.40)	2.09 (1.04)
		f	2290 (56%) S/S/D/W	1284 (31%)		
	A4 (N = 3133)	m	1413 (45%) M/CL	2037 (65%) 676 (22%)	2.90 (1.32)	1.80 (.75)
		f	1720 (55%) S/S/D/W	1086 (34%)		



**Table 1** (continued)

Immigrant status	Age group (N)	Gender (N; %)	Marital status (N; %)	Visible minority (N; %)	Household income (M; SD)	Household size (M; SD)
Paired	A1	.71	.85	.00***	.00***	.00***
Age-group	A2	.58	.00***	.00***	.00***	.00***
Difference	A3	.88	.00***	.00***	.73	.00***
<i>p</i>	A4	.09	.00***	.00***	.00***	.00***

(Data Source: the Canadian Community Health Survey 2011–2012)

Notes:

- (1) *N* = sample size; *m* = male; *f* = female; *M* = means, *SD* = standard deviation
- (2) Age group: A1 (adolescents, 15–19 years old), A2 (adults, 20–49), A3 (older adults, 50–64), A4 (seniors, 65–74)
- (3) Marital status: M/CL = married or common-law, S/S/D/W = single, separated, divorced or widowed
- (4) Visible minority: 0 = whites, 1 = visible minority members
- (5) Household income: 1 = \$0–\$19,999, 2 = \$20,000–\$39,999, 3 = \$40,000–\$59,999, 4 = \$60,000–\$79,999, 5 = \$80,000 or more
- (6) Household size: 1 = 1 person, 2 = 2 persons, 3 = 3 persons, 4 = 4 persons, 5 = 5 or more persons
- (7) Significant differences: \*\*\**p* < .001

the age groups of adolescents and adults. Except for adolescents, higher proportions of immigrant men were married or in common-law relationships than non-immigrant men; however, the opposite was the case for women. The data set that this study was derived from contained no information of age of arrival for immigrants, and cultural or racial origin was categorized into only two, 'white' or 'visible minority'; thus, detailed examinations of variations by these two demographics were not possible. In addition, marital status was controlled in all analyses based on two facts: consistently higher proportions of immigrants were married than were non-immigrants in *adults*, *older adults*, and *seniors* groups, while almost all adolescents were not married regardless of their immigrant status.

Table 2 shows the demographic information of the recent (less than 10 years of residence) and long-term immigrants (10 years or more). There were slightly more female participants from both residence groups except for the two adolescents groups. Larger proportions of visible minorities were among recent immigrants in all four age groups compared to long-term immigrants, but steady decreases were noticed among older groups in both residence groups. More recent immigrant *adults* and *older adults* were married, and more *older adults* and *seniors* of recent immigrants were living in a larger household. Long-term immigrants reported higher household income, except *seniors* group.

## Measures

For the self-rated subjective health, one item for general health and another for mental health asked, "In general, would you say your health (mental health) is ....?" with a response option ranging from 1 = *excellent* to 5 = *poor*.

Diagnosed illnesses were based on participants' answers to chronic and psychological illnesses diagnosed by health authority which lasted 6 months or longer. The ten chronic illnesses included asthma, back problems, bowel disorders, migraine, ulcers, effects of stroke, cancer, diabetes, heart diseases, and high blood pressure; the two psychological illnesses included mood disorder and anxiety disorder. The diagnosed conditions were computed by summing the binary coding, 0 = *no* and 1 = *yes*. Consequently, the score for the chronic illnesses ranged from 0 to 10, and psychological illnesses ranged from 0 to 2.

The three measures of adaptation were one item for daily life stress, "About the amount of stress in your life, would you say that most days are ....?" with a response option ranging from 1 = *not at all stressful* to 5 = *extremely stressful*; one item for life satisfaction, "How satisfied are you with your life in general?" with options from 1 = *very satisfied* to 5 = *very dissatisfied*; one item for sense of belonging, "How would you describe your sense of belonging to your local community?" with options from 1 = *very strong* to 4 = *very weak*.

So, in all measures, lower scores indicated better health and adaptation. In order to consolidate the variations of the response scales, each response score was first transformed into a score ranging from 0.00 to 1.00. For example, a score of 2 on the mental health item became 0.25, representing a response of one-fourth of the 1–5 range. Similarly, a score of 1 on psychological illness became 0.5, representing its response range 0–2. Next, each score was multiplied by 1000 for easier understanding of numerical comparisons in the figures.

**Table 2** Demographic information of recent and long-term immigrants by age group

Length of residence	Age group (N)	Gender (N; %)	Marital status (N; %)	Visible minority (N; %)	Household income (M; SD)	Household size (M; SD)			
Recent immigrants (N = 3198)	A1 (N = 347)	m	174 (50%)	M/CL	3 (1%)	284 (83%)	2.98 (1.42)	3.83 (.99)	
		f	173 (50%)	S/S/D/W	342 (99%)				
	A2 (N = 2593)	m	1132 (44%)	M/CL	1858 (72%)	1934 (75%)	3.28 (1.38)	3.07 (1.28)	
		f	1461 (56%)	S/S/D/W	727 (28%)				
	A3 (N = 195)	m	80 (41%)	M/CL	150 (77%)	123 (64%)	3.16 (1.40)	2.50 (1.33)	
		f	115 (59%)	S/S/D/W	44 (23%)				
	A4 (N = 63)	m	25 (40%)	M/CL	49 (78%)	36 (57%)	3.00 (1.63)	2.60 (1.37)	
		f	38 (60%)	S/S/D/W	14 (22%)				
	Long-term immigrants (N = 10,959)	A1 (N = 285)	m	150 (53%)	M/CL	3 (1%)	191 (68%)	3.51 (1.32)	3.80 (.91)
			f	135 (47%)	S/S/D/W	281 (99%)			
		A2 (N = 3758)	m	1767 (47%)	M/CL	2314 (62%)	2279 (61%)	3.81 (1.28)	3.04 (1.33)
			f	1991 (53%)	S/S/D/W	1433 (38%)			
A3 (N = 3865)		m	1716 (44%)	M/CL	2630 (68%)	1247 (33%)	3.45 (1.39)	2.07 (1.02)	
		f	2149 (56%)	S/S/D/W	1218 (32%)				
A4 (N = 3051)	m	1375 (45%)	M/CL	1980 (65%)	635 (21%)	2.90 (1.31)	1.78 (.72)		
	f	1676 (55%)	S/S/D/W	1061 (35%)					

Table 2 (continued)

Length of residence	Age group (N)	Gender (N; %)	Marital status (N; %)	Visible minority (N; %)	Household income (M; SD)	Household size (M; SD)
Paired	A1	.53	.89	.00***	.00***	.72
Age-group Difference	A2	.01**	.00***	.00***	.00***	.41
<i>p</i>	A3	.36	.03*	.00***	.01**	.00***
	A4	.40	.10	.00***	.57	.00***

(Data Source: the Canadian Community Health Survey 2011–2012)

Notes:

- (1) *N* = sample size; *m* = male; *f* = female; *M* = means, *SD* = standard deviation
- (2) Age group: A1 (adolescents, 15–19 years old), A2 (adults, 20–49), A3 (older adults, 50–64), A4 (seniors, 65–74)
- (3) Marital status: M/CL = married or common-law, S/S/D/W = single, separated, divorced or widowed
- (4) Visible minority: 0 = whites, 1 = visible minority members
- (5) Household income: 1 = \$0–\$19,999, 2 = \$20,000–\$39,999, 3 = \$40,000–\$59,999, 4 = \$60,000–\$79,999, 5 = \$80,000 or more
- (6) Household Size: 1 = 1 person, 2 = 2 persons, 3 = 3 persons, 4 = 4 persons, 5 = 5 or more persons
- (7) Significant differences: \**p* < .05; \*\**p* < .01; \*\*\**p* < .001

**Table 3** Summary of statistical significances in health and adaptation measures: comparisons between non-immigrants and immigrants, and between long-term and recent immigrants

Health and adaptation measures		Non-immigrants vs. immigrants		Long-term vs. recent immigrants	
Subjective health	General health	Age	***	Age	***
		Immigrant Status	***	Length of Residence	**
		Gender	ns	Gender	**
		A x IS	***	A x LR	ns
		A x G	***	A x G	*
		IS x G	***	LR x G	ns
		A x IS x G	ns	A x LR x G	ns
	Mental health	Age	***	Age	***
		Immigrant Status	***	Length of Residence	*
		Gender	ns	Gender	ns
		A x IS	***	A x LR	ns
		A x G	***	A x G	ns
		IS x G	ns	LR x G	ns
		A x IS x G	ns	A x LR x G	ns
Diagnosed health	Chronic illness	Age	***	Age	***
		Immigrant Status	***	Length of Residence	***
		Gender	***	Gender	*
		A x IS	***	A x LR	ns
		A x G	**	A x G	ns
		IS x G	ns	LR x G	ns
		A x IS x G	***	A x LR x G	ns
	Psychological illness	Age	***	Age	ns
		Immigrant Status	***	Length of Residence	ns
		Gender	***	Gender	ns
		A x IS	***	A x LR	ns
		A x G	ns	A x G	ns
		IS x G	***	LR x G	ns
		A x IS x G	ns	A x LR x G	ns
Adaptation	Daily stress	Age	***	Age	***
		Immigrant Status	*	Length of Residence	ns
		Gender	***	Gender	***
		A x IS	***	A x LR	*
		A x G	***	A x G	*
		IS x G	*	LR x G	ns
		A x IS x G	ns	A x LR x G	ns

**Table 3** (continued)

Health and adaptation measures	Non-immigrants vs. immigrants		Long-term vs. recent immigrants	
Sense of belonging	Age	***	Age	***
	Immigrant	***	Length of	*
	Status		Residence	
	Gender	***	Gender	ns
	A x IS	ns	A x LR	*
	A x G	ns	A x G	ns
	IS x G	ns	LR x G	ns
	A x IS x G	ns	A x LR x G	ns
Life satisfaction	Age	***	Age	***
	Immigrant	ns	Length of	ns
	Status		Residence	
	Gender	***	Gender	ns
	A x IS	***	A x LR	*
	A x G	*	A x G	ns
	IS x G	ns	LR x G	ns
	A x IS x G	ns	A x LR x G	ns

Notes: A = age, G = gender, IS = immigrant status, LR = length of residence

\* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$ ; ns = not significant

## Statistical Analyses

MANCOVAs were carried out to find the differences in the health and adaptation measures by age group and gender, comparing first non-immigrants and immigrants, and second recent and long-term immigrants. Further, to detect the presence of HIE in different age groups, paired age-group analyses were also carried out, comparing the same age groups from the two populations. In all analyses, visible minority status, household income, household size, and marital status were adjusted as covariates based on the previously established findings and the outcomes of demographics in the present study. Analyses were carried out with SPSS 17.0.

## Results

### HIE by Immigrant Status: Comparison of Immigrants and Non-immigrants

Significant differences in health measures reported in Table 3 revealed that the immigrant population was healthier in subjective as well as diagnosed health, by showing more positive assessments of general and mental health and fewer cases of diagnosed chronic and psychological illnesses. While the four age groups, *adolescents* (A1:15–19 years old), *adults* (A2:20–49), *older adults* (A3:50–64), and *seniors* (A4:65–74), perceived their general and mental health differently, overall there was no difference in men's and women's perceptions of these two

health domains. Regarding diagnosed illnesses, however, gender differences varied differentially in the two populations: both immigrant women and men had fewer psychological illnesses than their non-immigrant counterparts, but not for chronic illnesses, as both immigrant and non-immigrant women reported similarly more cases than their respective male counterparts.

As expected, both populations showed declines of general health and increases of chronic illnesses in older age groups. For subjective mental health, on the other hand, *older adults* (A3) reported the least healthy condition. Examining age groups from the two populations in paired analyses further showed healthier conditions for all health measures for A1 and A2 immigrants than non-immigrants, but fewer consistencies for A3 and A4. Although women reported more diagnosed illnesses than men regardless of immigrant status, non-immigrant women in A2 and A3 had higher numbers of diagnosed psychological illnesses than non-immigrant men; meanwhile, no gender differences were found from A2 and A3 of immigrants.

Regarding adaptation, immigrants reported a higher level of daily stress, and weaker sense of belonging than non-immigrants, but the two populations did not differ for their life satisfaction. These differences in daily stress and sense of belonging between the two populations, however, were age-group specific. Paired age-group comparisons yielded only A3 immigrants experiencing significantly higher daily stress than A3 non-immigrants. Further, the youngest, A1, and oldest, A4, groups yielded no differences for their sense of belonging by immigrant status; but, immigrant A2 had a stronger sense of belonging than non-immigrants while immigrant A3 had a weaker sense. Life satisfaction of immigrants was also an age-related experience: immigrant A1 were more satisfied with their life than non-immigrant peers, but no difference was found between the two A2 groups; meanwhile, immigrant A3 and A4 were less satisfied than their non-immigrant counterparts.

Women in general had a stronger sense of belonging and were more satisfied with life despite higher daily stress than men. Paired age-group comparisons indicated that A2 non-immigrant women were experiencing more stress than men, but this gender difference was smaller for A2 immigrants. Among immigrants, A2 women reported more satisfied with their life than A2 men, while A3 men reported a weaker sense of belonging than A3 women. Regardless of immigrant status, senior women had a stronger sense of belonging than men.

### **HIE by Length of Residence: Comparison of Recent and Long-Term Immigrants**

Fewer significant differences were observed between recent and long-term immigrants than between non-immigrants and immigrants. Still, regarding health, long-term immigrants reported less healthy subjective assessment of health and more chronic illnesses than recent immigrants. In contrast to other health measures, there was one idiosyncratic outcome - no variables differentiating diagnosed psychological illnesses between the two immigrant groups; i.e., the occurrences of psychological illnesses among recent and long-term immigrants did not vary by age, gender, or length of residence. In terms of adaptation, the two shared a similar level of life satisfaction and daily stress but long-term immigrants had a stronger sense of belonging, see Table 3.

Overall, except for the diagnosed psychological illness noted above, age groups showed differences in all measures of health and adaptation. Contrary to such consistent age-group differences, immigrant men and women differed only for general health,

chronic illness, and daily stress. In terms of the paired age-group comparisons, *A2* recent immigrants reported healthier conditions than their long-term counterparts in all four health measures as well as lower daily stress and higher life satisfaction. Meanwhile, more cases of chronic illness were reported by *A3* long-term immigrants; higher daily stress reported by *A4* women; and *A1* long-term immigrant girls reported higher cases of diagnosed psychological illness. In each paired age-group comparison, age was a more salient variable for immigrant health and adaptation than gender.

The correlations in Table 4 show the degrees to which age, gender, and measures of health and adaptation varied between the two immigrant groups. The recent immigrants' adaptation was not as strongly related to their age and gender as the long-term immigrants'. In general, the former also yielded lower magnitudes of relations across the measured variables, indicating that the health and adaptation of the latter were more closely integrated. There were two exceptions: first, the stronger the sense of belonging that recent immigrations experienced, the fewer chronic illnesses they reported; second, the higher the daily stress that recent immigrations experienced, the more chronic illnesses they reported.

### Patterns of Changes Across Age Groups in the Three Populations

Figure 1 depicts the patterns of subjective general and mental health reported by the four age groups when comparing non-immigrants, long-term and recent immigrants. With lower scores indicating healthier conditions, people in all age groups perceived their mental health as in better shape than general health, and this trend was the same in

**Table 4** Significant correlations across age, gender, and measures of health and adaptation for recent versus long-term immigrants

Recent /L-T	Age	Gender	General health	Mental health	Chronic illness	Psych. illness	Daily stress	Belonging	Life satisf.
Age		.04*	.12**	.06**	.23**	.04*			.07**
Gender	.02*		.07**		.06**	.04*			
General health	.18**			.41**	.27**	.16**	.16**	.09**	.31**
Mental health	.02*	.02*	.43**		.14**	.23**	.23**	.13**	.36**
Chronic illness	.33**	.06**	.45**	.17**		.19**	.13**	.05**	.14**
Psych. illness	.02*	.06**	.22**	.32**	.19**		.12**	.06**	.15**
Daily stress	-.20**	.05**	.18**	.25**	.10**	.18**		.12**	.25**
Belonging	-.11**	-.05**	.12**	.16**		.08**	.13**		.16**
Life satisf.			.40**	.42**	.21**	.23**	.31**	.21**	

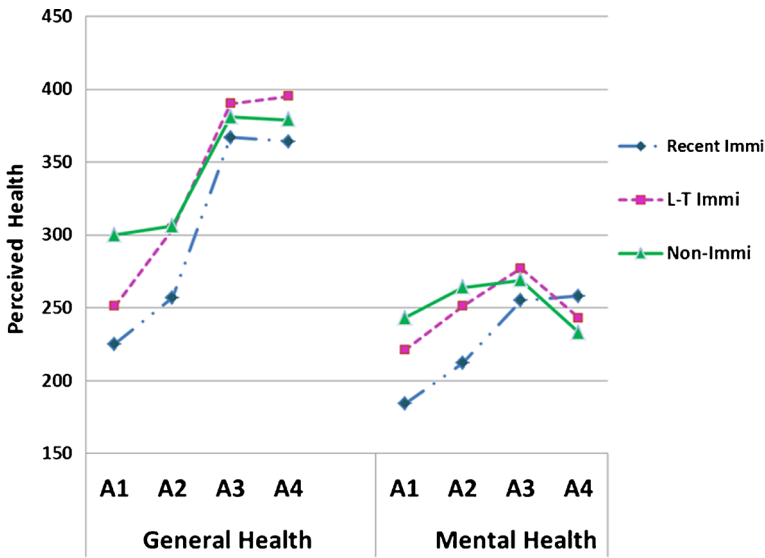
(Data Source: the Canadian Community Health Survey 2011–2012)

Notes: Age; 1 = 15–19, 2 = 20–49, 3 = 50–64, 4 = 65–74 years old. Gender; 1 = male, 2 = female

The numbers in italics indicate correlations for long-term immigrants

\* $p < .05$ ; \*\* $p < .01$  (2-tailed)





Notes: (1) The scores in the figure are those converted into the range from 0 to 1000, and lower scores indicate healthier perceptions. (2) Age Groups: A1=15-19, A2=20-49, A3=50-64, A4=65-74 years old.

**Fig. 1** Different patterns in self-perceived general and mental health across age groups and populations

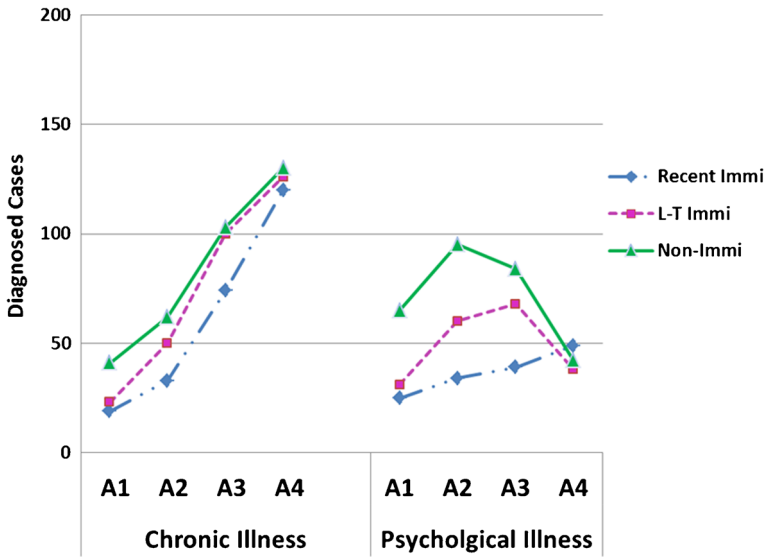
the three populations. However, the two immigrant groups showed different directions of the general health decline, since the A3 and A4 of long-term immigrants reported less healthy self-assessment compared to non-immigrants while those of recent immigrants reported being healthier. In addition, the A3 long-term immigrants had the lowest level of mental health among the three populations.

The HIE, predicting long-term immigrants to have more health problems than recent immigrants converging to the level held by non-immigrants, was most clearly detected with diagnosed chronic illnesses across the four age groups, as shown in Fig. 2. For diagnosed psychological illness, the predicted differential trends were observed in A1, A2, and A3, but not in A4: the cases of recent immigrants increased with older age groups while the other two populations shared the similar overall patterns showing lower cases for A4 than A3.

Figure 3 presents the patterns of daily stress and sense of belonging. With lower scores indicating less stress and stronger belonging, the overall trends of long-term immigrants were more similar to non-immigrants than to recent immigrants. As expected, the two older age groups of recent immigrants had a weaker sense of belonging; but unexpectedly, the recent immigrant A2 experienced the lowest daily stress and the long-term immigrant A2 felt the weakest sense of belonging among the three populations.

**Discussion**

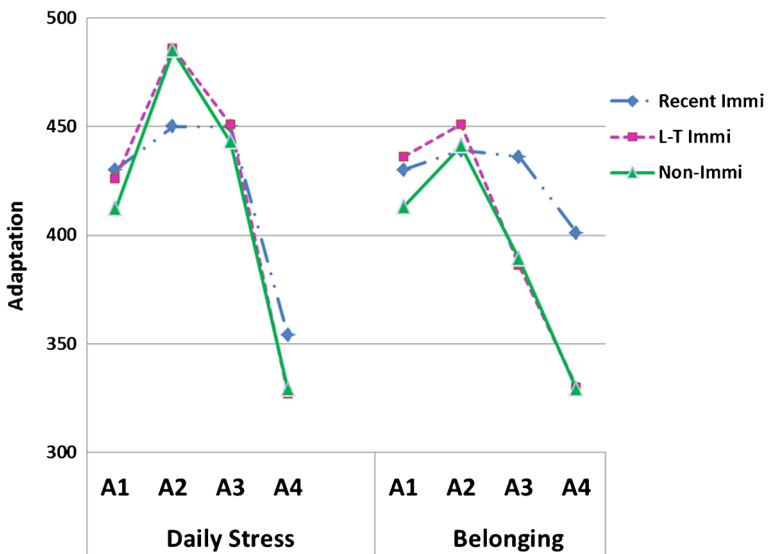
The findings of the present study provided evidence that, considered as a whole, foreign-born immigrants possessed better health than their native-born counterparts, in terms of both subjective and diagnosed health. For adaptation, immigrants,



Notes: (1) The scores in the figure are those converted into the range from 0 to 1000, and lower scores indicate fewer cases. (2) Age Groups: A1=15-19, A2=20-49, A3=50-64, A4=65-74 years old.

**Fig. 2** Different patterns in diagnosed chronic and psychological illnesses across age groups and populations

experiencing more stress daily and less sense of belonging to the community, still had a similar level of life satisfaction compared to non-immigrants. However, health and adaptation of immigrants were more strongly related to their age group than to gender.



Notes: (1) The scores in the figure are those converted into the range from 0 to 1000, and lower scores indicate less stress and stronger belonging. (2) Age Groups: A1=15-19, A2=20-49, A3=50-64, A4=65-74 years old.

**Fig. 3** Different patterns in daily stress and sense of belonging across age groups and populations

The influence of length of residence shown in the comparison between recent and long-term immigrants indicates that its impact is related to the domain of health; and adaptation of immigrants varied with their age group in relation to length of residence but not by gender and length of residence, suggesting that immigrants have differential sociocultural experiences according to their ages as distinctive stages of their life course.

The three questions below discuss age group and gender as key mechanisms for health and adaptation of individual well-being.

### **Do Immigrants Show Better Adaptation than Non-immigrants as They Do with Health?**

The findings of this study suggest that HIE, the relative health advantage of the immigrants was age-group specific. Although, overall, better health and adaptation were found with immigrants, the *older adults* of immigrants aged 50 to 64 years old turned out to be the most vulnerable segment of the population and did not yield HIE. Not only did they show significantly poorer health and more daily stress than non-immigrant counterparts, but they were also the least satisfied with their life compared to other age groups of immigrants. Thus, while other age groups of the immigrant population showed the presence of HIE, the *older adult* immigrants experienced the most difficulties, difficulties which were affecting their well-being negatively. Given the fact that most immigrants came from collective patriarchal cultures, the *older adults* of immigrants in this study could have been experiencing conflicts in personal as well as familial social contexts due to inconsistencies with own belief and values system such as the priority of family cohesion (Kwak 2003). It is conceivable accordingly that while finding difficulties in generating strong family relations in a new society, simultaneously slowly losing the grip of individual importance in the family structure, this immigrant age group might have adversely affected well-being as a result.

Although the degrees of HIE in health and adaptation domains are less varied with gender than age groups, still, it is critical to point out the disparities in the gender-difference findings between immigrant and non-immigrant populations. Of the health domains, while women in general had more diagnosed illnesses than men, no difference was found for their subjective health. On the other hand, for immigrants, both men and women had fewer psychological illnesses than their non-immigrant counterparts, but no difference was found with chronic illnesses. This set of findings indicates some issues involved in awareness of immigrants' mental health problems. Rather than a problem of access to healthcare, it seems immigrant psychological and cultural reluctance to acknowledge mental health needs hindered them from seeking out professional help, irrespective of gender. Of the adaptation domains, women had a stronger sense of belonging and were more satisfied with life despite experiencing higher daily stress than men. These disparities indicate the presence of *gender paradox* (cf., Arber and Cooper 1999; Wu and Schimmele 2005) – women having more health problems compared to men but possessing equally positive perception of health, and experiencing higher stress daily but engaging in a more positive lifestyle. Particularly with the *older adults*, immigrant women being able to build stronger sense of belonging to the community indicate their adaptive acculturation progress. It should be noted, though, that the radius of social boundaries for women in this age group may be narrowly drawn, and is still limited by those sociocultural practices prior to migration. So, their

sense of belong can be the feeling of connectedness within the enclave of immigrant social networks rather than an expansion beyond the ethnocultural group boundaries.

### **To What Extent Are Health and Adaptation Influenced by Immigrants' Length of Residence?**

For health, recent immigrants had significantly more positive self-assessments of general and mental health; meanwhile, long-term immigrants had more cases of diagnosed chronic illnesses. This contrast suggests that recent immigrants could have continued to assess their general and mental health differentially by their cultural belief or practice, while long-term immigrants had become more accustomed to utilization of health care system along with their more settled life style. However, length of residence did not affect immigrants at different age groups differently for either subjective or diagnosed health. Yet, for adaptation, length of residence did affect age groups of recent immigrants differently compared to those of long-term immigrants. As adaptation of immigrants is pertinent to their psychological strength in the estimate of life overall, this result suggests that the age groups from recent and long-term immigrants yielded different degrees of coping with or managing their socio-cultural surroundings.

In particular, for the two *adult* groups, as the most actively working segment of the population, those recent immigrants aged 20 to 49 years old enjoyed better health in all health measures, as well as lower daily stress and higher life satisfaction than their long-term counterparts. As the effectiveness of an individual's adaptation can be reduced by his or her becoming accustomed to the surroundings over time, this time-related process of changing seems to be observed in the differences between the two immigrant groups. This age group of recent immigrants, after meeting government immigration requirements as those possessed good health, benefitted from the *recency effect* (wherein newer immigrants tend to possess positive expectations towards the new settlement society); meanwhile, long-term immigrants did not benefit from familiarity with their surroundings. At the same time, this direction of findings reflects some different social circumstances for work-related daily activities and psycho-social differences in the life style of these two immigrant groups, perhaps because long-term immigrants are more fully aware of work-related competitiveness. As observed by Levitt (1998) and Levitt and Glick Schiller (2004), recent immigrants still have to a great extent retained transnational experiences with strong ties to and being supported by the community of origin, while for long-term immigrants, less ties are felt psychologically and practically as resources, and newly developing connections in the settlement society may not be recognized as secure and satisfactory to meet their expectations. That is, the relative flexibility and ease in life choices to reformulate social spaces and boundaries might be encountered as more difficult among long-term immigrants than recent immigrants.

Another important outcome to mention is that there were no variations on diagnosed psychological illnesses by age group, gender or length of residence among immigrants; so, further examinations are warranted for the immigrant population's awareness of and attitudes towards mental health. The fact that both immigrant women and men had very low cases of psychological illnesses irrespective of their length of residence and age implies that some preconception or reluctance exists in the immigrant population towards reporting and acknowledging mental health conditions which may require

action to treatment even though some caution needs to be exercised in generalization of the finding, since this study included only two categories of psychological illness, and some mental disorders might have higher occurrences at a particular duration of the immigrants' residence or be related to age at time of migration (e.g., Ali 2002; Gubernskaya 2014).

Without the information of age at arrival available for the present study, it is still reasonable to postulate that age of immigration moderates the influence of length of residence as the former makes an important life-stage junction for subsequent opportunities for health and adaptation. When the age of arrival is taken into account, immigrants' health and adaptation would be better understood in the premise of gender difference and age-group differences. Speculations can be made that men who migrated at an older age will experience poorer health as did the *older adults* in this study; among women, on the other hand, those who migrated at a young age may show their adaptation more negatively affected as they face greater disparities of rules and norms in their various social contexts.

### **What Are the Key Differences Shown in Overall Trends Across Recent, Long-Term, and Non-immigrant Populations?**

The health and adaptation of long-term immigrants were more closely intertwined than those of recent immigrants, and the impact of length of residence was also found in conjunction with age group differences. At the same time, the overall patterns across the age groups shown by long-term immigrants resembled those of non-immigrants more than recent immigrants, particularly for mental health domains. To explain these differential interrelations between the two immigrant populations, it is possible to point out some demographics and immigration history having led to the differences between recent and long-term immigrants, such as cultural and socioeconomic reasons in the composition of family setting and working experience in the labour market. More directly, though, it is conceivable that the two might have different sets of criteria in evaluating their well-being, including the usage of reference groups for judging their own health (Kobayashi et al. 2008; Wolff et al. 2010). So, it will be valuable to explore how variably social comparisons are being constructed in the immigrant groups across age groups in relation to health and adaptation domains.

Finally, it seems to be essential to enhance life satisfaction to promote the well-being of immigrant population since their life satisfaction yielded high interrelations most consistently with the measures of health and adaptation. The difference in each age-group comparison highlighted the fact that working-aged long-term immigrants (20 to 49 years old) were less satisfied with their life than recent immigrants, even though no difference was detected in the comparison between immigrants and non-immigrants for this working adult population. Consequently, long-term immigrants of this age group, who might have possessed better knowledge and familiarity with the society than recent immigrants, did not seem to have benefitted from their life experience to facilitate their adaptation.

Several limitations of the study should be noted for caution in interpreting the findings. First of all, since the CCHS data are cross-sectional, it is not feasible to draw conclusions on individuals' developmental and ageing aspects as life course perspectives. The participants were those who resided in private households, so some segments of the population were excluded, particularly those institutionalized with poorer health.

This fact could have been related to the extents to which the differences were observed between non-immigrant and immigrant populations as well as between the two immigrant groups, particularly for the seniors groups. As the numbers of older participants from the recent immigrant population were relatively small, interpretations of the relevant results should be also cautious. Due to the absence of ethnocultural background information, variable health assessments and ranges of adaptation were not examined with ethnic groups to reflect the impacts of their acculturation process such as family composition being linked to family value system, economic necessity, and norms of practical family relations changed in the settlement society. In addition, without knowing the age at time of migration, length of residence was only an approximately estimated measure in determining of its effects on the changes in immigrant well-being. Also, the immigrant categorical status, such as refugees, family reunion, or entrepreneurship case, could impact not only the initial-stage adaptation but also subsequent processes of sustained health and acculturative development.

## Conclusions

The findings of the present study have shown that analyzing the impacts of age and gender in accordance with the healthy immigrant effect facilitates our understanding of immigrant well-being, as HIE varied across age groups in domains of health and adaptation, but to a much lesser extent with gender.

The *older adult* immigrants aged 50 to 64 were the segment of the immigrant population experiencing the most difficulties compared to their non-immigrant counterparts, for whom no HIE was found; within the immigrant population, on the other hand, it was the *adult* working age group of long-term immigrants aged 20 to 49 who was experiencing the most negative health and adaptation compared to the recent immigrants of the same age group, indicating the influence by length of residence.

Overall, the long-term immigrants were with less favourable health than recent immigrants, and their patterns across age groups were more similar to non-immigrants than to recent immigrants. One particular result to be noticed was, however, that the diagnosed case of psychological illness among immigrants yielded no difference by their age, gender, or length of residence, which suggests the same 'reluctant' views on seeking professional help for mental health problems held by both recent and long-immigrants. Therefore, it is recommended that specific policies to enhance the immigrant well-being be targeted to people at different life stages with differential foci, and to promoting mental health awareness in the immigrant population.

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## Compliance with Ethical Standards

**Disclosure Statements** The author declares that there are no conflicts of interest. The author of this study was not involved in designing of the study or data collection; consequently, obtaining consent from the participants and ethical approval were not the author's responsibilities.

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