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Avant-propos

Julie BOUCHER Rédactrice en chef

Chers lecteurs,

Au nom du comité éditorial et de nos collaborateurs, j'ai le plaisir de vous présenter le volume 6, numéro 1 de la *Revue interdisciplinaire des sciences de la santé* (RISS).

Depuis la parution du premier numéro en 2009, la RISS a respecté son engagement de publier des travaux exceptionnels dans le domaine de la santé. Avec chaque numéro, la revue étend sa couverture et élargit son public, celui-ci ne faisant pas exception. Il présente une gamme d'articles rédigés tant par des étudiants de premier cycle que des étudiants des cycles supérieurs, de l'Université d'Ottawa et d'ailleurs au Canada.

Ce recueil d'articles est le produit de travaux d'étudiants sur un large éventail de sujets. Toutefois, les recherches sont guidées par les mêmes objectifs clés : explorer des méthodes et des modèles innovateurs pour adresser les besoins en santé; déterminer et surmonter les obstacles à l'accès aux soins de santé; et fournir des solutions pour améliorer l'utilisation des soins de santé, surtout au sein de populations vulnérables, pour réduire les iniquités en santé et optimiser les avantages pour la santé.

Il ne me reste plus qu'à remercier nos collaborateurs d'avoir travaillé sans relâche pour réaliser ce numéro. Carlos Pastrana, ton dessin de couverture imaginatif capture réellement l'essence de la revue. Jessica Simoneau, je suis reconnaissante de ta diligence et de tes efforts pour traduire le résumé des articles. À notre conseiller académique, Professeur Raywat Deonandan, Ph. D., nous vous devons toute notre gratitude pour votre enthousiasme et votre engagement envers le succès de la revue. Bien sûr, ce numéro n'aurait pas vu le jour sans l'expertise de nos lecteurs critiques et de notre merveilleux comité éditorial. J'apprécie votre dévouement, votre travail professionnel et les nombreuses heures requises pour répondre aux standards de la revue. Aux lecteurs, nous apprécions votre appui inébranlable. C'est grâce à vous que la revue peut grandir et connaitre un succès continu. Enfin, aux auteurs sans qui cette initiative ne serait pas possible, nous sommes reconnaissants que vous partagiez vos connaissances dans ce numéro.

J'espère que cet aperçu a capté votre intérêt. Bien que le but de cette revue est de partager de nouvelles et précieuses connaissances aux lecteurs, la preuve de sa réussite est sa capacité de susciter d'autres questions et d'inspirer des recherches futures.

Julie Boucher, MSc

Foreword

Julie BOUCHER Editor-in-Chief

Dear Reader,

On behalf of our Editorial Board and contributors, it is my great pleasure to present Volume 6, Issue 1 of the *Interdisciplinary Journal of Health Sciences* (IJHS).

Since publishing its inaugural issue in 2009, the IJHS has remained steadfast in its commitment to featuring outstanding work in the field of human health. With every new issue, the journal grows its audience and expands its reach, and this one is no exception. It showcases an array of articles from undergraduate and graduate students alike, within the University of Ottawa but also across academic institutions in Canada.

The collection of articles presented herein represents the culmination of students' work on a broad range of topics. Nevertheless, the key objectives are the same: exploring innovative models and methods to address unmet health needs; identifying and challenging barriers to healthcare access; and providing solutions to enhance healthcare utilization, particularly among vulnerable populations, to reduce health inequities and yield the highest attainable health benefits.

It only remains for me to thank the contributors who have worked tirelessly to bring this issue to fruition. Carlos Pastrana, your imaginative cover design truly captures the essence of the journal. Jessica Simoneau, I am grateful for your effort and diligence in translating the article abstracts. To our faculty advisor, Dr. Raywat Deonandan, for your enthusiasm and dedication to seeing this journal thrive, a considerable debt of gratitude is owed to you. Of course, this issue would not have been possible without the expertise of our peer reviewers and our wonderful Editorial Board. I appreciate your dedicated and professional work and the countless hours spent maintaining the journal's standards. To the readers, we value your unwavering support. It is because of you that the journal has been able to grow and experience continued success. Finally, to the authors without whom this endeavour would not be possible, we appreciate you sharing your knowledge within the covers of this issue.

I hope that this brief overview has piqued your interest. Although the purpose of this journal is to present valuable new knowledge to its readers, the true testament to its success lies in its ability to incite more questions and plant the seed to inspire future research.

Julie Boucher, MSc

Transmission of Human Papillomavirus Without Sexual Contact

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Résumé :

(traduction)

Le virus du papillome humain (VPH) est une des infections sexuellement transmissibles les plus répandues. Il existe quatre types de VPH : 6, 11, 16, et 18. Les types 6 et 11 causent les condylomes acuminés alors que les types 16 et 18 sont asymptomatiques chez les hommes, mais peuvent évoluer en cancer du col utérin chez les femmes. Bien que ce soit rare, un faible pourcentage d'hommes et de femmes ont reçu le diagnostic du VPH malgré l'absence de contact sexuel antérieur. Dans cette étude, nous discutons le cas d'un jeune homme de 15 ans de l'Asie du Sud qui a contracté un type inconnu de VPH à faible risque sans avoir eu de contact sexuel. Le VPH est extrêmement contagieux, mais en général, le système immunitaire est capable de contrôler l'infection et de prévenir l'apparition de condylomes acuminés. Dans ce cas, il est important d'empêcher la propagation d'infections virales. Plusieurs déterminants de la santé affectent la transmission du VPH, notamment le revenu, le statut social, le réseau de soutien social, l'éducation et l'alphabétisme, la culture, les environnements sociaux et physiques, ainsi que les services de santé. Pour contribuer à la prévention du VPH, l'éducation sexuelle devrait être enseignée dans les écoles dès un jeune âge et le vaccin Gardasil® devrait être administré aux femmes ainsi qu'aux hommes dès le bas âge afin de réduire le fardeau de la maladie et l'incidence du VPH.

Mots-clés : VPH, non sexuel, mâle, Gardasil®

Abstract:

Human papillomavirus (HPV) is one of the most common sexually transmitted infections. There are four common HPV strains: 6, 11, 16, and 18. Strains 6 and 11 cause genital warts, while strains 16 and 18 are asymptomatic in males and may progress to cervical cancer in females. Although uncommon, a small percentage of males and females have been diagnosed with HPV without previous sexual contact. In this case report, we discuss a case conducted on a 15-year-old South Asian male who contracted an unknown low-risk strain of HPV with no history of sexual contact. HPV is highly infectious, however in the majority of cases the immune system is able to clear the infection, preventing the appearance of genital warts. In cases such as these, it is important to help control the spread of viral infections. Several determinants of health are involved in and affect the transmission of HPV, including income and social status, social support networks, education and literacy, culture, social and physical environments, and health services. To aid in the prevention of HPV, sexual education should be taught at early ages within schools and the Gardasil® vaccine should be administered to both females and males at an early age to reduce the burden of disease and the incidence of HPV.

Keywords: HPV, nonsexual, male, Gardasil®

Introduction

Human papillomavirus (HPV) is one of the most common sexually transmitted infections in the world. HPV can be spread through vaginal, anal, or oral sex with someone who is infected with the virus. Although uncommon, a small percentage of males and females have been diagnosed with HPV with no prior sexual contact (Sonnex, Strauss, & Gray, 1999; Strauss, 2002). It is estimated that 75% of Canadians and 60% of college-aged American women will have at least one HPV infection in their lifetime (Ho, Bierman, Beardsley, Chang, & Burk, 1998; Marra, Ogilvie, Colley, Kliewer, & Marra, 2008). The four most common strains of HPV are 6, 11, 16, and 18. Lower-risk strains 6 and 11 may cause genital warts, while higher-risk strains 16 and 18 are asymptomatic in males and may progress to cervical cancer in females (Grimes, Benjamins, & Williams, 2013). Most strains of HPV infection remain asymptomatic in males and females causing the disease to be difficult to detect and treat.

The control and transmission of viral infections, such as HPV, are affected by several determinants of health. This includes income and social status, available social support networks, culture, and social and physical environments, as these may impact one's access to resources for infection prevention and treatment. As well, HPV transmission is affected by the education and literacy and the health services available for children in schools. Early education and direct treatment in school health services are strong primary control and preventative measures. Another determinant of health that is involved in the transmission of HPV is gender. A false stigma about HPV is that it is only necessary for females to be given the HPV vaccine because they are the ones at risk of cervical cancer. However, it is important for males to be vaccinated at an early age as well because there are several other cancers that also affect males, such as mouth, throat, and anal cancers.

There are significant costs associated with treating an HPV infection. Treatment may include removal of genital warts, suppression of viral replication, and surgery or radiation if the virus has progressed to cancer (The Society of Obstetricians and Gynaecologists of Canada [SOGC], 2014). The treatment and therapy costs continue to rise, which increases the importance of prevention of the infection through HPV education and vaccination. The purpose of this paper is to emphasize the importance of HPV prevention through vaccination and education about HPV. It is particularly important since the virus can be transmitted both sexually and non-sexually; therefore, more people are at risk of infection.

Materials and Methods

A 15-year-old South Asian male contracted an unknown low-risk strain of HPV with no history of sexual contact. This deduction was reached after education of the patient was performed to determine a source of transmission and after a thorough history was conducted. Sexual contact for the purpose of this case will be defined as penetrative genital contact, oral-genital contact, or genital-genital contact. The patient presented with a single three millimetre cauliflower-like genital lesion on the ventral aspect of his penis, which was treated unsuccessfully on multiple occasions. After ten physician visits, he was given six treatments of Histofreezer®, two treatments of Condyline®, and one treatment of Aldara®, totalling $1340 in treatment costs (see Table 1). At his next follow-up appointment, the patient will undergo a biopsy and will be referred to a dermatologist for continuation of care. The patient will be followed to determine the HPV strain and to follow through with his ongoing treatment plan.

Table 1 Case treatment costs (N. Ahmed, personal communication, July 5, 2014).

Treatment	Cost
Histofreezer® (cryotherapy), six treatments	$350
Condolyne® (topical solution) 0.5%, two treatments	$120
Aldara® (Imiquimod), one treatment	$420
Physician appointment, ten visits	$450
Total cost	$1340

A study in sexually transmitted infections reported that the HPV virus has been found underneath the fingernails of individuals with genital warts (Sonnex et al., 1999). HPV has the ability to retain up to 30% of its infectivity for seven days at room temperature after known contact with fomites (Roden, Lowy, & Schiller, 1997). This allows the transmission of HPV by means of manual-genital contact, which is a speculation of how the patient in this case may have contracted the virus. HPV is known to be highly infectious, but in the majority of cases, the immune system is able to clear the infection or suppress the onset of symptoms. However, the virus may remain dormant in the body for many years (Waller, McCaffery, Nazroo, & Wardle, 2005). In such cases, it is important to help control the spread of the virus.

Discussion and Conclusion

It is becoming more difficult to control HPV infection due to the additional possibility of non-sexual transmission. The treatment of genital warts and HPV-associated diseases also has cost implications. In Canada, the average cost of treatment per episode of genital warts is $207 for women and $176 for men (Marra, Ogilvie, Colley, Kliewer, & Marra, 2009). General treatment may include cryotherapy, topical creams, and immune system repressive drugs (SOGC, 2014). The type of treatment and frequency of administration depend on the severity or duration of the case. The most effective way to prevent HPV infection is through vaccination. A study by the National Advisory Committee on Immunization (NACI; 2012) showed that the vaccine had 85.6% efficacy against infection of strains 6, 11, 16, and 18 amongst 16-26 year-old men in Canada (see Table 2).

The HPV vaccine reduces the cost burden, as it prevents both genital warts and cervical cancer. In the United-States, the annual cost of death and disease from cervical cancer is around $270,000,000 (Brown, Riley, Schussler, & Etzioni, 2002). In addition to vaccination, another preventative technique is education (Weinstock, Berman, & Cates, 2004). Adolescent males and females should be educated about sexual and non-sexual means of HPV transmission and the potentially dangerous implications to their health. Proper education will increase their likelihood to take appropriate precautions, such as washing their hands more often and using protection during any form of sexual intercourse.

One of the main reasons parents do not get their children HPV-vaccinated is due to a lack of education (Stokley et al., 2014). Many people do not have sufficient knowledge on modes of HPV transmission, preventative options, and the potentially dangerous effects on health (Holcomb, Bailey, Crawford, & Ruffin, 2004). Stokley et al. (2014), reported that lack of knowledge was the top reason for females (see Figure 1) and the third top reason for males (see Figure 2) not getting the HPV vaccine. A survey conducted in Toronto high schools reported that 87% of students have not heard of HPV (Dell, Chen, Ahmad, & Steward, 2000). With proper education, more youth will be aware of the significance of HPV and the false stigmas about HPV vaccinations, particularly for males, can be reduced.

Table 2 Efficacy of HPV vaccine in young men 16-26 years of age in Canada (NACI, 2012).

Endpoint	HPV4 Gardasil® Cases (n = 1397)	Placebo Cases (n = 1408)	Efficacy (%)	95% CI	*P-value*
All external genital lesions (EGL)	3	31	90.4 (all types) 84.3 (type 6) 90.9 (type 11) 100 (type 16) 100 (type 18)	69.2-97.6 46.5-97.0 37.7-99.8 0-100 0-100	<0.001
Persistent infections (HPV types 6, 11, 16, 18-related)	15	101	85.6	73.4-92.9	<0.001
HPV type 6-related	4	33	88	66.3-96.9	
HPV type-11 related	1	15	93.4	56.8-99.8	

HPV immunization in Canada and the United States is voluntary; therefore, the success of the HPV vaccine depends on the public's acceptance of the vaccine. A common barrier to acceptance is the belief that the vaccine will promote an early onset of sexual activity in children. Although the virus is transmitted primarily through sexual contact, the vaccine protects against both sexual and non-sexual forms of HPV transmission. Administering the vaccine at an early age allows time for an immune response to develop before the individual is at greater risk of infection following the onset of sexual activity. Holcomb et al. (2004), reported that 86.2% of individuals prefer to have learned about HPV before becoming sexually active. The most common and effective HPV vaccine for males and females is Gardasil®, which is a quadrivalent vaccine against strains 6, 11, 16, and 18 (Stokley et al., 2014). Apart from mild adverse effects common to most vaccines, such as local pain in the arm where the shot was given, fever, and nausea, there are no serious safety concerns associated with the vaccine because it does not involve live viral material (Stokley et al., 2014).

The spread of HPV may be lessened by preventative measures: education at a young age and vaccination for both males and females. In our case, neither the vaccine was given nor was the patient ever educated about HPV. These measures could have prevented the non-sexual transmission of HPV to the patient.

Figure 1 Top reasons parents do not give their daughters the HPV vaccine (Stokley et al., 2014).

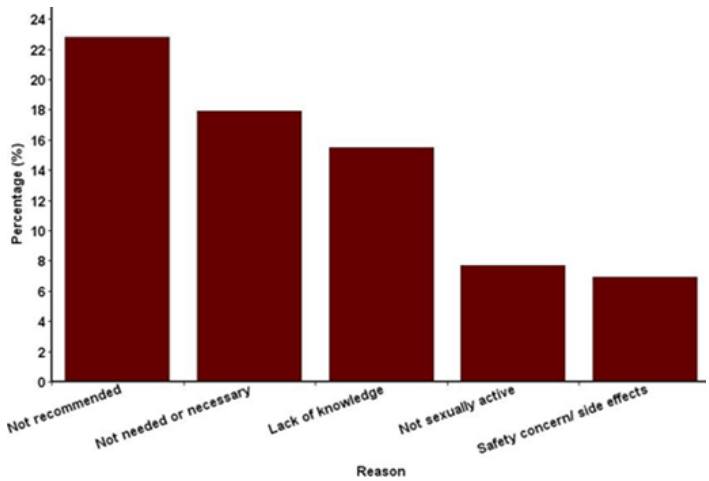
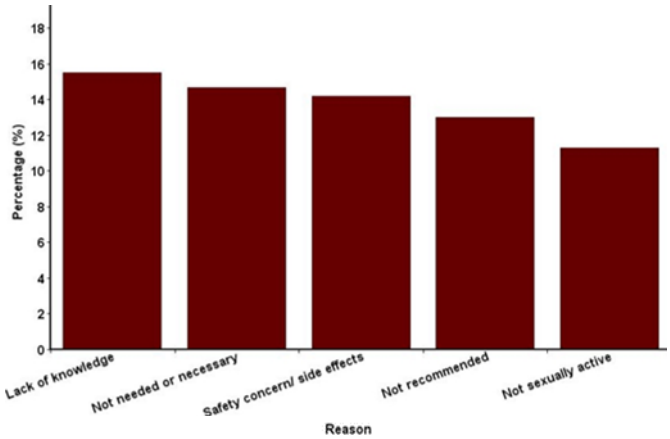


Figure 2 Top reasons parents do not give their sons the HPV vaccine (Stokley et al., 2014).



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Planning and Delivery of Health Services – An Article Review on Urban Aboriginal Mobility in Canada: Examining the Association With Healthcare Utilization

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Résumé :

(traduction)

L'article écrit par Marcie Snyder et Kathi Wilson publié dans la revue *Social Science and Medicine* en 2012, s'intéresse à l'utilisation des services de santé par les populations autochtones du Canada qui habitent en milieu urbain. À l'aide du Modèle comportemental de l'utilisation des services de santé (Behavioural Model of Health Services Use ou BMHSU), les facteurs de prédisposition, les facteurs d'habilitation, et les facteurs de besoin ont été organisés et utilisés pour l'analyse des données. Plus précisément, une comparaison a été effectuée entre l'utilisation des services de santé conventionnels (administrés par les médecins et les infirmières) et les services de santé traditionnels (administrés par les guérisseurs traditionnels) à Toronto et Winnipeg. En plus des facteurs géographiques et d'éducation, les résultats de la recherche ont identifié la mobilité comme étant un facteur qui influence l'utilisation des soins de santé.

Mots-clés : Mobilité, urbain, santé des Autochtones, utilisation des soins de santé, Canada

Abstract:

An article from *Social Science and Medicine*, written by Snyder and Wilson (2012), examined the use of healthcare services by urban Aboriginal populations in Canada. Using the Behavioural Model of Health Services Use (BMHSU), predisposing, enabling, and need factors were organized and used for data analysis. Specifically, a comparison was made between conventional (physicians and nurses) and traditional (traditional healers) health service utilization in Toronto and Winnipeg. In addition to the geographical and educational factors, the results of the research recognized mobility as a significant predisposing complement to healthcare utilization.

Keywords: Mobility, urban, Aboriginal health, healthcare utilization, Canada

Introduction

Snyder and Wilson open the article by briefing the readers on the history of Indigenous population of Canada, referred to as Aboriginals. They suggest various "push and pull factors" including socioeconomic status (SES), education, and unmet healthcare needs that influence the Aboriginal population to migrate to urban environments (Snyder & Wilson, 2012). These factors of migration strongly align with Evelyn Peters' research (2005) on urban Aboriginal communities in Canada, and set a foundation upon which the authors attempt to explain the utilization of health services amongst the Aboriginal population. This introduction, well supported by the data from Statistics Canada's 2006 Aboriginal Peoples Survey (APS) and other research papers, is bound to capture the readers' attention.

Materials and Methods

The effect of mobility on healthcare utilization amongst the Aboriginal population is an under-researched topic. Thus, Snyder and Wilson used an existing conceptual framework that best fits their study – the Behavioural Model of Health Services Use (BMHSU; Andersen & Newman, 1973). This model, which has been modified and expanded, is still applicable and widely used in the field of public health; one such use was noticed in a recent study on Canadians with dementia (Forbes, Morgan, & Janzen, 2006). This model organizes variables such as residential mobility, employment, and self-rated health status into three categories that determine the use of health services: (i) predisposing, (ii) enabling, and (iii) need factors (Andersen & Newman, 1973). Using the data from Statistics Canada's 2006 APS, Snyder and Wilson have astutely applied this model, using binary logistic regression analysis, to correlate the three factors to physician, nurse, and traditional healer use. In their research, Winnipeg and Toronto are the two Canadian Census Metropolitan Areas (CMAs) that were compared due to the contrasting differences in their Aboriginal population size, geographical location, and Aboriginal-led services offered (Snyder & Wilson, 2012). By using a similar approach, research conducted by Peters (2006) and Snyder and Wilson (2015) both provide support for this viewpoint.

Results and Discussion

Due to categorical differentiation by the BMHSU, the readers will discover that the authors' findings are easier to comprehend. The results for both CMAs and the assessed factors are within a 95% confidence interval, making the data precise. The results conclude that education, income, and employment are significant predictors of the use of health services; however, this is true for the whole Canadian population, and not exclusive to Aboriginal people (Steele, Dewa, & Lee, 2007).

In addition, two significant predisposing factors concluded from the study are age and residential mobility. Research by Wilson, Rosenberg, and Abonyi (2011) explains that the older Aboriginal population is predominantly affected, as they experience geographic isolation and loss of traditional approaches to healing due to their colonial past. This strengthens the article's findings by indicating that "traditional healing represents an unmet healthcare need" for the Aboriginal population in Toronto and may require a person to travel outside the city in search of traditional healthcare services (Snyder & Wilson, 2012). For further support, the results illustrate that only a small fraction of newcomers have access to traditional healer use in Toronto when compared to Winnipeg.

The Second Report on the Health of Canadians (1999) mentions that despite reductions in substance use and improvements in education, many Aboriginal communities still experience higher infant mortality rates, suicide rates, chronic diseases, and risk for unintentional injuries than the Canadian population as a whole. While all 12 key determinants of health (Public Health Agency of Canada, 2011) apply to the aforementioned issues, culture seems to be particularly dominant since the article specifically takes Aboriginal population into consideration. Some underlying premises could be marginalization (Skinner & Masuda, 2013) and perception of conditions by the Aboriginal people (Senese & Wilson, 2013). While Snyder and Wilson (2012) are not as specific regarding each determinant, they provide the readers with a wide range of possibilities for low healthcare utilization.

Hence, when reading this article, one should keep in mind that changes in healthcare access is dependent on more than just mobility factors. If conventional traditional uses are valued differently amongst Aboriginal people living in Winnipeg and Toronto, this may simply be due to differences in cultural values placed on those services (Wilson et al., 2011). This is further characterized by the classification of three distinct Aboriginal groups: First Nations, Métis, and Inuit. While Snyder and Wilson (2012) mention this distinction in the beginning, they generalize them into one group in their findings. Also, the 2006 APS only accounts for First Nations living off reserves; whereas, similar or decreased health access may be affecting those living on reserves. Likewise, Toronto and Winnipeg, which do provide

insight into two differing urban settings, are not representative of all urban Aboriginal populations as described by the title of the article. On the contrary, Snyder and Wilson (2015) have successfully maintained this distinction throughout their research.

Conclusion

Overall, Snyder and Wilson have written a compelling article that raises the issue of planning and delivery of healthcare services in Canada. Particularly, it enlightens the readers by analyzing and discussing the complex relationship between Aboriginal peoples' mobility and healthcare utilization. While the article is not specific regarding the outlined causes, it exposes the readers to many determinants of health, provides sufficient evidence for mobility being a significant predisposing factor, and provides an impetus for more thought and research. Recent healthcare research by Snyder and Wilson (2015) has contributed by further employing the aforementioned concepts to analyze this public health issue.

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The Development of Scoring Criteria for a New Picture Naming Task

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Résumé :

(traduction)

Objectif : Le but de cette étude est de développer un système de notation pour une nouvelle tâche de dénomination afin d'évaluer la performance de dénomination de jeunes adultes (18 à 30 ans) et d'ainés (65+ ans) unilingues anglophones, unilingues francophones, et bilingues anglais-français. Cette nouvelle tâche de dénomination servira de service de santé important pour aider à diagnostiquer et évaluer les personnes âgées souffrant de troubles cognitifs, tout en servant d'outil pédagogique pour les fournisseurs de soins de santé.

Matériels et méthodes : Cent-vingt images sur fond blanc dans PowerPoint ont été présentées aux participants, suivant le même ordre aléatoire. La tâche de dénomination consistait à nommer l'image affichée à l'ordinateur. Les participants unilingues ont passé le test dans leur langue maternelle et ceux bilingues ont passé le test en anglais, en français, et dans les deux langues. Un critère de notation a été établi selon les réponses apportées.

Résultats : Des critères de notation stricts et souples ont été développés pour la tâche de dénomination. Huit images ont été supprimées de la tâche de dénomination originale en raison de leur faible qualité et/ou clarté, de l'incapacité des participants à les nommer, ou de la grande variété de réponses qui leur étaient associées. Selon les critères stricts et souples, la performance de dénomination des jeunes adultes et des ainés unilingues francophones et anglophones était similaire. Les personnes bilingues ont le mieux réussi lors du test bilingue et le moins bien réussi en français. Parmi tous les groupes d'âge et de langue, les résultats des participants bilingues en français étaient les plus faibles.

Conclusion : La tâche de dénomination semble appropriée pour les participants unilingues francophones et anglophones. Les résultats suggèrent qu'un test bilingue devrait être utilisé pour évaluer les personnes bilingues anglais-français.

Mots-clés : Dénomination d'image, bilinguisme, vieillissement, tâche de dénomination

Abstract:

Objective: The purpose of the study was to develop a scoring system for a novel naming task suitable for assessing naming performance in younger (18-30 years) and older (65+ years) adults in monolingual English, monolingual French, and English-French bilingual groups. This novel naming task will serve as an important health service to help diagnose and assess cognitively impaired older individuals, while also serving as an educational tool for healthcare providers.

Materials and Methods: The Naming Task consists of 120 images organized in the same randomized order, and are shown on a white background displayed on a computer screen using PowerPoint. Participants are instructed to name the image displayed. Monolinguals completed the test in their native language and bilinguals completed the test in English only, French only, and a bilingual administration. Scoring criteria was established based on the responses from testing.

Results: Strict and lenient scoring criteria developed for the Naming Task are presented. Eight items were removed from the original Naming Task due to quality and/or clarity, inability to name the image, or too many alternate responses. Performance in monolingual English and French was similar in younger and older adults for strict and lenient scoring. Bilinguals performed better with bilingual administration and worse with French administration, where scores were the lowest of all age and language groups.

Conclusion: The Naming Task appears to be suitable for monolingual French and English individuals. Results suggest that a bilingual administration should be used when testing English-French bilinguals.

Keywords:

Picture naming, bilingualism, aging, naming task

Introduction

Despite the overwhelming increase of bilingualism in Canada, there are no appropriate tools to assess language abilities in older English-French bilingual speakers. A new Naming Task will serve as a tool for healthcare providers to assess naming abilities in bilingual adults. This may be important when assessing older adults for medical conditions that impact language abilities, such as dementia and aphasia. The purpose of the present study is to develop a scoring system for a novel naming task that is suitable for assessing naming performance in monolingual English, monolingual French, and English-French bilinguals. Upon scoring criteria development, this novel naming task will serve as an important health service to help diagnose and assess cognitively impaired older individuals.

Two types of scoring criteria were developed for the Naming Task: strict and lenient scores. Strict scores represented the formal name for an item, while lenient scores included acceptable synonyms or slang terms. The analysis presented in this paper will determine which names are used the most often for each item and establish a clear set of guidelines for strict and lenient scoring in both English and French. Performance across groups will be compared on the strict and lenient scoring criteria, in order to examine the impact of language administration on bilingual performance and to determine if the test is suitable for all language groups.

Literature Review

In the recent decade, research has begun exploring the impact of bilingualism on cognition, especially in the areas of executive function and language. This research has demonstrated that, relative to monolinguals, bilingual individuals show superior performance on tasks of executive function (e.g., inhibition of task-irrelevant information; Adesope, Lavin, Thompson, & Ungerleider, 2010; Bialystok, 2009; Bialystok, Craik, Green, & Gollan, 2009), but poorer performance on language tasks (e.g., picture naming tasks) (Gollan, Montoya, Fennema-Notestine, & Morris, 2005; Roberts, Garcia, Desrochers, & Hernandez, 2002). In addition, bilingualism can be seen as a protective factor, as research with an immigrant sample living in Toronto has suggested that bilingualism may delay the onset of dementia by five years in older adults (Bialystok, Craik, & Freedman, 2007; Craik, Bialystok, & Freedman, 2010).

The Boston Naming Test (BNT) is a widely used clinical picture-naming task, where patients are asked to name the image displayed (Kaplan, Goodglass, & Weintraub, 1983). Overall, individuals show a decline in naming ability as they age (Kaplan et al., 1983), specifically after the age of 70 (Brouillette et al., 2011). Research examining the utility of the BNT with bilinguals has shown that monolinguals tend to outperform bilinguals and the level of difficulty for the test likely differs between languages (Roberts et al., 2002). For example, in a study comparing English-speaking monolinguals, bilingual Spanish-English speakers, and bilingual English-French speakers, both bilingual groups scored significantly worse than the monolingual English participants (Roberts et al., 2002). Furthermore, bilinguals have demonstrated difficulty with verbal fluency, frequent tip-of-the-tongue states, and longer picture naming latencies (Bialystok, 2009), even when completing the task in their dominant language (Gollan & Acenas, 2004). Additional studies have indicated that bilinguals perform worse on naming tasks such as the BNT, both in measures of accuracy (Bialystok, Craik, & Luk, 2008; Kohnert, Hernandez, & Bates, 1998) and response time (Gollan et al., 2005; Gollan, Fennema-Notestine, Montoya, & Jernigan, 2007; Ivanova & Costa, 2008; Roberts et al., 2002).

Research with French Canadians suggests that the French translation of the BNT does not account for cultural appropriateness, which is important when administering the test in a language other than the one in which it was originally developed (Roberts & Doucet, 2011). Specifically, research suggests that the French translation of the BNT is not acceptable for assessing naming abilities in English-French bilinguals or in monolingual French individuals (Roberts & Doucet, 2011; Sheppard, Kousaie, Monetta, & Taler, 2016). It has been suggested that when there is a large inconsistency in naming certain items, these items should be removed or the items should be changed in their order of difficulty (Roberts & Doucet, 2011). For example, research with older adults from Quebec City indicated that there were 13 BNT items with multiple acceptable synonyms (e.g., “seahorse” can either be “hippocampe” or “cheval de mer”) and an additional six items that had no clear acceptable response (e.g., “globe”), as native speakers in French disagree on the name of the item (Roberts & Doucet, 2011). Additional research comparing monolingual English and French speakers to English-French bilinguals on the BNT demonstrated that a French administration of the task consistently yielded poorer scores, even in the French monolingual group (Sheppard et al., 2016). Furthermore, after matching for underlying naming ability, differential item functioning analyses suggested that a significant number of items functioned differently across the three participant groups and in different languages of administration (Sheppard et al., 2016), suggesting that the BNT is not equivalent in English and French.

Materials and Methods

Participants

Six groups of participants were included in this study: younger (n = 44) and older (n = 64) monolingual-English speakers, younger (n=30) and older (n = 30) monolingual-French speakers, and younger (n = 48) and older (n = 52) bilingual English-French speakers. Young adults were aged 18 to 30 and older adults were aged 65 or older. Monolingual English participants and bilingual English-French participants were recruited and tested in the Ottawa-Gatineau region, while monolingual French speakers were recruited and tested in Quebec City. Younger adults were recruited through word of mouth and local undergraduate populations, while older adults were recruited through advertisements in community centres, grocery stores, and newspapers. Monolingual participants had either limited or no exposure to languages other than their native language. Bilinguals had limited exposure to languages other than French and English. All bilingual participants were proficient in both English and French before the age of 13 and self-reported their proficiency in French and English using a 5-point Likert scale (see Table 1) on measures of auditory comprehension, reading, speaking, and writing.

Naming Task

The Naming Task consists of 120 images, 100 of which were selected from the coloured Snodgrass set (Rossion & Pourtous, 2004) and the remaining 20 were developed by Dr. Taler, the lead researcher in this study. The Snodgrass images were selected based on their array of difficulty and strong name agreement, while the additional images were created based on the same colour scheme as the Snodgrass set, but with a higher level of naming difficulty. The images were organized in the same randomized order for all participants and were shown on a white background displayed on a computer screen using PowerPoint. Participants were instructed to identify the image on the screen and the research assistant was instructed to record all answers given by the participant.

Neuropsychological Battery

Participants completed a neuropsychological battery, including the forward and backward digit span subtests of the Wechsler Adult Intelligent Scale-Third Edition (Wechsler, 1997); the Montreal Cognitive Assessment (Nasreddine et al., 2005); a version of the Stroop colour-word interference test (Stroop, 1935) in which the number of items produced in 45 seconds was recorded in each of the three conditions (word reading, color naming, and incongruent colour naming); the 64-item Wisconsin Card Sorting Test (Grant & Berg, 1948); and category (animal) and letter (FAS) verbal fluencies (Benton & Hamsher, 1976). Monolingual participants completed the verbal fluency tasks in their native language and bilingual participants completed the tasks in English, in French, and in an administration where they could respond in either language. The neuropsychological battery was administered to demonstrate that all study participants had normal cognitive function. See Table 2 for demographics and neuropsychological performance across all groups.

Table 1 Mean calculation ± standard deviation of proficiency by modality for both English and French for bilingual younger (n = 48) and bilingual older (n = 52) participants. Ranking followed a 5-point Likert scale (1 = no ability; 5 = native-like ability).

	Young Adults				Older Adults			
	English		French		English		French	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Auditory Comprehension	5.00	0.00	4.73	0.51	4.94	0.24	4.78	0.50
Reading	4.95	0.22	4.64	0.53	4.92	0.27	4.76	0.43
Speaking	4.93	0.27	4.49	0.59	4.94	0.34	4.67	0.52
Writing	4.68	0.36	4.23	0.83	4.83	0.43	4.51	0.78

Table 2

Demographic and neuropsychological performance by participant group (mean ± standard deviation). Verbal fluency scores for bilingual groups are reported where participants could answer in either language. MoCA = Montreal Cognitive Assessment; Digit Span= Wechsler Adult Intelligent Scale-Third Edition; WCST = 64-item Wisconsin Card Sorting Test; FAS = letter verbal fluencies; Animals = category verbal fluencies.

	Younger Adults						Older Adults					
	Monolingual English (n = 44)		Monolingual French (n = 30)		Bilingual (n = 48)		Monolingual English (n = 64)		Monolingual French (n = 30)		Bilingual (n = 52)	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Age (years)	21.84	1.84	21.80	2.47	21.10	2.00	70.81	2.73	72.60	6.59	72.23	6.36
Education (years)	15.70	1.21	15.13	1.38	15.71	1.52	15.23	2.70	16.20	2.57	16.38	2.64
MoCA (/30)	28.32	1.38	27.53	2.64	27.83	1.51	27.74	1.52	27.50	1.36	27.71	1.73
Digit Span												
Forwards (/16)	11.25	2.09	12.53	2.29	10.95	2.42	10.79	1.89	10.47	2.40	10.55	2.03
Reverse (/14)	6.95	1.95	8.77	2.62	7.80	2.23	7.56	2.19	7.07	2.03	7.92	2.38
WCST (categories /6)	4.28	1.01	4.70	0.47	4.59	0.64	3.61	1.21	4.07	0.69	3.62	1.23
Stroop												
Word	104.71	17.38	115.23	15.86	108.95	14.37	95.08	14.87	104.07	16.05	96.09	15.34
Colour	78.29	13.84	86.77	14.37	76.93	10.96	66.16	12.83	73.10	14.07	62.17	12.44
Inference	52.69	11.70	48.67	8.26	52.78	8.44	34.46	7.90	32.07	9.85	36.68	8.25
Verbal Influency												
FAS	40.59	13.10	38.23	8.24	38.90	10.79	40.88	14.03	36.37	10.13	38.88	15.75
Animals	24.02	5.44	22.67	5.26	22.68	6.69	21.23	4.67	18.27	4.62	19.53	6.79

Procedure

All monolingual participants completed the testing in one session of two hours, while bilingual participants completed the testing in two sessions of two hours each. All bilingual participants completed the Naming Task in three administrations: English only, French only, and either-language where they could respond in either English or French. Two language administrations were completed in the first testing session, while the third administration was completed in the second testing session.

The study procedures adhered to federal guidelines for protection of human research participants and received ethical approval from the Research Ethics Board at the Bruyère Research Institute, Laval University, and the University of Ottawa. Participants were remunerated $10/ hour for all testing completed and provided informed consent prior to participating.

Development of Scoring Criteria

Dr. Taler developed preliminary scoring criteria for the Naming Task in English and French; these scoring criteria formed the basis of the strict and lenient scoring protocol that was developed for this study. First, the data from each participant were scored based on the preliminary scoring criteria, wherein one point was awarded for each correct answer. Percentages were then calculated for each image based on the number of participants who named the image correctly. During this process, alternative answers provided by participants were recorded. Two independent reviewers went through each item to determine the strict and lenient scoring criteria. The strict scoring criteria were selected based on the most frequent response provided by participants (i.e., a minimum of 50%) and/or the most formal or known name used in society. Lenient responses were selected based on synonyms (e.g., “ironing board” vs. “ironing table”), clarity of the image (e.g., “violin” vs. “viola”), culturally relevant slang terms (e.g., “baby carriage” vs. “pram”), and shortened names for the image (e.g., “green pepper” vs. “pepper”). The two independent researchers then met to discuss their findings. Discrepancies were resolved through discussion and all established scoring criteria were verified by three additional researchers. See Appendix A for a list of strict and lenient responses for each item.

Results

Items Recommended for Removal

Eight items were recommended for removal in English and French: stirrup, gavel, beetle, barn, blouse, and flute were removed due to the clarity and/or quality of the image; rickshaw was removed because no younger or older monolingual French participants could name the image; and necklace was removed as there were too many alternative names for these image (e.g., for necklace: “pearls”, “string of pearls”, “pearl necklace”, and “necklace”).

Overall Task Performance

Figures 1 and 2 present an overall summary of task performance by age and language group according to strict and lenient scoring criteria. The largest difference in naming abilities between older and younger adults is seen in the bilingual French administration groups. Overall, older adults performed better than younger adults in all language categories. The only group where younger participants scored higher than older participants was the monolingual French group, and younger participants scored an average of one item higher (strict and lenient).

For both younger and older adult groups, monolingual English participants had the highest overall score across the task, ranging from an average of 99 correct items using strict scoring and 106 correct items using lenient scoring, out of 120 items. Bilingual English-French participants were able to correctly name an average of 92 and 94 (strict and lenient scoring, respectively) of the items when completing the test in English; however, this increased to 95 and 102 (strict and lenient scoring, respectively) when responses were accepted in either language. The majority of bilingual participants in the bilingual administration responded in English (i.e., 52% of older adults and 62% of younger adults). The average number of items named correctly did not improve by more than five items in any group when lenient scoring was added.

Results by Item

Table 3 represents the percentage of participants who correctly identified each item under strict and lenient scoring.

Figure 1 Average number of images named under strict scoring criteria by age and language group.

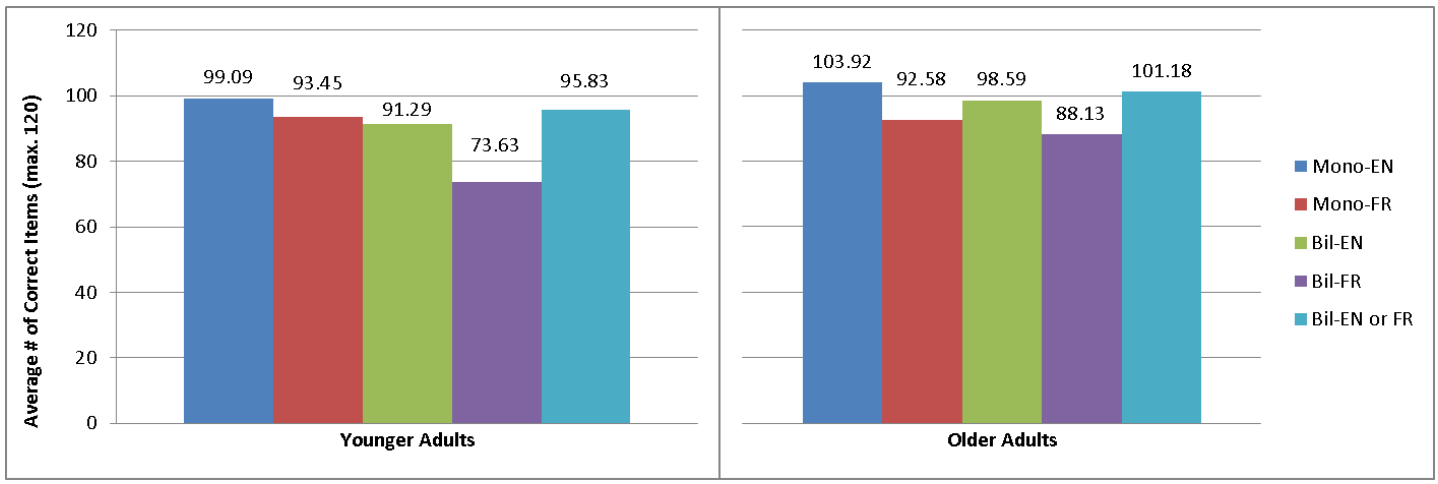

Figure 2 Average number of images named under lenient scoring criteria by age and language group.

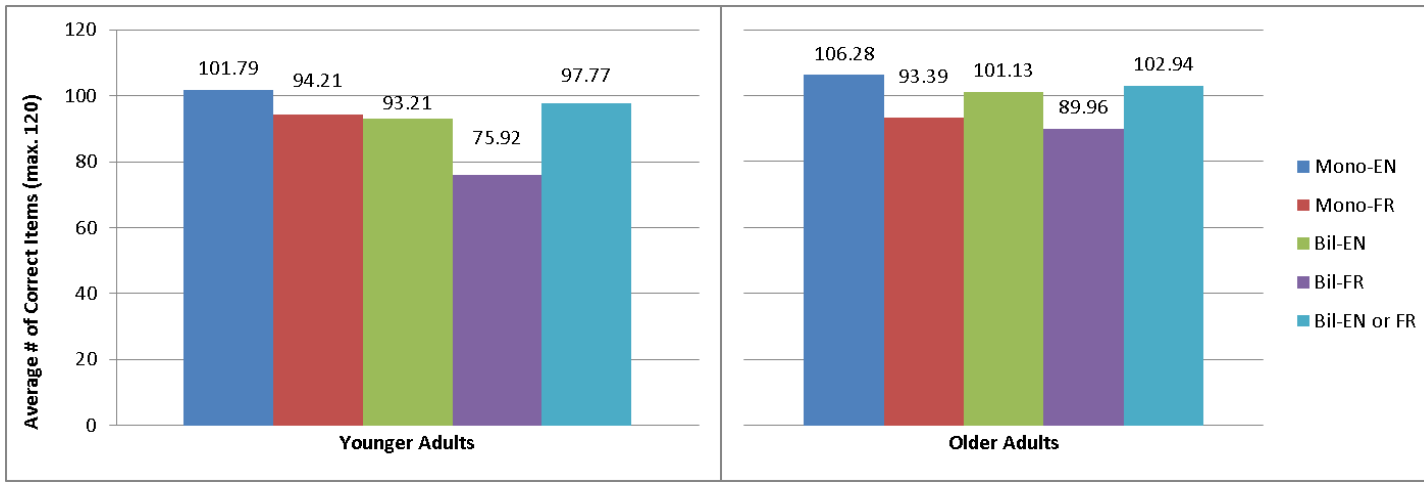

Table 3

Percentage of correct item responses for strict and lenient scoring for participants in monolingual and bilingual groups. ME = Monolingual English; MF = Monolingual French; YA = Younger adults; OA = Older adults; St = Strict; Len = Lenient; Eng = English Administration; Fre = French Administration; Bil = Bilingual Administration.

Item	**ME** (%)				**MF** (%)				**Bilingual YA** (%)						**Bilingual OA** (%)					
	YA		**OA**		**YA**		**OA**		**Eng**		**Fre**		**Bil**		**Eng**		**Fre**		**Bil**	
	St	**Len**	**St**	**Len**	**St**	**Len**	**St**	**Len**	**St**	**Len**	**St**	**Len**	**St**	**Len**	**St**	**Len**	**St**	**Len**	**St**	**Len**
crown	100	100	100	100	100	100	100	100	98	98	94	94	98	98	100	100	98	98	100	100
helicopter	100	100	100	100	100	100	100	100	100	100	100	100	100	100	98	98	100	100	98	98
barrel	98	98	98	98	55	55	71	71	96	96	75	75	100	100	100	100	94	94	100	100
tiger	100	100	95	95	100	100	87	87	100	100	98	98	100	100	100	100	96	96	100	100
rolling pin	88	88	97	97	97	97	100	100	54	54	48	48	81	81	93	93	77	77	96	96
spool of thread, spool	51	72	80	91	86	69	65	71	15	44	38	52	47	62	69	89	42	60	80	86
violin, fiddle	100	100	98	98	90	90	94	94	98	98	94	94	98	98	94	94	94	94	98	98
iron	100	100	100	100	97	97	100	100	88	88	65	65	96	96	98	98	96	96	100	100
alligator, crocodile	100	100	100	100	100	100	94	94	100	100	100	100	100	100	100	100	96	96	100	100
pliers	72	72	95	95	100	100	100	100	56	56	65	65	77	77	91	91	90	90	98	98
kangaroo	100	100	100	100	100	100	90	90	100	100	98	98	100	100	98	98	98	98	100	100
duck	95	95	91	91	97	97	87	87	98	98	96	96	100	100	96	96	94	94	92	92
guitar	100	100	95	95	100	100	94	94	100	100	100	100	100	100	98	98	94	94	96	96
trombone	77	77	72	72	66	66	45	45	75	75	71	71	72	72	80	80	75	75	78	78
well	93	95	100	100	100	100	97	97	94	94	65	65	98	100	98	98	92	92	96	96
rhinoceros	93	100	92	92	100	100	81	81	100	100	96	96	100	100	89	93	94	94	90	90
basket	98	98	98	98	100	100	100	100	100	100	88	88	98	98	98	98	98	98	100	100
lobster	95	95	100	100	97	97	100	100	90	90	60	60	89	89	96	96	77	77	98	98
cummer-bund	30	30	83	83	14	14	0	0	19	19	4	4	26	26	63	63	13	13	66	66
pipe	100	100	100	100	100	100	100	100	96	96	92	92	100	100	100	100	100	100	100	100
belt	100	100	97	97	100	100	100	100	100	100	98	98	100	100	98	98	96	96	100	100
ostrich	74	84	89	89	76	76	58	68	83	83	71	71	85	85	83	87	75	75	84	86
ottoman; hassock	60	77	42	84	59	66	55	55	27	33	23	27	45	49	41	67	40	40	54	64
chest of drawers; dresser	77	77	91	91	66	66	65	65	56	56	21	21	62	62	83	83	33	33	68	68
ruler	100	100	100	100	100	100	100	100	98	98	96	96	96	96	100	100	98	98	100	100
spinning wheel	30	30	92	92	14	14	77	77	19	19	4	4	23	23	76	76	38	38	80	80
asparagus	93	93	98	98	90	90	97	97	94	94	77	77	94	94	96	96	90	90	100	100
candelabra	21	30	78	88	0	10	26	26	17	38	13	23	15	34	72	72	38	42	62	66
leopard; cheetah	91	95	77	78	69	76	61	61	106	75	81	85	77	85	78	81	65	65	78	82
racquet	91	91	100	100	100	100	100	100	85	92	94	94	98	98	96	96	92	94	96	100
sheep	84	84	97	97	93	93	100	100	85	85	92	92	94	94	83	83	79	79	94	94
door knob	93	95	92	92	100	100	97	97	79	79	60	60	81	81	83	83	94	94	94	94

Item	ME (%)				MF (%)				Bilingual YA (%)						Bilingual OA (%)					
	YA		OA		YA		OA		Eng		Fre		Bil		Eng		Fre		Bil	
	St	Len	St	Len	St	Len	St	Len	St	Len	St	Len	St	Len	St	Len	St	Len	St	Len
ear	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
boot	100	100	97	97	97	97	97	97	100	100	100	100	100	100	100	100	92	92	98	98
ring	100	100	98	98	97	97	90	90	100	100	83	83	100	100	98	98	90	90	98	98
grass hopper	79	98	97	97	90	90	74	74	83	92	63	63	85	96	83	93	79	79	86	90
nail file	77	84	88	88	66	66	65	65	81	83	52	52	85	85	85	91	63	63	90	92
screwdriver	95	95	100	100	100	100	100	100	92	92	77	77	98	98	100	100	92	92	100	100
glasses	98	98	95	95	100	100	100	100	100	100	98	98	100	100	98	98	100	100	100	100
record player	81	88	63	78	59	59	90	90	63	75	15	15	66	74	44	70	56	56	70	80
anchor	98	98	98	98	90	90	97	97	96	96	58	58	96	96	98	98	92	92	98	98
pineapple	100	100	97	97	100	100	97	97	100	100	98	98	100	100	98	98	90	90	100	100
nut	63	63	66	66	28	28	48	48	44	44	6	6	38	38	46	46	27	27	50	50
bridle	33	33	48	48	7	7	3	3	21	21	4	4	19	19	35	35	27	27	34	34
hanger	100	100	89	89	97	97	100	100	88	90	42	42	89	89	93	93	65	65	92	92
hammer	100	100	100	100	100	100	100	100	100	100	88	88	98	98	98	98	100	100	100	100
abacus	49	49	84	84	45	45	87	87	42	42	2	2	47	47	74	74	33	33	78	78
eagle	84	95	84	100	93	93	58	65	90	94	81	81	94	100	81	91	87	88	90	94
artichoke	40	40	70	70	34	34	81	81	33	33	23	23	34	34	69	69	58	58	52	52
lightswitch	98	98	95	98	62	62	42	42	92	94	29	29	96	96	78	91	29	29	78	84
carafe	16	16	55	55	34	34	26	26	10	10	10	10	17	17	50	50	50	50	44	44
eye	98	98	100	100	100	100	97	97	100	100	98	98	100	100	96	96	100	100	100	100
mushroom	100	100	97	97	100	100	100	100	98	98	94	94	100	100	96	96	98	98	98	98
ironing board	98	100	100	100	72	97	81	100	81	85	42	52	87	91	94	100	85	94	98	98
wrench	100	100	92	92	52	52	48	48	83	81	19	19	72	72	74	74	37	37	70	70
onion	100	100	97	97	97	97	100	100	98	98	98	98	98	98	98	98	98	98	98	98
centaur	56	56	33	33	62	62	19	19	38	38	25	25	45	45	31	31	35	35	32	32
axe	95	95	94	94	100	100	100	100	100	98	67	67	98	98	96	96	90	90	98	98
nail	100	100	98	98	86	86	100	100	88	90	85	85	98	98	98	98	98	98	100	100
squirrel	100	100	100	100	100	100	100	100	98	98	98	98	98	98	100	100	98	98	100	100
lips, mouth	100	100	100	100	100	100	87	87	100	100	98	98	100	100	98	98	100	100	100	100
mitten	81	81	64	89	93	93	100	100	77	81	90	90	89	91	80	87	94	94	92	100
cannon	93	93	89	89	100	100	90	90	96	96	92	92	98	98	96	96	96	96	96	96
stroller, carriage	70	70	11	11	90	90	84	84	56	56	27	27	55	55	28	28	21	21	28	28
gorilla	88	88	83	83	97	97	39	39	88	88	83	83	89	89	70	70	79	79	74	74
pomegran-ate	91	91	80	80	79	79	55	55	83	83	46	46	87	87	81	85	46	48	78	80
wagon	93	93	92	92	24	24	29	29	56	56	42	42	64	64	89	89	52	52	80	80
tambourine	91	91	66	66	48	48	19	19	67	67	54	54	64	64	54	54	54	54	62	62
heart	100	100	100	100	100	100	97	100	100	100	100	100	100	100	98	98	100	100	100	100
zebra	100	100	100	100	100	100	94	94	98	98	98	98	100	100	100	100	92	92	100	100
screw	100	100	98	98	100	100	100	100	96	96	75	75	98	98	98	98	96	96	98	98
celery	74	74	91	91	76	76	87	87	77	77	77	77	77	77	93	93	92	92	90	90

Item	ME (%)				MF (%)				Bilingual YA (%)						Bilingual OA (%)					
	YA		OA		YA		OA		Eng		Fre		Bil		Eng		Fre		Bil	
	St	Len	St	Len	St	Len	St	Len	St	Len	St	Len	St	Len	St	Len	St	Len	St	Len
calipers	7	7	36	36	0	0	3	3	8	8	2	2	9	9	19	19	12	12	14	14
stool	98	98	100	100	72	72	71	71	88	88	25	25	81	81	89	89	54	54	88	88
seahorse	93	93	91	91	100	100	65	65	94	94	35	56	89	94	78	78	31	60	80	82
bow	88	98	95	100	100	100	94	100	90	96	19	77	83	89	93	96	23	92	74	98
rollerskate	93	93	92	92	48	48	100	100	65	65	73	73	81	81	85	85	92	92	92	92
glove	100	100	98	98	97	97	100	100	96	96	92	92	98	98	96	96	100	100	100	100
peacock	86	86	95	95	86	86	94	94	73	73	31	31	89	89	69	69	67	67	90	90
vest	100	100	91	91	45	45	90	90	98	98	88	88	96	96	100	100	88	88	96	96
kettle	91	91	100	100	97	97	100	100	83	83	58	58	85	85	93	93	92	92	96	96
Bunsen burner	53	53	70	70	14	14	13	13	52	52	42	42	64	64	56	56	21	21	50	50
colander	37	98	72	83	90	90	90	90	19	71	29	29	40	79	44	69	42	42	66	78
coat	67	100	48	92	90	90	81	81	71	100	94	94	72	100	57	96	88	88	64	92
trumpet	91	91	70	70	100	100	55	55	92	92	90	90	91	91	76	76	85	85	72	72
trowel	28	28	59	59	0	7	0	10	8	8	2	15	13	13	35	35	12	17	30	30
raccoon	100	100	86	86	100	100	52	52	94	94	77	77	100	100	83	83	67	67	84	84
salt shaker	91	100	89	89	66	86	97	100	83	96	38	88	89	98	91	94	83	87	98	100
arrow	93	93	100	100	100	100	94	94	96	96	83	83	98	98	100	100	96	96	94	94
accordion	93	93	95	95	76	76	100	100	85	85	83	83	89	89	93	93	96	96	98	98
green pepper, bell pepper	98	98	98	98	100	100	100	100	96	96	42	77	89	94	94	94	58	90	82	100
broom	98	98	100	100	100	100	100	100	98	98	85	85	100	100	100	100	94	94	100	100
top	70	77	97	97	97	97	97	97	50	50	65	65	91	91	72	72	79	79	90	90
pitcher, jug	88	88	98	98	55	55	26	26	65	65	27	27	62	62	89	89	42	42	76	76
chisel	47	47	86	86	17	17	23	23	44	44	6	6	43	43	69	69	33	33	60	60
metronome	49	49	81	81	45	45	61	61	52	52	50	50	60	60	76	76	75	75	84	84
sled	91	98	84	86	86	86	87	87	77	88	38	38	85	96	72	76	58	58	82	82
hand	100	100	100	100	100	100	100	100	96	96	98	98	98	98	98	98	100	100	98	98
monocle	51	51	83	83	31	31	52	52	40	40	17	17	45	45	70	70	69	69	72	72
thimble	84	84	91	91	59	59	97	97	58	58	15	15	64	64	80	80	67	67	88	88
corn	100	100	100	100	93	93	74	74	100	100	96	96	98	98	100	100	96	96	94	94
clothespin, clothes peg	77	77	100	100	97	97	100	100	50	50	50	50	77	77	89	89	77	77	88	88
chicken	70	88	61	94	69	69	94	94	81	83	81	81	85	87	61	91	90	90	84	90
harp	100	100	97	97	90	90	94	94	90	90	75	75	96	96	98	98	92	92	98	98
pumpkin	100	100	98	98	100	100	97	97	98	98	98	98	100	100	93	93	96	96	100	100
watering can	74	77	97	97	90	90	100	100	35	35	48	48	72	72	81	81	83	83	86	88
saw	100	100	100	100	100	100	100	100	94	94	83	83	96	96	100	100	98	98	100	100
dragonfly	98	98	77	77	90	90	68	68	81	81	56	56	98	98	48	48	50	50	70	70
pear	98	98	100	100	100	100	100	100	98	98	77	77	100	100	100	100	98	98	100	100
rocking chair	91	91	100	100	93	93	94	94	92	92	63	63	94	94	96	96	85	85	94	94
windmill	98	98	98	98	97	97	100	100	83	83	58	58	96	96	94	94	85	85	98	98
butterfly	100	100	100	100	100	100	100	100	100	100	96	96	98	98	98	98	90	90	100	100

Analysis 1: Strict and Lenient Scoring Differences. There were a number of items where performance improved by one to five extra items once lenient criteria was taken into consideration. The following is a list of items where percentages improved once lenient scoring was included, in both English and French for all language groups: spool of thread, ottoman, candelabra, leopard, eagle, ironing board, bow, coat, and salt shaker. Additionally, there were a number of items that scored higher once lenient scores were included in English only: grasshopper, record player, beetle, light-switch, mitten, colander, and sled; and in French only: hippocampe, truelle, and poivron.

Analysis 2: Language Group Differences. Bilingual participants performed more poorly on the task than monolingual participants in their respective languages. The difference was most extreme when comparing the monolingual French participants and the bilingual-French administration. While there was a similar pattern of results shown with the monolingual English participants and the bilingual-English administration, the performance differences were not as great (i.e., smaller difference between groups) or consistent (i.e., not as many items displaying group differences). It should be noted that there are a small number of items where bilingual English-French speakers scored better than the monolingual groups. In English, these items include cannon, celery, and flute. In French, these items include cyclo-pousse, lèvres, wagon, and bec Bunsen.

Analysis 3: Age Differences. The following is a list of items that had large generational differences, where younger adults scored higher than older adults: necklace, centaur, stroller, gorilla, tambourine, trumpet, and racoon. However, overall, older adults scored higher than younger adults in all languages and language administration groups.

Discussion

The purpose of this study was to develop scoring criteria for a new bilingual naming task, as it will serve as an important health service for cognitively impaired older adults. Older and younger participants were tested using a preliminary scoring criteria to determine if the test was appropriate for both English- and French-speaking individuals. Although the task can easily be administered to all groups, there are differences in how each group of participants performs based on their age group, language group, and for the bilingual participants, language of administration.

Allowing lenient scoring to be considered did improve the average number of correct responses by one to five items per group, with most groups improving by two items. An advantage to having both strict and lenient scoring criteria is that poorer performance on certain items is more likely to be related to item difficulty or language difficulty, as the lenient criteria takes into consideration acceptable synonyms, culturally relevant slang terms, and shortened names for the item. Adding lenient scoring improves the quality of the Naming Task because it demonstrates that although participants may not use the formal name for the item, they still know what the image is representing and can name the item using terms they are familiar with. Some items (e.g., cheetah and leopard) were given two strict scores because this image was very representative for both names, and participants may not be able to accurately distinguish a difference. Some items (e.g., necklace) were removed because there were too many possible responses, making it difficult to score the item.

Based on the quality of the image, a number of items were recommended for removal. Removal criteria was determined based on the responses provided by the participants, indicating that these items were ambiguous, and thus not a good visual representation of the item in question. Furthermore, additional items were recommended for removal as they had a large number of alternate names, making it difficult to score.

There were also large language group differences, with monolingual English participants outperforming every other language group, and the bilingual French administration group performing the most poorly of all the groups. Interestingly, the monolingual French group vastly outperformed the bilinguals in the French administration. This difference might be related to the fact that the bilingual participants were selected from the Ottawa region, which is largely English-dominant. Even though all of the bilinguals had good self-reported proficiency in both languages, the environment in which they live and work may be more English-dominant than would be expected for bilinguals in Quebec City, where monolingual French participants were selected and tested.

Finally, there were a number of items where older adults outperformed the younger adults. This finding could be attributed to generational differences (Schmitter-Edgecombe, Vesneski, & Jones, 2000), or the idea that older adults may have a greater vocabulary (Hawkins et al., 1993; Sheppard et al., 2016). There may have been a number of items that older adults, but not younger ones, have been exposed to, explaining the difference between age groups (e.g., metronome). The items where there was a very large difference between older and younger adults were not necessarily recommended for removal; however, further analysis of these

items is required to determine if the generational differences are significant enough to alter the results of the test for future participants.

Future research should seek to understand why certain language groups, primarily monolingual English individuals, outperform others, and to determine how these discrepancies can be resolved to allow for the Naming Task to serve as an appropriate tool for bilingual older adults. More analysis is required to determine which images should be removed as a consequence of the inequality between language groups and age groups. Research should further focus on data collection with monolingual and bilingual patients with mild cognitive impairment conditions and Alzheimer's disease, to test the validity of the scoring criteria.

Conclusion

The present study established strict and lenient scoring criteria for an English-French picture-naming task. The Naming Task will serve as a health service for both English and French individuals to assess cognitive impairment and can be used as a suitable alternative to the BNT. The Naming Task appears to be suitable for monolingual French and English individuals. However, results are unclear when comparing bilingual to monolingual participants. Results suggest that when possible, a bilingual administration should be used when testing English-French speaking individuals, as responses will be stated in the participant's dominant language, which is affected by their language environment.

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Appendix A. English and French Strict and Lenient Scoring Criteria.

Item #	English Strict Score	English Lenient Score	French Strict Score	French Lenient Score
1	crown		couronne	
2	helicopter		hélicoptère	
3	barrel		baril, tonneau	
4	tiger		tigre	
5	rolling pin		rouleau à pâte	
6	spool of thread, spool	thread, bobbin	bobine de fil	ficelle, fil
7	to remove image		to remove image	
8	violin, fiddle	viola	violon	viola
9	iron		fer à repasser	
10	alligator, crocodile		crocodile, alligator	
11	pliers		pince	
12	kangaroo		kangourou	
13	to remove image		to remove image	
14	duck		canard	
15	guitar		guitare	
16	trombone		trombone	
17	well	wishing well	puits	
18	to remove image		to remove image	
19	rhinoceros	rhino	rhinocéros	
20	basket		panier	
21	lobster		homard	
22	cummerbund		gaine	
23	pipe		pipe	
24	belt		ceinture	
25	ostrich	emu	autruche	émeu
26	ottoman, hassock	foot stool	pouf	coussin
27	chest of drawers, dresser		commode, buffet	
28	ruler		règle	
29	spinning wheel		rouet	
30	asparagus		asperge	
31	candelabra	candles	candélabre	chandelles
32	leopard, cheetah	jaguar	leopard, guépard	jaguar
33	racquet	badminton racquet, tennis racquet	raquette	
34	sheep		mouton	
35	door knob	knob	poignée de porte	
36	ear		oreille	
37	boot		botte	
38	ring		bague	
39	grasshopper	cricket	sauterelle	
40	nail file	file	lime à ongles	
41	screwdriver		tournevis	
42	glasses		lunettes	
43	record player	turn table	tourne-disque	
44	anchor		ancre	
45	to remove image		to remove image	
46	pineapple		ananas	
47	nut		écrou	
48	to remove image		to remove image	
49	bridle		bride	
50	hanger	coat hanger, clothes hangers	ceintre	
51	hammer		marteau	
52	to remove image		to remove image	
53	abacus		boulier	abaque
54	eagle	hawk, falcon	aigle	faucon
55	artichoke		artichaut	
56	lightswitch	switch	interrupteur	
57	carafe	decanter	carafe	
58	eye		oeil	
59	mushroom		champignon	
60	ironing board	ironing table	planche à repasser	table à repasser
61	wrench		clé (à écrou)	

Item #	English Strict Score	English Lenient Score	French Strict Score	French Lenient Score
62	onion		oignon	
63	centaur		centaure	
64	axe		hache	
65	nail		clou	
66	squirrel		écureuil	
67	lips, mouth		lèvres, bouche	
68	mitten	mitt	mitaine	
69	cannon		canon	
70	stroller, carriage	baby carriage, pram, baby stroller	pousette	landau, pousse-pousse, carosse, carosse de bébé
71	gorilla		gorille	
72	pomegranate		pomme grenade	grenade
73	wagon		brouette	
74	tambourine		tambourin	
75	heart		coeur	
76	zebra		zèbre	
77	screw		vis	
78	celery		celeri	
79	calipers		compas	
80	stool		tabouret	
81	seahorse	horse fish	hippocampe	cheval de mer
82	bow	ribbon	noeud papillon	boucle, ruban, noeud
83	rollerskate		patin à roulette	
84	glove		gant	
85	peacock		paon	
86	vest		veste	
87	kettle	teakettle	bouilloire	
88	Bunsen burner		bruleurs busen, bec Bunsen	
89	colander	strainer	passoire, égouttoir	
90	coat	jacket	manteau	veston
91	trumpet		trompette	
92	trowel		truelle	pelle de jardinage
93	raccoon		raton laveur	
94	to remove image		to remove image	
95	salt shaker	salt	salière	sel
96	arrow		flèche	
97	accordion		accordéon	
98	green pepper, bell pepper	pepper	poivron (vert)	piment, piment vert
99	broom		balais	
100	top	spinning top	toupie	
101	pitcher, jug		cruche, pichet	
102	chisel		ciseau	
103	metronome		métronome	
104	sled	toboggan	luge, traîneau	
105	hand		main	
106	monocle		monocle	
107	thimble		dé à coudre	
108	corn	corn on the cob	blé d'Inde, maïs	
109	Clothespin, clothes peg		pince à linge, épingle à linge	
110	chicken	hen	poule	
111	harp		harpe	
112	pumpkin		citrouille	
113	watering can	watering pail	arrosoir	
114	saw		scie	
115	dragonfly		libellule	
116	pear		poire	
117	rocking chair		chaise berçante	
118	windmill		moulin (à vent)	
119	butterfly		papillon	
120	to remove image		to remove image	

Changement Climatique et Iniquités en Santé : L'apport de L'approche Interventionnelle en Santé des Populations dans un Contexte Québécois

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Résumé :

Dans un monde globalisé, le changement climatique vient s'ajouter à la pléthore de problèmes complexes auxquels la santé publique doit faire face. Cet article propose de s'intéresser, à travers une perspective interventionnelle en santé des populations et dans un contexte québécois, aux conséquences du changement climatique sur les populations vulnérables ainsi qu'aux domaines d'action pouvant les mitiger. Une recherche documentaire a été effectuée dans sept banques de données liées à plusieurs disciplines en sciences sociales, de la santé et de l'environnement. Reconnaissant également l'apport des organismes non gouvernementaux pour la santé des populations, celle-ci a été complémentée par des rapports d'organisations militantes et citoyennes. Les résultats montrent que plusieurs secteurs peuvent collaborer avec les agences de santé publique et les organismes communautaires pour réduire, d'une part, le changement climatique et, de l'autre, les iniquités en matière de santé. Au Québec, trois domaines d'action semblent particulièrement prometteurs, soit : l'aménagement territorial en milieu urbain, le transport et la mobilité durable et l'agriculture urbaine et périurbaine. Préconisant un cadre social écologique et une collaboration multisectorielle, les interventions centrées sur la santé des populations permettent d'atténuer les conséquences du changement climatique sur les iniquités sociales et sanitaires. Quelques défis et pistes de recherche liés à leur implantation et à leur pérennité sont discutés.

Mots-clés :

Changement climatique, environnements physiques, iniquités en santé, déterminants écologiques de la santé, santé des populations, interventions multisectorielles

Abstract:

(translation)

In a globalized world, climate change is yet another complex problem faced by public health. This article explores the consequences of climate change on vulnerable populations and the measures to mitigate them from an interventional perspective in population health, in a Quebec context. A literature review was conducted using seven databases related to disciplines in social sciences, health sciences and environment. Given the contribution of non-government agencies to population health, the literature review was complemented by reports from activist and community organizations. Results show that many sectors can collaborate with public health agencies and community-based organizations to reduce climate change and health inequities. In Quebec, three fields of activity seem especially promising: territorial development in urban settings, sustainable transport and mobility, and urban and suburban agriculture. Arguing for a social ecological framework and a multisectoral collaboration, interventions focused on population health mitigate the consequences of climate change on social and health inequities. Some challenges and research avenues linked to their implementation and continuation are discussed.

Keywords:

Climate change, physical environments, health inequities, ecological determinants of health, population health, multisectoral interventions

Introduction

Dans un monde globalisé, le changement climatique (ci-après CC) vient s'ajouter à la pléthore de problèmes complexes auxquels la santé publique doit faire face. Ses effets sur la santé se manifestent souvent de manière indirecte et touchent les strates de la société de façon inégale (Association canadienne de santé publique [ACSP], 2015). Au Canada, le gouvernement fédéral nouvellement élu en 2015 s'est engagé à agir sur le CC en réduisant sa progression et en améliorant les capacités des collectivités à le contrer. Les interventions doivent être adaptées au contexte dans lequel elles seront mises en œuvre, en plus de toucher à plusieurs secteurs, comme le transport, l'énergie, l'agriculture, ou l'urbanisme (Watts et al., 2015). Tout comme les autres provinces du Canada, le Québec a des particularités politiques, économiques, sociales, et géographiques qui sont importantes à considérer lors de la conception et la mise en œuvre d'interventions sur le CC (Côté, Logan, et Paquin, 2015; Doyon, Bélanger, et Gosselin, 2008). Pourtant, l'absence de littérature québécoise qui met l'accent sur les iniquités sociales découlant du CC et qui propose conséquemment des pistes d'action intersectorielles et contextuelles pour les mitiger est flagrante. En effet, les études sur le CC restent centrées sur des enjeux populationnels comme la mortalité (Doyon et al., 2008) ou ses conséquences économiques (Bouchard et Smargiassi, 2007) ou psychologiques (Charbonneault et al., 2000), omettant d'identifier, d'une part, les groupes de personnes les plus susceptibles d'en subir les conséquences défavorables en raison d'inégalités sociales et de l'autre, les interventions ayant le potentiel de réduire leurs vulnérabilités et d'améliorer leur résilience, et ce, dans une perspective d'équité et de justice sociale. Pour combler cette double lacune, cet article s'intéresse aux questions suivantes, et ce, dans un contexte québécois :

Quels sont les groupes les plus affectés par les effets du CC sur la santé?

Quels domaines d'actions et pratiques d'interventions ont le potentiel d'atténuer ces conséquences sur la santé de ces populations?

Pour ce faire, nous proposons d'abord une recension des écrits au sujet de la globalisation, du CC et de ses conséquences sur la santé des populations vulnérables. Nous argumenterons ensuite que l'approche axée sur la santé des populations, par ses repères socioécologiques et ses interventions à de multiples niveaux, est en mesure d'atténuer d'une part, le CC et de l'autre, les inégalités sociales de santé. Enfin, pour illustrer son potentiel, nous présenterons trois domaines d'action et de programmes d'intervention prometteurs, qui sont propices au contexte québécois et qui s'appuient sur l'approche axée sur la santé des populations. En conclusion, quelques défis seront explicités quant à la mise en place et à la pérennité de telles interventions.

Matériels et méthodes

Une recherche documentaire a été effectuée dans sept banques de données liées à diverses disciplines en sciences environnementales, sociales, et de la santé : *PsychInfo* (psychologie), *Sociological Abstract* (sociologie), *Medline* (médecine et épidémiologie), *Canadian Public Health Journal* (santé publique et des populations), *Population Research and Policy Review* (santé des populations et politiques sociales), *Érudit* (multidisciplinaire – littérature de langue française), et *Web of Sciences* (multidisciplinaire – littérature internationale), en utilisant les mots-clés suivants : « Climate change », « Intervention », « Population Health », « Inequalities », « Québec », et leur équivalent en français. Des rapports gouvernementaux québécois, canadiens, et internationaux ainsi que ceux d'organismes non gouvernementaux ont également été scrutés afin d'en faire émerger les nouvelles pratiques d'intervention, les politiques sociales, et les programmes en voie d'être évalués. Les critères d'inclusion comprenaient la langue (français ou anglais) et la date de publication (à partir de l'année 2000). Pour être qualifiés de prometteurs, les domaines d'action et les programmes d'intervention devaient respecter les postulats des *Multiples Interventions Programs* qui seront discutés plus spécifiquement dans ce manuscrit, soit : a—toucher au moins un déterminant de la santé; b—être actionnable par au moins deux paliers décisionnels, qu'il soit à l'échelle locale, provinciale, ou fédérale; c—utiliser des stratégies multiples à divers niveaux du système écologique; d—avoir des retombées positives dans plusieurs domaines sectoriels (ex. environnement et santé); e—être applicables en contexte québécois. Les interventions sélectionnées ont par la suite été présentées à deux professeurs et experts en santé des populations de l'Université d'Ottawa afin d'obtenir leur rétroaction quant à leur pertinence dans le champ interventionnel en santé des populations.

Résultats

Le CC dans un monde globalisé

La globalisation, marquée par la planétarisation des échanges et de l'information, a des effets sur les déterminants écologiques de la santé (ACSP, 2015; Buse, 2013; Warren et Lemmen, 2014). L'activité humaine accélérée,

l'augmentation de la population, l'urbanisation et les normes individualistes qui caractérisent notre époque, affectent plusieurs composantes écologiques nécessaires à la vie en santé comme la qualité de l'air, les ressources alimentaires et hydriques, les cycles de nitrogène et de phosphore nécessaires aux plantes, la fertilité des sols, la douceur des eaux souterraines, les ressources marines et terrestres, une réserve d'énergie suffisante et un climat relativement stable et favorable à la vie (ACSP, 2015; Watts et al., 2015). Les systèmes écologiques sont ainsi menacés, puisque notre empreinte écologique augmente considérablement (dans les pays industrialisés) alors que l'indice planète vivante, une mesure de la biodiversité, diminue sensiblement dans les pays en développement (ACSP, 2015; Watts et al., 2015). Le CC est une manifestation de ces risques liée notamment à l'augmentation des émissions de gaz à effet de serre. Selon le groupe d'experts intergouvernemental sur l'évolution du climat (GIEC, 2014), le CC persistera pendant plusieurs siècles, même si les émissions de gaz à effet de serre produites par les activités humaines sont réduites, puisque la capacité d'absorption de ces gaz par les surfaces océaniques et terrestres continuera à diminuer.

Les liens entre le CC, la santé, et les inégalités sociales dans le monde et au Québec

Ces changements atmosphériques ne sont pas sans conséquences pour les populations mondiales. En effet, le lien entre le CC et ses répercussions, souvent défavorables pour la santé des collectivités, est bien documenté (Doyon, et al., 2008; Bourque et Willox, 2014; Haines, McMichael, et Epstein, 2000; Last, 2010). Les changements climatiques agissent sur la santé de manière directe, par exemple à travers les catastrophes naturelles ou de manière indirecte à travers les systèmes physiques (glaciers, eau, cours d'eau, mer), les systèmes biologiques (écosystèmes terrestres et marins, incendies de forêt), les systèmes humains (production alimentaire et moyens de subsistance) et les processus sociaux (en exacerbant les migrations, et les conflits en lien avec le manque de ressources; Watts et al., 2015; GIEC, 2014). Parmi les phénomènes découlant du CC les plus préoccupants pour la santé des populations québécoises, on retrouve :

La multiplication des phénomènes météorologiques extremes. Le Québec connaîtra de plus en plus des phénomènes météorologiques imprévisibles (Ministère du développement durable, de l'environnement et de la lutte contre les changements climatiques [DDELCC], 2015; Institut national de santé publique du Québec [INSPQ], 2014; Climat Québec, 2015). En effet, plusieurs acteurs notent l'augmentation importante, sur le territoire québécois, d'épisodes de neige ou de pluie, d'événements météorologiques rares comme les tornades et vents violents, ou d'événements, comme les sècheresses qui perdurent (Côté et al., 2015 ; INSPQ, 2014). Ces phénomènes ont des répercussions directes sur l'environnement physique des résidents et, par conséquent, sur leur santé (Charbonneau et al., 2000; INSPQ, 2014; Warren et Lemmen, 2014). Par exemple, les inondations dérivant d'une accumulation de pluie peuvent amener des effets directs sur la population (p. ex. décès par la noyade; des blessures) ou indirects (p. ex. pertes de revenus; stress; troubles gastro-intestinaux; INSPQ, 2014). Des études indiquent également que ces phénomènes peuvent augmenter la probabilité de souffrir de troubles d'adaptation, notamment ceux liés au stress post-traumatique (Charbonneau et al., 2000; Warren et Lemmen, 2014). En plus de poser un danger pour la sécurité et le bien-être de la population, la multiplication de ces phénomènes aura d'importantes répercussions sur l'économie. L'une des plus grandes crises ayant touché le Québec, celle du Verglas en 1996, a causé plus de six milliards de dollars en pertes économiques, en plus nombreuses pertes humaines.

Certes, la capacité de fuir les intempéries ou de se protéger ne semble pas égale à travers la société. Elle est liée aux contextes sociaux dans lesquels vivent les individus et les groupes (Maltais et Gauthier, 2008). Bien que les données québécoises soient plus rares à ce sujet, une pluralité de rapports officiels (GIEC, 2014; Victorian Council of Social Science [VCOSS], 2014) et d'études internationales (Hoffman, 2009; Watts et al., 2015) explique que le statut socioéconomique d'une personne peut grandement l'influencer dans sa capacité à réagir aux événements météorologiques. Des 173 personnes décédées en 2009 après un feu de forêt en Australie, plus de la moitié était des personnes âgées ayant peu de ressources sociales et financières pour être évacués rapidement (VCOSS, 2014). Des 1800 personnes décédées par les inondations suivant l'ouragan Katrina, Hoffman (2009) rapporte une disproportion significative de personnes de race noire, de personnes ayant un handicap et de personnes âgées dont le statut socioéconomique était faible. En clair, si le CC peut affecter la santé de l'ensemble des Québécois par la multiplication de phénomènes météorologiques extrêmes, il est possible de croire que ces derniers toucheront plus fortement les personnes désavantagées sur le plan socioéconomique et souffrant d'exclusion sociale en raison, par exemple, de leur âge, d'une situation d'handicap ou de leur appartenance à une minorité visible.

Hausse de la température et des vagues de chaleur. Le réchauffement climatique provoquera une augmentation significative des vagues de chaleur au Québec. Une vague de chaleur peut se comprendre comme étant une température

au-dessus de 30°C accompagnée d'un indice d'humidité de plus 40°C, et ce, pour au moins deux journées consécutives (INSPQ, 2010a). Santé Canada (2012) estime que le nombre de ces journées doublera fort probablement dans les cinquante prochaines années dans plusieurs villes canadiennes et de la province de Québec. Les vagues de chaleur peuvent avoir des effets directs sur la santé des populations. En effet, la chaleur accablante peut mener les individus à souffrir des maux de tête, des périodes d'épuisement, de déshydratation et de crampes musculaires (Barna, Goodman, et Mortimer, 2012; Gower, 2011). Dans des cas extrêmes, les vagues de chaleur peuvent provoquer des pertes de conscience, voire même la mort (Gower, 2011; Sheffield et Landrigan, 2011). Après avoir examiné l'effet possible du CC sur le taux de mortalité dans trois villes québécoises (Montréal, Québec, et Saguenay), Doyon et ses collègues (2008) ont projeté que le CC allait contribuer significativement à l'augmentation des décès en été dans les prochaines années. D'ailleurs, deux ans après la publication de leurs résultats, au mois de juillet 2010, le Québec a vécu l'une de ses pires canicules. L'analyse qui en a été faite par Bustinza et ses collègues (2013) révèle qu'environ 280 Québécois en sont décédés, soit environ 33% de plus en comparaison aux semaines équivalentes des années précédentes. Parallèlement, la vague de chaleur a contribué à plus de 3400 hospitalisations, provoquant un important achalandage dans les urgences de la province (Bustinza et al., 2013).

Les individus qui résident en ville et qui ont un faible statut socioéconomique sont particulièrement à risque de subir les contrecoups des vagues de chaleur (Laaidi, 2012; Watts et al., 2015). En effet, ils sont plus susceptibles de vivre, grandir et s'amuser à l'intérieur « d'îlots de chaleurs ». Produits de la déforestation urbaine, de l'étalement des villes et du transport, les îlots de chaleur peuvent augmenter la température ambiante de 12°C en milieu urbain en comparaison au milieu rural (Giguère, 2009; Laaidi, 2012). Les personnes défavorisées en milieu urbain sont plus à risque de souffrir des symptômes liés à la chaleur accablante puisqu'ils sont plus enclins à habiter dans des logements non climatisés (p. ex. des tours en hauteur) et ont moins accès aux transports ou aux congés permettant de quitter les zones de chaleur (INSPQ, 2010b; Keller, 2013; Watts et al., 2015). Keller (2013) déclare que le risque de mourir durant les vagues de chaleur est un problème davantage social que biologique. Ses observations concordent avec celles de Klinenberg (1999) qui avait remarqué que la majorité des décès suivant la vague de chaleur à Chicago, en 1995, se produisaient à l'intérieur de quartiers où la pauvreté se conjuguait à des infrastructures comme des logements de piètre qualité ou des espaces verts réduits. L'intersection entre le fait de vivre dans la pauvreté et d'avoir un âge élevé est également un facteur de risque important. Des 15 000 décès occasionnés par la vague de chaleur en 2003 sur le territoire français, environ 80% avaient plus de 75 ans, souvent en situation de pauvreté et d'isolement social (Gower, 2011; Sheffield et Landrigan, 2011).

Parallèlement, la hausse des températures et les chaleurs accablantes peuvent amener des effets indirects sur la sécurité alimentaire (Watts et al., 2015). Le CC contribue à la diminution de la qualité des récoltes pouvant mener à une augmentation globale des prix de la nourriture, et ce, même au Canada (Lewis et Witham, 2012; Watts et al., 2015). Le prix élevé de la nourriture peut, à son tour, forcer les individus vivant dans une situation de précarité à consommer des aliments de piètre qualité, augmentant ainsi les risques de maladies chroniques (ACSP, 2015). Les résultats de l'enquête Bilan-Faim rapportent d'ailleurs une forte augmentation entre 2008 et 2011 (22%) des demandes d'aide alimentaire au Québec (Pegg, 2011). Bien que d'autres facteurs que le CC puissent expliquer cette augmentation, l'Institut national de santé publique du Québec (2010c) affirme que le CC fait et continuera de faire partie des responsables de l'insécurité alimentaire chez les résidents de la province.

Pollution atmosphérique et santé. La hausse des températures qui est principalement anthropogénique (c.-à-d. occasionnée par les activités humaines) favorisera, non seulement la fréquence et la sévérité des canicules, mais aussi la formation de pollution atmosphérique (Bouchard et Smargiassi, 2007; Environnement Canada, 2013a). Le rapport Bouchard et Smargiassi de la Direction des risques biologiques, environnementaux et occupationnels, révèle qu'en 2002 seulement, le Québec a perdu près de 2000 personnes en raison des particules fines se trouvant dans la pollution atmosphérique. Ce nombre élevé de décès s'accompagne d'au moins 500 visites aux urgences, principalement liées aux problèmes cardiaques et respiratoires en plus d'occasionner des coûts importants frôlant les dix milliards de dollars (Bouchard et Smargiassi, 2007).

Encore une fois, les études montrent que la pollution touche particulièrement les individus résidant en ville, surtout ceux ayant un faible statut socioéconomique (Finkelstein et al., 2003; Neidell, 2004; Wong et al., 2008). Dans le contexte canadien, une étude de l'effet de la pollution atmosphérique sur le taux de mortalité de 5228 personnes à Hamilton montre que les personnes défavorisées étaient plus nombreuses à mourir des suites de maladies cardio-pulmonaires (Finkelstein et al., 2003).

En somme, le portrait présenté ci-dessus démontre au moins deux constats : 1) le CC a des effets directs et indirects sur la santé des collectivités. Ces effets s'accentueront au cours des prochaines années; 2) Les populations sont

touchées de façon inégale par le CC. L'intersection entre les facteurs biologiques (l'âge) et socioéconomiques (pauvreté, insécurité alimentaire, et de logement) ou géographiques (milieu urbain) a été retenue comme un facteur de risque important. En effet, les Québécois aux extrêmes d'âge (enfants et personnes âgées), qui sont désavantagés socioéconomiquement et qui vivent en milieu urbain sont ainsi plus vulnérables quant à la multiplication des phénomènes météorologiques extrêmes, aux vagues de chaleur, à l'insécurité alimentaire, ou à la pollution atmosphérique. Ces conclusions guideront le reste de ce manuscrit, notamment dans la discussion de l'approche à adopter et les interventions à mettre en place.

Discussion

Les résultats présentés n'ont rien de surprenant. Les travaux en épidémiologie et en médecine sociale ont depuis longtemps indiqué la présence d'un gradient social en santé, soit une corrélation positive entre l'état de santé et le positionnement qu'un individu occupe dans la hiérarchie sociale (voir les travaux de Krieger, 2012; Navarro, 2002; Wilkinson, 2010). Ce gradient est le résultat d'inégalités structurelles dans les opportunités de s'actualiser sur le plan de la santé. Elles résultent tant de l'organisation de la société que de ses choix politiques, économiques et sociaux. Ainsi, prétendre qu'une seule caractéristique (l'âge chez les personnes âgées, par exemple) explique qu'ils aient plus de difficultés à s'adapter au CC serait, non seulement erroné, mais pourrait minimiser l'effet des autres facteurs dans l'entretien de cette dynamique.

On reconnaît maintenant l'importance d'agir sur les iniquités en matière de santé, notamment par l'approche axée sur la santé des populations (ASPC, 2012). Contrairement aux paradigmes interventionnels mettant principalement l'accent sur les facteurs individuels des maladies (c.-à-d. biomédical), l'approche axée sur la santé des populations utilise un cadre holistique lui permettant de repérer l'interconnexion de diverses influences (p. ex. psychologique, socioculturelle, politique) sur la santé d'une population. Elle concède ainsi que le bien-être collectif ne peut être attribuable uniquement à l'efficacité de son système de soins et qu'elle se doit, dans une perspective d'équité et de justice sociale, d'attaquer les inégalités en matière de santé (ASPC, 2012; Evans et Stoddart, 1990).

Pour Edwards et ses collègues (2004; 2006), explorer les interconnexions entre les dimensions individuelles et collectives ainsi que leurs boucles de rétroactions (c.-à-d. comment les systèmes se modifient et s'interinfluencent) permet d'éviter « le blâme des victimes » ou, autrement dit, d'éviter de responsabiliser les individus qui ne disposent pas des ressources nécessaires pour s'adapter adéquatement au CC. Pour ce faire, l'auteure suggère l'adoption d'un modèle socioécologique axée sur la santé des populations (Edwards, 1999; Edwards et Di Ruggiero, 2011). Ces modèles ont pour particularité d'intégrer les déterminants sociaux de la santé dans l'analyse d'une problématique. Plus précisément, ils réitèrent que cette dernière a bien souvent des causes qui dépassent le spectre individuel. Par conséquent, afin d'améliorer la santé d'une collectivité, il est essentiel d'opter aussi pour des stratégies en amont, c'est-à-dire qui améliorent l'environnement dans lequel elle évolue (Edwards et al., 2004), tout en considérant son contexte social, historique et politique (Edwards et Di Ruggiero, 2011). Une approche axée sur la santé des populations doit miser sur des stratégies et des interventions multiples, aussi appelées les Multiple Interventions Program (ci-après MIPs). Les MIPs se caractérisent par l'utilisation simultanée de plusieurs stratégies (c.-à-d. politiques sociales, interventions communautaires, soins directs), ciblées à divers niveaux du système socioécologique (c.-à-d. contexte global, systèmes, milieux, individus) et parfois livrées à des populations spécifiques (p. ex. les individus ayant un faible statut socioéconomique). Considérant le caractère multidimensionnel des MIPs, l'action intersectorielle devient non seulement souhaitable, mais nécessaire dans les interventions subséquentes. L'intersectorialité peut se comprendre comme une préoccupation partagée par plusieurs paliers (c.-à-d. palier fédéral, provincial, municipal) et ministères (p. ex. ministre de l'Agriculture, de l'Environnement) afin d'adresser, de façon concertée, une problématique (Edwards, 1999; Edwards et al., 2006). Pour illustrer le potentiel des MIPs sur les iniquités de santé exacerbées par le CC, trois domaines d'action différents, mais complémentaires sont présentés. Elles sont tirées du contexte québécois et se basent sur les vulnérabilités identifiées plus haut. En effet, nous montrerons comment des investissements dans des secteurs intersectoriels touchants : a) l'aménagement du territoire urbain, b) le transport et la mobilité durable et c) l'agriculture urbaine et périurbaine, peuvent avoir des retombées positives sur plusieurs déterminants sociaux et écologiques de la santé.

Aménagement du territoire urbain

L'aménagement du territoire est tributaire d'une bonne santé sur les plans collectifs et individuels. Les îlots de chaleur en milieu urbain contribuent aux problèmes de santé, notamment lors de vague de chaleur accablante. Sans l'implantation de mesures visant adapter le territoire québécois, les victimes de vague de chaleur et des hausses

de températures seront accrues au cours des prochaines années (Doyon et al., 2008). Les personnes qui habitent dans un quartier défavorisé sont particulièrement vulnérables aux îlots de chaleurs, n'ayant pas aussi facilement accès à des infrastructures de qualité (p. ex. parcs, logements climatisés, etc.).

Les recherches suggèrent fortement de lutter contre les îlots de chaleurs urbaines, notamment par l'augmentation de l'indice de végétalisation des municipalités (Giguère, 2009; Heinze, 2011; Watts et al., 2015). Pour ce faire, au moins deux types de stratégies complémentaires sont nécessaires : a) la bonification des espaces verts en ville et b) l'amélioration durable des infrastructures. Concrètement, ces stratégies se traduisent par des mesures de plantation ponctuelle d'arbres dans les quartiers et les stationnements, la construction de toits verts et de murs végétaux, la construction de parcs et de platebandes dans les ruelles (Giguère, 2009). Le projet ILEAU de Montréal (Interventions locales en environnement et aménagement urbain) est ici présenté comme une intervention prometteuse qui propose d'attaquer les îlots de chaleurs par une stratégie à multiples niveaux systémiques (ILEAU, 2015). Au niveau communautaire, le programme propose le verdissement des toits, la transformation des stationnements en espaces verts, et la construction de parcs sécuritaires et conviviaux pour les citadins (Communauté métropolitaine de Montréal [CMC], 2015). Pour engager et mobiliser la communauté, le projet ILEAU-Montréal offre des stratégies telles que le porte-à-porte (niveau interindividuel), des rencontres dans les écoles primaires et secondaires (niveau intracommunautaire), des partenariats avec des organismes communautaires, et la création de comités de mobilisation et d'action citoyenne (p. ex. planter des arbres). Le projet ILEAU touche ainsi à une diversité de citoyens et s'avère, dans la pratique, un projet prometteur puisqu'il semble s'appuyer sur les postulats de l'approche de la mobilisation communautaire. Cette dernière se démarque par ses actions et ses analyses, reconnaissant aux facteurs environnementaux un rôle déterminant dans la santé physique et mentale des sociétés (Doucet et Favreau, 1991). C'est par la collectivisation des problématiques, soit une réflexion sociocritique sur son quartier et ses défis, que s'enclenchera un désir d'engagement et de changement durable. Par conséquent, l'implication citoyenne est cruciale dans l'intervention puisqu'elle reconnaît que les « experts » sont ceux qui vivent de façon continue dans les quartiers : « (le projet est) mené en étroite collaboration avec les partenaires de mobilisation locaux afin d'assurer l'engagement du plus grand nombre d'organisations et ainsi créer un effet d'entraînement » (INSPQ, 2015, p.2).

Plusieurs études soutiennent que ce type de projet a des retombées positives et durables pour la santé des populations et pour l'environnement. Parmi les rapports analysés, notons l'amélioration de la qualité de l'air du quartier (Amorim, Rodrigues, Tavares, Valente, et Borrego, 2013; Giguère, 2009; Zupancic, Bulthuis, et Westmacott, 2015), la réduction de sa pollution atmosphérique (Heinze, 2011; Zupancic et al., 2015), la diminution de la température ambiante et au sol (Giguère, 2009; Zupancic et al., 2015) ainsi que la réduction des coûts liés à la climatisation (Heinze, 2011). On note également qu'elle promeut et facilite l'activité physique et le bien-être, et favorise les contacts sociaux dans les collectivités (Alcock, White, Wheeler, Fleming, et Depledge, 2014; Heinze, 2011). Une caractéristique particulièrement notable de l'intervention est sa sensibilité aux inégalités sociales. Comme il a été mis en relief auparavant, les îlots de chaleurs sont très présents dans les quartiers défavorisés. Par conséquent, le projet ILEAU s'implante principalement dans les quartiers ayant une plus grande concentration de personnes à faible statut socioéconomique (ceux de l'Est de Montréal). Ce paramètre est particulièrement important pour assurer, d'une part, la santé des collectivités, mais également la réduction des iniquités de santé chez les plus vulnérables.

Transport et mobilité durable

Le transport demeure l'un des secteurs qui contribue le plus à la pollution atmosphérique dans la province de Québec (Fondation David Suzuki, 2014; Union des municipalités du Québec [UMQ], 2008). Cette dernière occasionne de nombreux problèmes de santé en milieu urbain où un peu plus de 80% de la population québécoise réside (Institut de la statistique du Québec [ISQ], 2015). Les quartiers défavorisés sont durement touchés par la pollution atmosphérique : ils seront plus nombreux à en souffrir et en mourir (Bouchard et Smargiassi, 2007). Pour contrer ces effets néfastes sur la santé, les études suggèrent fortement de développer une offre plus active et attrayante de transports durables (Barna et al., 2012; Litman, 2015; Transport Canada [TC], 2009). Concrètement, au plan ministériel, cette offre doit se traduire par une politique visant à soutenir les municipalités dans cet effort. À court terme, l'introduction des politiques « Complete Streets » (ci-après CS) mènera vers le réaménagement d'axes routiers plus verts et durables. À long terme, un système efficace de transport actif et collectif permettra non seulement de diminuer la pollution atmosphérique (p. ex. moins de congestions), mais de promouvoir un mode de vie actif au sein de la population (p. ex. augmentation des cyclistes dans une municipalité).

Le CS est une intervention en pleine effervescence aux États-Unis (Seskin et Gordon-Koven, 2013) et qui prend beau-

coup d'ampleur en Ontario où elle est financée en partie par le gouvernement provincial (Toronto Centre for Active Transportation [TCAT], 2015). L'intervention vise à planifier, à aménager et à repenser nos routes afin qu'elles puissent accueillir, de façon sécuritaire et attrayante, une diversité de modes de transports (c.-à-d. le vélo, la marche et le transport en commun) et d'utilisateurs (p. ex. personne âgée, les jeunes, les mères monoparentales). La voiture devient ainsi un moyen parmi tant d'autres de se déplacer en ville, les autres étant devenus tout aussi agréables et efficaces (Litman, 2015).

Le CS s'inscrit dans la visée des interventions MIP pour plusieurs motifs. D'abord, il se formalise à divers niveaux par un engagement politique des municipalités et de la province au profit de routes qui sont conçues pour être accessibles pour tous. Ensuite, il utilise de multiples stratégies pour en arriver à repenser l'aménagement des routes. Sur le plan de l'urbanisme, l'élargissement des trottoirs, l'augmentation de la fréquence des autobus, la réduction de la vitesse permise pour les voitures, la construction de sentiers pédestres et cyclables et de nouvelles voies réservées aux autobus et covoitureurs figurent parmi les stratégies les plus courantes (Litman, 2015). Les stratégies d'urbanisme sont également accompagnées de stratégies communautaires. Par exemple, des comités citoyens dont la mission est de promouvoir et d'assurer les besoins découlant des gens du quartier sont mis en place (Litman, 2015; TC, 2009). La configuration des aménagements répond alors aux besoins d'une diversité de personnes comme les personnes âgées, les enfants ou les personnes à mobilité réduite. Le CS est aussi sensible au contexte de chaque municipalité. En effet, l'adoption des politiques CS ne mène pas nécessairement à une reconfiguration complète des routes construites. Plutôt, la municipalité, en étroite concertation avec le gouvernement et les citoyens, détermine les zones à prioriser en se basant sur plusieurs indications : nombre d'accidents, temps de congestion, nombre de cyclistes, etc. (Smart Growth America, 2015). À cet effet, un guide d'implantation complet permet d'adapter le CS aux réalités vécues par une communauté (voir le site Internet de Smart Growth America, 2015).

De nombreuses recherches ont évalué les retombées des CS. Ces dernières ont relevé des répercussions favorables sur l'environnement, la santé et même sur l'économie (Litman, 2015; New York City Department of Transportation [NYCDOT], 2012; TC, 2009). Plus spécifiquement, le rapport du ministère du Transport de New York (NYCDOT, 2012, p. 22-41) montre qu'après l'implantation de CS, le nombre de piétons et de cyclistes blessés par les automobiles avait diminué entre 7% et 56% sur certaines artères de Manhattan. Parallèlement, la ville a assisté à une augmentation d'au moins 10% des usagers de transports en commun, à une réduction de la congestion routière d'au moins 7% et à une réduction des émissions de gaz à effet de serre de 9% aux heures de pointe. Ces données sont assez similaires à celles de Portland où les politiques CS ont mené à une « réduction de 12,5% des émissions de dioxyde de carbone liées au transport » (TC, 2009, p. 2 – traduction libre). Qui plus est, puisque les artères deviennent plus attrayantes, le CS a stimulé l'économie de plusieurs quartiers new-yorkais en diminuant de près de moitié (47%) le taux d'inoccupation commerciale dans les rues visées par le programme (NYCDOT, 2012, p. 9). Un rapport canadien a lui aussi dressé un portrait positif de l'intervention, suite à son implantation dans la ville de Victoria. Les auteurs notent une « amélioration de l'accessibilité du territoire pour les personnes sans automobiles, des économies sur l'entretien des routes et des stationnements, l'amélioration de la condition physique des résidents et de la santé publique, la conservation de l'énergie, de même que la diminution de la pollution sonore et des gaz à effet de serre» (Litman, 2015, p. 22 – traduction libre).

Agriculture urbaine et périurbaine

Tel que discuté plus haut, la hausse des températures contribuera à la multiplication des phénomènes météorologiques extrêmes qui, à leur tour, peuvent mener vers d'importantes pertes agricoles au Canada comme à l'international. Ces pertes ont des répercussions directes sur la disponibilité de produits locaux à des prix raisonnables. En l'absence d'une sécurité alimentaire stable, les populations vulnérables peuvent avoir de la difficulté à s'alimenter convenablement, menant ainsi à divers troubles de santé (ex. maladies chroniques, obésité). Le rapport Béliveau (2007) présenté à la commission sur l'avenir de l'agriculture et de l'agroalimentaire du Québec se veut assez transparent sur le modèle d'agriculture qui prévaut dans la province : « Au Québec, l'agriculture dans les régions rurales ne permet plus de subvenir aux besoins des populations urbaines sur le plan de la diversité alimentaire. Les habitants des villes n'ont d'autre choix que d'aller vers le marché de l'alimentation, qui offre des fruits et légumes transportés sur de grandes distances, ce qui coûte cher, pollue et réduit la qualité des aliments » (p. 4). À ces problèmes, s'ajoutent ceux déjà occasionnés par les îlots de chaleur en milieu urbain (Giguère, 2009) et ceux liés à l'augmentation constante du coût de la vie (Lewis et Witham, 2012).

L'agriculture urbaine et périurbaine (ci-après AUP) apparait dans la littérature comme une intervention durable et écologique freinant l'insécurité alimentaire tout en agissant à long terme sur le CC (Alaimo, Packnett, Miles, et Kruger, 2008; Béliveau et al., 2007; Suarez-Balcazar, Martinez, Jayraj, et Cox, 2006). L'AUP peut se comprendre comme les

formes d'activités qui visent à produire, à manufacturer et mettre sur le marché des aliments variés pour la population en milieu urbain ou périurbain (c.-à-d. en bordure des banlieues). Elle utilise de multiples stratégies tels les jardins communautaires (stratégie communautaire), les marchés locaux (stratégie municipale) et les politiques agricoles (stratégie provinciale) à plusieurs niveaux (agriculteurs et bénévoles, organismes communautaires, municipalités, gouvernement) pour arriver à ses fins. Certes, réduire l'AUP à sa composante de production serait d'ignorer ses nombreux bénéfices au plan environnemental, social, et de la santé. L'étude de Alaimo et ses collègues (2008) montre que les personnes défavorisées qui participent aux jardins communautaires sont près de 3.5 fois plus susceptibles de manger des légumes et des fruits cinq fois par jour (n = 766). Celle de Suarez-Balcazar et ses collaborateurs (2006) soulèvent que parmi une communauté afro-américaine, les marchés locaux découlant des AUP mènent à un taux très élevé de satisfaction quant à la qualité et les coûts des produits, menant la communauté à en consommer davantage. La revue de littérature de Golden (2013) soutient à partir de données internationales que l'AUP peut également promouvoir le sentiment d'appartenance à la communauté de même qu'à la création d'emplois pour les plus démunis. Les rapports Béliveau (2007) et Boily (2012) relèvent également ces effets positifs sur l'environnement urbain et périurbain. Ceci est notamment lié au fait que l'AUP diminue le transport associé à l'importation d'aliments et permet de créer de nouveaux espaces verts.

L'un des défis majeurs de l'AUP réside cependant dans sa principale force : elle est intersectorielle. En effet, puisque ses retombées touchent plusieurs domaines (santé, agriculture, environnement), elle trouve du mal à se faire financer de façon durable par un bailleur de fonds. Ainsi, les organismes communautaires peuvent être subventionnés pour certains de ses volets (p. ex. le volet promotion des saines habitudes de vie ou celui de la lutte aux îlots de chaleurs), sans toutefois qu'elle soit considérée comme une intervention complète en soi. Au Québec, plusieurs déplorent que le ministre de l'Agriculture n'ait pas encore reconnu formellement l'agriculture urbaine comme une forme durable d'agriculture, contribuant par le fait même à son sous-financement et à son statut marginal en société (Béliveau et al., 2007). Par conséquent, l'AUP peut être perçue comme une menace par les projets privés de développements urbains et de banlieue (Boily, 2012).

Conclusion

Le CC aura des conséquences profondes sur les collectivités et leurs populations vulnérables, au Québec comme ailleurs. Pour les contrer, une volonté politique (Watts et al., 2015), intersectorielle (Buse, 2013) et systématiquement mue par des valeurs d'équité (Walpole, Rasanathan, et Campbell-Lendrum, 2009) est nécessaire. Un récent rapport de l'Institut de médecine (2015) avance que la « la santé, l'équité, la durabilité et la résilience font partie du même cercle vertueux ». Dans ce sens, l'approche centrée sur la santé des populations s'aligne avec les principes de la promotion de la santé et des déterminants sociaux de la santé présentés par la déclaration d'Alma Ata, la Charte d'Ottawa et la Commission sur les déterminants de la santé de l'OMS (Health Resources in Action, 2013; Patrick, Capetola, Townsend, et Nuttman, 2012; Patrick, Noy, et Henderson-Wilson, 2015). Elle réitère que le bien-être d'une société dépasse largement l'accessibilité aux services de santé. En effet, des interventions, qui à priori ne sont pas ciblées pour la santé, peuvent avoir des répercussions positives tant sur le plan de l'environnement que sur les iniquités en matière de santé. Au Québec, des actions multiples dans les secteurs de l'aménagement urbain, du transport et de l'agriculture offrent des avenues prometteuses permettant d'atténuer les émissions anthropogéniques de gaz à effet de serre, d'améliorer la résilience face aux adversités climatiques et de réduire les iniquités sociales en santé.

Force est d'admettre que la compartimentation des ministères, ayant chacun leur propre culture et leurs propres objectifs à atteindre, complexifie grandement la mise en place de telles collaborations (Greaves et Bialystok, 2011). Le secteur de la santé, en collaboration interdisciplinaire avec d'autres champs, a donc un rôle majeur à jouer. Le discours sur le CC doit être encouragé par les leaders en santé (professionnels et administrateurs), notamment en avançant les cobénéfices pour la santé de la mitigation du changement climatique, d'autant plus que plusieurs maladies, notamment celles chroniques, partagent des voies causales similaires à celle du CC (Smith et al., 2014; Watts et al., 2015) et profitent simultanément des interventions comme l'agriculture urbaine ou une diminution de l'utilisation des transports motorisés. Qui plus est, afin d'optimiser leur durabilité, les interventions nécessitent une collaboration avec la communauté favorisant ainsi l'autonomisation. Sans une implication de la communauté, certains de ces projets peuvent vite tomber sous le radar de l'embourgeoisement ou seront voués à l'échec en raison de leur inadéquation contextuelle. Dans ce sens, il est pertinent de considérer les villes comme unité de changement et de résilience (Bentley, 2007; Hancock, 2009; Health Resources in Action, 2013; Institute of Medicine, 2015; Jabareen, 2013; Watts et al., 2015), tel qu'il a été proposé dans ce travail. Les villes, à travers leur monde, ont entrepris des actions pour faire face au CC, implantées par leurs municipalités de manière plus flexible qu'à l'échelle nationale. Cela a constitué une sorte

de « gouvernance par le milieu » qui, de manière transversale, a lié plusieurs villes à travers le monde (Watts et al., 2015). La gouvernance au niveau local permet d'adopter la vision « Santé dans toutes les décisions » de manière plus souple en surmontant les conflits liés aux idéologies politiques à l'échelle nationale. De plus, les actions locales permettent d'évaluer la mise en œuvre des interventions dans des contextes restreints et de comprendre les besoins, les croyances et les pratiques avant de planifier le changement.

Des recherches plus approfondies sont nécessaires pour appuyer ces arguments. Un constat est néanmoins apparent : la réussite des activités proposées nécessite un effort descendant des politiques gouvernementales, et un effort ascendant de l'engagement citoyen, afin de pouvoir « craquer la noix de l'équité » (Baum, 2007) et de moduler les conditions écologiques et sociales affectant la santé planétaire et humaine.

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Note

[1] Les praticiens en santé publique et des populations qui s'intéressent à cette méthodologie d'intervention peuvent trouver un coffre à outils complet à l'adresse suivante : http://www.miptoolkit.com (en anglais seulement).

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Storytelling and Asperger Syndrome: A Key for Social Integration

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Résumé :

(traduction)

La narration est un moyen de communication universel entre les êtres humains. Cette habileté est inhibée lorsque les troubles de développements neuronaux empêchent les interactions réciproques, la compréhension du langage corporel, et les nuances du langage. Le syndrome d'Asperger (SA), l'un de ces troubles, est caractérisé par un handicap social et un comportement répétitif. Puisque les individus atteints du SA ne peuvent pas communiquer de messages au moyen de la narration, ils souffrent d'isolement social et se retirent de la société. Le développement du système des neurones miroirs dans le cerveau, qui stimule l'imitation des pairs, pourrait être modifié chez les individus atteints du SA, d'après un mécanisme qui n'est pas encore compris. Il faut pouvoir imiter les émotions d'autrui afin de comprendre leurs sentiments et leur perception du monde, mais la « théorie de l'esprit » ne se manifeste pas normalement chez les individus atteints du SA. Bien que certaines études ont évoqué cette barrière, les opinions et les faits actuels démontrent que les personnes atteintes du SA peuvent se servir de la narration pour s'intégrer dans la société. À l'avenir, les recherches devraient étudier la narration comme moyen d'augmenter les interactions sociales des individus atteints du SA.

Mots-clés :

Syndrome d'Asperger, narration, théorie de l'esprit, système des neurones miroirs, intégration sociale

Abstract:

Storytelling is a universal way of communication between human beings. It is inhibited when neurodevelopmental disorders hinder human reciprocity, the understanding of body language, and nuances of language. Asperger Syndrome (AS), one of these disorders, is characterized by social impairment and repetitive patterns of behaviour. Messages cannot be conveyed through storytelling, which causes social isolation and withdrawal of individuals with AS from society. The development of the mirror neuron system in the brain, which incites imitation of peers, might be altered in AS by a mechanism that is not entirely understood. Because mirroring the emotions of others is key to understanding their feelings and perceptions of the world, the "theory of mind" is not formed in individuals with AS as it normally would be. While studies have suggested this impediment, current views and evidence show that people with AS may use storytelling as a powerful tool to integrate themselves into society. Future research should investigate storytelling as an intervention to increase social interaction of individuals with AS.

Keywords:

Asperger Syndrome, storytelling, theory of mind, mirror neuron system, social integration

Storytelling is a framework used ubiquitously in communication and is an important key in understanding human interactions. When neurodevelopmental disorders hinder the understanding of body language and the nuances of language, as well as reciprocity, storytelling is impeded. Asperger Syndrome (AS), a disorder located on the autism spectrum, is characterized by social impairment and repetitive patterns of behaviour (American Psychiatric Association, 2013). These traits, in turn, impair the ability of individuals with AS to decode messages conveyed through storytelling. Although the mechanism of AS is not fully understood, the development of the mirror neuron system, a system in the brain which incites imitation of peers, might be altered (Iacoboni & Dapretto, 2006). Since mirroring the emotions of others is key to understanding their feelings and perceptions of the world, the ability to comprehend and reflect mental states is restrained. This ability is known as the "theory of mind" (ToM; Premack & Woodruff, 1978), which is not formed in individuals with AS, as it normally would be. Empathy is impeded and social impairment ensues. Especially during childhood, bullying can seriously affect individuals with AS, as they are perceived as being isolated and different, and having poor social skills. Withdrawal from others and severe tantrums can occur (Heinrichs, 2003). While previous research suggests that AS causes social impairment (Heinrichs, 2003), current views indicate that people with AS may use storytelling as a powerful tool to integrate themselves in society (Martinovich, 2006).

Individuals interact in a way to create a connection between each other and transmit important information about their lives. This transfer of information is largely made through the use of stories. The use of stories is ubiquitous in all domains of life because stories strike a chord within individuals (Zak, 2013). People have a tendency to remember the beginnings and ends of conversations. To compensate for that, stories are used because they increase tension until the climax. A sense of familiarity with a beginning, middle, and end compels the listeners (Zak, 2013). Brian Sturm (1999), a professor of library science at the University of North Carolina at Chapel Hill, notes how this art of storytelling itself has stages. The conversation before the story brings about the idea of telling the story, and settles who is telling the story. The teller announces the story as a distinct "entity," identifying it as something unique and special (Sturm, 1999). Gradually, the teller brings the listeners into a "story realm" through several conducts such as humour, the novelty of the story, the familiarity of the story, or by assuring the physical and emotional comfort of listeners (Sturm, 1999). The physical comfort could, for example, be giving someone a comfortable chair to sit on. The emotional comfort is, for instance, linked to having a "good" or a "bad" day. These conducts, when not clogged, facilitate bringing the listeners from reality to this "altered consciousness" (Sturm, 1999). Distractions, which occur in AS, prevent that transition to the world of storytelling.

The repetitive patterns of behaviour of individuals with AS exacerbate these distractions. For example, people with AS can be inclined to work on a specific subject such as molecular structure or photography. Although they do not have an intrinsic passion for the subject, they can dedicate a great amount of time on it as it becomes a repetitive pattern of behaviour (Klin, 2006). Consequently, they can continue to talk about that subject for a very long time because they do not comprehend their listeners' body language and nonverbal cues that may show disinterest with the subject (Klin, 2006). In this case, the effects of social impairment and repetitive behaviour are compounded. Hence, the individual with AS is disconnected from the other interlocutors.

Since storytelling is anchored in understanding emotional states, AS creates difficulty in connecting the dots in stories and finding the underlying message. The conducts identified in the storytelling conceptualization of Sturm (1999) are obstructed because nuances cannot be comprehended. This also explains why these individuals disconnect very easily from conversations. Pathos, the ability to appeal to the listener's emotions, is essential in persuading someone to stay connected to the story and to enter the story realm. Those with autism spectrum disorders, who do not understand these appeals to emotions, simply stop listening. They understand the cognitive basis of humour, but do not understand why one should share humour with others for amusement (Kasari & Rotheram-Fuller, 2005). This is explained by the absence of a ToM in individuals with autism.

The ToM is the ability of individuals to "impute mental states to himself and others" (Premack & Woodruff, 1978). In other words, if an individual understands the desires and beliefs of others, this shows an acquired ToM of others. Autism therapies, such as social communication intervention, focus on reducing the deficits associated to the lack of ToM in individuals with autism. Notably, individuals with autism can be sensitized to the importance of face perceptions to recognize emotional expressions (Schreibman, 1988). For instance, familiarizing individuals with autism with drawings of sad, happy, confused, or angry faces and their meanings can help them with their interactions with others (Schreibman, 1988).

Furthermore, AS restricts figurative thinking, hypothetical situations that assume exaggerations, and understanding of sarcastic comments (Craig & Baron-Cohen, 2000). These elements form an important part of storytelling and imaginative thinking. Executive dysfunction of creativity in indi-

viduals with AS is manifested by their inclination towards reality-based scenarios. Previous studies done at the University of Cambridge reveal that children with AS are less able to come up with the plot of a story after being offered an imaginary theme on which to expand (Craig & Baron-Cohen, 2000). Because figurative language is used in everyday conversations and in recounting of events, AS hinders the comprehension of the information that is being transmitted.

Although several literary devices such as metaphors, hyperboles, and irony used in storytelling are thereby inhibited in people with AS, the current outlooks advocate that other storytelling conducts in specific settings can be put to use. This idea started through exposures to "social stories" during childhood. Social stories are stories that help individuals in the autism spectrum understand the nuances of interpersonal relationships by showing day-to-day situations (Gray, 1994). Many people with AS are skilled at visual learning and often enjoy illustrated social stories. Carol Gray is the original author of social stories such as *The New Social Story Book*. In her books, she illustrates effective models of social interactions in a concrete way that can be helpful for children with AS (Gray, 2010). Social stories provide information about potential results of specific reactions and the emotional states that arise. This may improve a person's understanding of a previously difficult situation and diminish the anxiety in AS by structuring a person's life (Gray, 2010).

Quantifying the ability of storytelling in those with autism is growing (Losh & Gordon, 2014). Martinovich (2006), a psychologist and creative therapist, argues that storytelling should be encouraged for all individuals on the autism spectrum. Her book, *Creative Expressive Activities and Asperger Syndrome*, uses creative activities to develop skills in relationships and work on the creativity of individuals with AS (Martinovich, 2006). These tools can help in daily life and can be used on a wider scale. For example, John Elder Robison is a writer with AS, who shared many stories about being autistic in his following books: *Look Me in the Eye and Be Different: Adventures of a Free-Range Aspergian* (Robison, 2007; 2011). In another case, Robin Borakove (2014), a children's book author and storyteller with AS, tells stories to children while dressing up as characters in these stories. Hence, storytelling is a new approach to integrate people with AS into society.

Since AS disrupts the storytelling framework, it clouds the understanding of quotidian stories as a result. Nonetheless, storytelling is a valuable tool to familiarize individuals with AS to model social interactions and allow them to improve their creativity (Martinovich, 2006). This diminishes their possible feeling of isolation from society. Furthermore, moulding what AS is into stories told by people with AS and disseminating these stories, may be a noble step in the right direction. This would allow others to become more aware and sensitive to AS. Finally, further research on using this technique as an intervention and encouragement of those who have this condition to tell their own stories as much as possible would be worthwhile.

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An Overview of the Malaria Epidemic in Sub-Saharan Africa

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Résumé :

(traduction)

La malaria est une maladie parasitaire transmise par les moustiques lorsqu'ils se nourrissent de sang. Le risque de contracter la malaria est le plus élevé chez les personnes qui habitent les pays tropicaux en raison de l'humidité omniprésente qui favorise les infections. En conséquence, le taux de mortalité des femmes et des enfants atteints de malaria est disproportionnellement élevé en Afrique subsaharienne. Le manque d'éducation sanitaire et de connaissances sur la malaria constitue d'être un obstacle important contre l'efficacité de la prévention et du traitement de cette maladie. Le manque d'éducation sanitaire a réduit l'efficacité des agents antimalariques, comme le médicament Artemether Lumefantrine, car ceux-ci sont distribués et administrés par des personnes non formées. En raison du manque de données sur l'incidence et de données de prévalence, il est difficile d'approvisionner adéquatement les pays endémiques en médicaments. De plus, le manque de connaissances sur la pathogenèse et la transmission de la malaria a empêché plusieurs personnes à se faire traiter rapidement et à adopter des mesures préventives. Récemment, la mise en œuvre de programmes d'éducation sanitaire par des organismes internationaux a permis aux professionnels de la santé locaux et ambulants d'être éduqués sur la maladie et sur les méthodes d'administration d'agents antimalariques.

Mots-clés :

Malaria, *Plasmodium falciparum*, Afrique subsaharienne, niveau d'instruction, moustique *Anopheles*

Abstract:

Malaria is a parasitic disease that is transmitted by mosquitos during their blood meal. The risk of contracting malaria is highest for people in tropical countries, due to the ever-present humid weather that allows yearly infections. Consequently, sub-Saharan Africa has a disproportionately higher rate of death among women and children with malaria. One of the major barriers identified in the efficacy of malaria treatment and prevention is the lack of health education and literacy. The lack of health education has decreased the efficacy of antimalarial drugs, such as Artemether Lumefantrine, due to the distribution and administration of the drug by untrained persons. The lack of incidence and prevalence data makes it difficult to ensure adequate supply of the drug in endemic countries. Furthermore, the lack of knowledge of malaria pathogenesis and transmission has prevented many from promptly seeking treatment and practicing preventative care methods. Recently, the implementation of health education programs by international organizations has allowed local and travelling healthcare practitioners to be educated on the disease and methods of antimalarial drug administration.

Keywords:

Malaria, *Plasmodium falciparum*, sub-Saharan Africa, education and literacy, *Anopheles* mosquito

Introduction

Malaria is a disease caused by a parasitic protozoan of the genus *Plasmodim* that can live in humans and mosquitoes, specifically female *Anopheles* mosquitoes (Sinclair, Zani, Donegan, Olliaro, & Garner, 2009). There are four different species of *Plasmodium* that cause malaria in humans and they are *P. falciparum, P. malariae, P. ovale,* and *P. vivax* (Sinclair et al., 2009). In 2013, 97 countries in Africa, South East Asia, and South America had ongoing malaria transmission (World Health Organization [WHO], 2011). According to the WHO (2011), an estimated 3.4 billion people are at risk of malaria. Ninety percent of all malaria deaths occur in sub-Saharan Africa, where the most prevalent malaria parasite is *P. falciparum* (White et al., 2014). In 2012, 500 000 children under five years of age died — this translates to 1 300 children per day (WHO, 2011).

Life Cycle and Pathogenesis of Plasmodium Falciparum

An infected female *Anopheles* mosquito carries male and female gametocytes that contain malaria (White et al., 2014). The gametocytes develop into oocysts, which mature and release sporozoites into the salivary glands of the mosquito. The *Anopheles* mosquito bites humans because the protein and iron found in blood nourishes their eggs. While the mosquito draws blood, the sporozoites that were in the salivary glands are injected into the human. If another mosquito bites the same human, it will ingest the blood and sporozoites. The injected sporozoites will then travel to the liver and invade the mosquito's liver cells. In the liver, the sporozoites mature into merozoites. The merozoites transform into the male (micro) and female (macro) gametocytes that are re-injected into the human while feeding. As a result, the malaria cycle is perpetuated by the repeated transmission of gametocytes and ingestion of sporozoites while the mosquito feeds on blood (Augustincic et al., 2015).

The erythrocytic cycle of the parasite is responsible for the clinical manifestation of malaria symptoms: recurring fevers and chills (Kone et al., 2013). The pathogenic process of malaria is characterized by the bursting of erythrocyte-containing merozoites (White et al., 2014). The merozoites perpetuate reinfection by invading other erythrocytes and releasing adhesive proteins that increase parasitic numbers in the blood. If left untreated, malaria can lead to severe anaemia due to the destruction of erythrocytes, as well as respiratory distress due to low oxygen delivery by erythrocytes (Kone et al., 2013). Additionally, aggregation of erythrocytes to the endothelium can cause cerebral lesions that can lead to depression, impaired memory, and personality changes (White et al., 2014). Finally, the peptides on the parasite have low immunogenicity response, which can inhibit their destruction by antibodies. As a result, those that are infected can develop partial immunity with asymptomatic infections.

P. falciparum malaria is very hard to control in sub-Saharan Africa due to year-round infection opportunities (Augustincic et al., 2015). Frequent epidemics are common because of changes in the environment, a lack of education, and an absence of resources to fund treatment. This paper will analyze the relationship between health education and literacy, and the efficacy of treatment of *P. falciparum* in sub-Saharan Africa.

Discussion

Studies have shown a positive correlation between health education and the efficacy of treatment (Kroeger, Meyer, Mancheno, & Gonzalez, 1996). During 1970s and the 1980s, malaria was reasonably well controlled due to high awareness among the population and the use of intermittent preventative treatment (IPT) practices (antenatal administration of sulfadoxine-pyrimethamine drug and mosquito nets) to treat and prevent malaria among children (Paul et al., 2015). However, the spread of drug resistance and a poor understanding of the disease have led to adverse consequences for malaria control. For example, a study conducted on East African mothers reported that many believe that IPT of malaria during pregnancy weakens the mother and causes poor birth outcomes. In fact, 77% of mothers believed that malaria is not preventable. This misconception can negatively affect the likelihood of mothers participating in preventative behaviour to protect their children from the disease. Moreover, the false assumption that signs and symptoms of malaria will dissipate on their own discourages residents from seeking treatment (Staedke et al., 2009). In fact, studies have shown that only 60% of fevers caused by malaria seek treatment, and only one third of those cases strictly adhere to the treatment as to clear parasitaemia (Galactionova et al., 2015). Consequently, more than half of the potential benefits of treatment are lost due to insufficient patient compliance, which can be attributed to a lack of proper education.

The lack of health literacy on malaria medication has decreased the efficacy of available drugs used in the treatment of malaria (Sinclair et al., 2009). To better serve rural inhabitants, many small communities have created makeshift dispensaries on the side of rural roads (Opiyo, Yamey, & Garner, 2016). However, many of these vendors have not received adequate training on the administration of the medication, such as the required dosage, the drug sched-

ule, the requirement to ingest the drug with fatty foods, and instructions on re-administration (Maxmen, 2012).

In countries where malaria is endemic, the lack of federal training guidelines for public health educators has significantly limited the treatment and control of the disease (Opiyo et al., 2016). For example, patients suspected of having uncomplicated *P. falciparum* malaria are treated with Artemether Lumefantrine, a common treatment that uses Artemisinin combination therapy (ACT) to provide rapid relief of malaria symptoms in children (Sinclair et al., 2009). This therapy can clear 100% of the parasite if given within the first 24 hours of the onset of symptoms (Opiyo et al., 2016). The administration of this therapy would only cost 6-12 USD per person, provided that the dosage and administration of the drug is correctly implemented (Goodman, Coleman, & Mills, 1999). However, the implementation of ACT therapy as a method of treatment was greatly delayed in some sub-Saharan African countries due to a bottleneck in funding to train healthcare practitioners (Goodman et al., 1999). As a result, there has been noncompliance with national guidelines on the proper administration of ACT as a malaria treatment (Sinclair et al., 2009). Consequently this has led to over-prescription of the drug, and has more than doubled the costs of ACT therapy to 16-29 USD per patient (Staedke et al., 2009).

The lack of prevalence and incidence data in the rural areas of sub-Saharan Africa makes it difficult to forecast the disease (Opiyo et al., 2016). Because many residents are reluctant to seek treatment when exhibiting malaria symptoms, they often self-prescribe antimalarial drugs, which makes tracking disease prevalence by drug purchase and collecting incidence data problematic (Kone et al., 2013). The inability to forecast the disease can make it difficult to predict regional demands of antimalarial drugs, thus creating a shortage of the medication (Opiyo et al., 2016). Moreover, antimalarial drugs expire within six months of the manufacturing date, meaning they cannot be stockpiled (Sinclair et al., 2009). As a result, there could be a surplus of drugs in areas with lower malaria incidence and a shortage of the medication in areas with a greater malaria incidence (Maxmen, 2012). All of these factors combined result in large inefficiencies of malaria service and control in endemic countries.

Recently, non-governmental organizations have stepped in to provide health education and preventative tools in countries where malaria is endemic (Opiyo et al., 2016). The implementation of an antimalarial treatment policy by the WHO has helped hospitals and clinics to refine treatment protocols through adequate training of staff and community workers (WHO, 2011). Education of expectant mothers has helped to decrease many of the misconceptions surrounding the use of IPT, thus reducing the frequency of malaria infections among pregnant women and children younger than five years of age (Amoran, 2013). Federal governments have also invested in commercials to educate the public on malaria transmission as well as methods of protection (Augustincic et al., 2015). By increasing health education and literacy on malaria, as many as 274 million cases and 1.1 million deaths in sub-Saharan Africa have been prevented (Kroeger et al., 1996).

Conclusion

P. falciparum is a mosquito-transmitted infectious disease and a large proportion of the disease burden is carried by sub-Saharan Africa. The disease has a higher prevalence among those that are immunocompromised, often including children and pregnant women. One of the largest barriers inhibiting malaria treatment is a lack of education and literacy, which has caused misconceptions about disease development and prevention (Kroeger et al., 1996). Consequently, there has been overuse and misuse of malaria drugs due to self-diagnosis and self-prescription, a practice that has rendered cheaper drugs such as chloroquine and sulphadoxine-pyrimethamine ineffective (Opiyo et al., 2016).

To combat malaria, preventative methods must be targeted towards the vulnerable population. First, local communities must receive direct support in the form of sufficient training for practitioners on accurate diagnosis and medical administration of anti-malarial drugs. Second, the formation of a mobile team of practitioners could educate rural residents on disease transmission as well as methods of prevention. Third, tracking local antimalarial drug purchases would assist in determining the prevalence of the disease. Another future endeavour would be to direct more research and funding efforts towards vaccine development. The implementation of these steps would go a long way in controlling the disease in endemic areas.

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Critique of a Community-Based Population Health Intervention in a First Nations Community: Public Health and Medical Anthropology Perspectives

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Résumé :

(traduction)

Le projet de Sandy Lake sur la santé et le diabète est une initiative de partenariat communautaire qui a été lancée dans le but de prévenir le diabète dans une communauté de Premières Nations dans le Nord de l'Ontario. Grâce à l'engagement des intervenants clés, le projet a mené une série d'études qui traitaient des besoins et des priorités de la santé publique, selon les contextes. Celles-ci ont conduit à l'adoption de nombreuses interventions sanitaires conformes à la culture, tout en adressant plusieurs déterminants de la santé, tels que l'éducation sanitaire, l'environnement physique, la nutrition, l'hygiène de vie personnelle, les services de santé, et la culture des communautés de Premières Nations. Le projet de Sandy Lake, qui a développé des capacités réciproques pour les intervenants communautaires et les partenaires universitaires, a évolué comme modèle d'intervention en santé des populations. Les composantes scolaires sont appliquées à grande échelle dans d'autres communautés de Premières Nations au Canada. La présente critique est rédigée dans une perspective de santé publique et d'anthropologie médicale et formule des recommandations fondées sur des preuves pour améliorer ces programmes.

Mots-clés : Déterminants de la santé, intervention en santé des populations, santé publique, anthropologie médicale, prévention du diabète

Abstract:

Launched as a community-based partnership endeavour, the Sandy Lake Health and Diabetes Project (SLHDP) aimed to prevent diabetes in a First Nations community (FNC) in Northern Ontario. With active engagement of the key stakeholders, SLHDP conducted a series of studies that explored public health needs, priorities, and the contexts. These led to the adoption of a variety of culturally appropriate health interventions, addressing several health determinants such as health education, physical environments, nutrition, personal health practices, health services, and FNC culture. SLHDP built reciprocal capacity for both the community stakeholders and academic partners, thus evolved as a model of population health intervention. The school components are being scaled-up in other parts of FNCs in Canada. This paper presents a critique from public health and medical anthropology perspectives and draws evidence-based recommendations on how such programs can do better.

Keywords: Health determinants, population health intervention, public health, medical anthropology, diabetes prevention

Introduction

Launched in 1991 as a community-based partnership endeavour, the Sandy Lake Health and Diabetes Project (SLHDP; Table 1) primarily strived to determine the prevalence and risk factors of diabetes (Kakekagumick et al., 2013). The overarching objective was to prevent diabetes by improving personal health practices regarding diet and physical activity (Ho, Gittelsohn, Harris, & Ford, 2006). SLHDP addressed key health determinants such as health education, physical environments, nutrition, and health services. The intervention approaches like School Curriculum, Diabetes Radio Show, Northern Store Program, Community Walking Trail, and other community actions were tailored to fit into the Aboriginal cultural context and focused on enabling individuals with health knowledge and skills to fight diabetes (Ho et al., 2006). Taking a comprehensive overview of population health principles by addressing the social, physical, and cultural determinants of health, is a fundamental prerequisite to ensure overall health and wellbeing of the community (World Health Organization [WHO], 2016). This paper presents a critique of the SLHDP from two disciplinary perspectives: public health and medical anthropology.

Figure 1:

Sandy Lake First Nations (SLFN) Indian Reserve is an Oji-Cree Band with about 3,000 inhabitants located in the west part of Northern Ontario. The community gets service from a privately owned Northern Store.There are four local groceries. Education is maintained by the Sandy Lake Board of Education with one elementary and one high school. The five clans living there are governed by an elected Governance Council advised by an Elder Council. The following six boards carry out the council's operations: Community Development, Education, Health, Housing, Radio Station, and Recreation (Statistics Canada, 2011). The SLHDP was triggered by a report brought forward in 1991 by the Chief of SLFN community to the medical director of that zone to voice their concerns regarding an increased prevalence of diabetes (Kakekagumick et al., 2013). In a community-based participatory approach, SLHDP researchers conducted a range of surveys, assessments, ethnographic, and formative research, and designed interventions as mentioned above. Parts of the program continue up to now with support from the local government and community (J. Rae, Health Director, SLHDP, personal communication [email], May 9, 2016).

Reasons for Selecting Two Disciplinary Perspectives

Public health was chosen to appraise how SLHDP has reflected the values of this discipline, realized its core functions, and delivered essential services. As per the fundamental values of public health, SLHDP recognized the importance of the health of a community, made efforts to reduce the predominant health inequity, ensured community participation, and demonstrated respect for Aboriginal culture. Reflecting the core functions of public health, SLHDP assessed community health needs, and developed appropriate policies and programs, thus, assuring delivery of essential services (Public Health Agency of Canada [PHAC], 2007). Hence, the criteria for appraisal of this program are based on the realization of these values, public health core functions, and services.

Medical anthropology was chosen as the second discipline for this critique because it has distinct sociocultural, biological, and etymological approaches to study chronic health conditions in human populations (Armelagos, Leatherman, Ryan, & Sibley, 1992). The traditional ecological perspective implicit in SLHDP has not gained general acceptance in medical anthropology, as it deals with the homeostatic systems (Landy, 1983). The ecological view is driven by biomedical theory in its procedures (Hahn & Kleinman ,1983) and does not consider the exact role of social relations in the development of health and illness (Singer, 1989). Medical anthropology explains sociocultural, biological, and etymological factors and how they affected the evolution and distribution of diabetes in an Aboriginal community (Schoenberg, Drew, Stoller, & Kart, 2005).

Public Health Perspectives

Public health is a combination of sciences and arts, encompassing skills and values dedicated to maintaining and improving the overall health and wellbeing of people through collective social actions (Sheps, 1976; Department of Health [DH], 1988). The core functions of public health include assessment, policy development, and assurance of the required services (Centre for Disease Control and Prevention [CDC], 2014). To accomplish these basic functions, the discipline advocates for the delivery of ten essential services: assess; inform, educate, and empower; mobilize partnerships; develop policies; enforce laws; link to services; assure competent workforce; evaluate; monitor health; and research (CDC, 2014). SLHDP realized all three core functions and delivered most of these essential services with their inherent strengths and weaknesses as described below.

Strengths in Public Health Perspective

Assess, Develop, and Implement Health Policy. SLHDP adopted a thorough approach to conducting a series of assessments. The initial surveys documented a very high age-standardized rate (26.1%) of type 2 diabetes mellitus (T2DM) in the community (Kakekagumick et al., 2013) that was substantially higher than the overall prevalence (8.7%) in a non-Aboriginal population (Statistics Canada, 2011). The researchers rigorously advocated with this alarming finding and were able to draw national attention, including from politicians and the media (Kakekagumick et al., 2013). Thereby, the importance of intervention was recognized and funding secured. These early initiatives laid a solid foundation for developing effective policies and delivering essential health services (Ho et al., 2006).

Link to Services and Create Supportive Environments. SLHDP not only established basic health facilities but also linked them with other relevant services that promoted synergies in the program. The organization of Northern Store Program, to ensure availability of healthy foods, was a midstream intervention. SLHDP linked a downstream component to it by organizing a store visit where lifestyle counseling was provided, encouraging the consumption of nutritious foods and discouraging unhealthy choices (Lytle & Fulkerson, 2002). Likewise, building a Community Walking Trail by engaging volunteers with funds from an NGO partner created opportunities for physical and other recreational activities. Similarly, banning the sales of high-fat and high-sugar snacks in and around the schools was another example of policy coherence that contributed to the creation of a supportive environment (Ho et al., 2006).

Inform, Educate, and Empower People. SLHDP implemented its health education policy through a local radio show that provided an opportunity for listeners to call in and ask questions with any health-related issues. A diabetes curriculum was administered at schools targeting students to equip them with essential health knowledge. A family component of the curriculum linked parents through the radio program and an information booth showed them how to prepare healthy foods. Thus, the agento-structural types of interventions that addressed both the structural determinants and individual agencies, informed, educated, and enabled community people to make healthier choices regarding diet and physical activities (Backholer et al., 2014).

Mobilize Partnerships and Strengthen Community Action. Based on the principles and values of a participatory approach, the researchers established and maintained strategic partnerships with the local Band government, community leaders, businesses, and NGOs. They were involved with due respect and trusteeship, enabling them to become fruitful partners and owners of the program. They jointly arranged periodic stakeholders' meetings, youth diabetes summer camps, sports and recreational events, and a variety of community events during the local fair with the NGO partners and community leaders (Kakekagumick et al., 2013). These efforts mobilized the partners and strengthened community supports for the program.

Ensure Competent Workforce, Community Strength, and Coping Skills. The program recruited and trained staff from the community who acquired skills to counsel and demonstrate healthy food preparation. Sports and recreational activities enhanced physical fitness and built confidence among the youth. Overall, these enhanced people's coping skills and contributed to community resilience; thereby, enabling them to learn how to face prevailing health challenges, including diabetes (Gunderson & Folke, 2005). After the termination of funding in 2007, teachers sustained the school curriculum with incentives from the community (Saksvig et al., 2005). This is an example of successful institutionalization of the program by a resilient community.

System Management, Research, and Reorientation of Health Services. The program was able to engage with five out of six councils of the Band government (except housing) that facilitated the research agenda by exploring systems-level perceptions and expectations and weighing the adaptation needs of the programs (Ho et al., 2006). Thus, the researchers integrated the program with existing health services and also reoriented them to better address the identified health needs that improved the responsiveness and uptake of the program (WHO, 2016).

Weaknesses in Public Health Perspectives

Missing Broader Determinants of Health. The roots of the epidemic lie in the denigration of traditional foods habits and commendation of dominant society's idealized dietary practices (Howard, 2014). Therefore, Benyshek, Martin, and Johnston (2001) rightly named it a "political disease" (p. 52) whereby historical records of deprivation, social, and economic disruptions are all consistent with findings showing that chronic protein energy malnutrition underlies the cause of diabetes (p. 41). A systematic review shows that similar programs in Australia aiming to improve nutrition typically target a range of structural determinants including food supply, food policy, and family (Johnston et al., 2013). Although SLHDP achieved a change in the food supply by establishing the Northern Store Program, it relied on foods shipped from long distances by air cargo and sold at high

prices. Rather, a more efficient alternative could be to grow healthy foods locally, during the summer months. This approach could encourage family gardening, traditional food habits, and also support local economy, ensuring availability of fresh fruits and vegetables.

Lacking Aboriginal and Holistic Concept of Health. Highlighting the notion of intergenerational impacts of historical trauma (Brave-Heart & DeBruyn, 1998), medical anthropologist Howard (2014) argued that mental, spiritual, and emotional shocks sustained by the residential school survivors could not be separated from strain inflicted on their bodies. Coined "boarding school syndrome" by Robertson (2006), the condition which manifested itself as the current diabetes epidemic.

Interventions aimed to address Aboriginal health must keep in mind this evolution pathway and endeavour to foster the Aboriginal concept of health that embraces emotional, intellectual, spiritual, cultural, and social aspects of wellbeing (Johnston et al., 2013). SLHDP attempted to address the physical, cultural, and some social aspects of health, but no efforts were made in dealing with the spiritual and emotional aspects. Adopting a medical anthropology perspective could better reflect this holistic concept of health as is highlighted below.

Medical Anthropology Perspectives

Medical anthropology is a subfield of anthropology that studies "how health and illness is shaped, experienced, and understood in light of global, historical, and political forces" (Stanford University, 2015, p. 1). As mentioned above, diabetes in Indigenous communities is a consequence of the history of colonization, policies of systematic assimilation, and bearings of residential schools (Mendenhall, Seligman, Fernandez, & Jacobs, 2010). The "social suffering" and "psychological stress" that sprung from these influences are medical anthropology concepts which explain why in the contemporary world, diabetes has emerged as an epidemic and disproportionally affected Indigenous society (Rose, 1985). Integrating anthropological terms such as "distress" and "duress" with the biomedical term "high blood sugar" makes the definition of diabetes clearer (Rock, 2003, p.153) and clarifies the profound impact sweetened blood (diabetes) has on Aboriginal people's lived experience (p. 163). Thereby, anthropological engagement is crucial in exploring the relations between mind and body as well as individuals and society, and designing a connected program to address diabetes in the Aboriginal community (Benyshek, Martin, & Johnston, 2001; Scheper-Hughes & Lock, 1987).

Strengths in Medical Anthropological Perspective

Respecting Aboriginal Voice and Concern. The voice and concerns of the FNC were paid due regard as manifested by the signing of an agreement between the two parties that initiated the SLHDP. The investigators and community leaders met regularly to plan all aspects of the project jointly on the ground (Macaulay et al., 2003). The researchers noted inputs from community elders and continually incorporated them to refine the intervention elements as necessary, demonstrating their respect for traditional views and accountability to FNC (Gittelsohn et al., 2003).

Integrating Indigenous Knowledge. A year-long ethnographic study collected information on health beliefs, attitude, body image, perceptions of food and physical activities, notions about disease causation and determinants of health, and the Aboriginal concept of disease prevention (Saksvig et al., 2005). This qualitative study delved down the root causes of how colonial policies affected traditional livelihoods and pushed the community members to adopt sedentary lifestyles that predisposed the risk factors for diabetes. This in-depth indigenous knowledge base helped to design a culturally sensitive program.

Adapting the Program. Because the historical context played a significant role in developing the current epidemic, it was crucial to address it by adapting the program accordingly (Edwards & Di Ruggiero, 2011). To that end, SLHDP researchers applied insights garnered from the ethnographic study. For instance, a Ph.D. student jointly developed the school curriculum with a local schoolteacher, integrating inputs from community elders. Thus, they were able to incorporate Aboriginal intergenerational learning styles with an emphasis on tradition, while using humour. The key adaptation was to use storytelling as a way to introduce the main concepts of health education lessons. The stories followed the activities of imaginary but familiar Indigenous characters (Missy and Buddy) as they learned about the importance of a healthy lifestyle to prevent diabetes (Saksvig et al., 2005).

Delivering Culturally Sensitive Programs. The peer component of the school program created opportunities for students to act as role models. The activities included a video cooking club for children that demonstrated the preparation of healthy snacks by children. Another activity was a Diabetes Kids show that aired three times a week on a youth radio program (Ho et al., 2006). The traditional community rituals and practices were given due consideration by immersing the program with local fairs. A mascot appropriate to the Aboriginal culture was introduced that often showed up

to the community events. SLHDP added some sports tournaments like baseball, hockey, and broomball that not only fulfilled physical activity requirements but also provided recreation to the community (Ho et al., 2006; Saksvig et al., 2005). These are all examples of culturally sensitive programs that respect Aboriginal traditions.

Weaknesses in Medical Anthropological Perspectives

As per Howard (2014), a population health program grounded in medical anthropological theories and collective community resilience can regenerate the balance among mind, body, heart, and soul of individuals, families, communities, and nations; thus, it is able to successfully restore health and wellbeing. SLHDP had some notable deficiencies in this regard.

Underutilization of Community Resources and Social Capital. As SLHDP was not based on any anthropological theoretical framework, the program faced multiple challenges. For example, it faced difficulties in continuing the home visit component, as it was human resource-intensive. But with adequate community engagement, training, and empowering, volunteers could undertake this task. Providing sample food items for cooking demonstrations consumed most of the program budget but could be overcome by relying on local products as there were four other running stores (Kakekagumick et al., 2013). By following social capital theory (Moore, Salsberg, & Leroux, 2013), social networks could be motivated to provide these items, which might encourage farming and self-sustenance. Moreover, the community had traditional healers and an elder council with skills and experience in which community members had full trust. Strategic alliances to mobilize this "network embedded" social capital could also reinforce the population health equity perspective (Moore et al., 2013, p. 3).

Deficient Social Connection. "The social dynamics surrounding the meanings attributed to food, the relationships people have with food, and how these are contextualized in family and kinship relationships, are paramount considerations in diabetes prevention and management for Indigenous peoples" (Howard, 2014, p. 535). Traditionally Aboriginal people learn by observation and participation in daily living activities, following the example of their social circle (Neegan, 2005). Likewise, programs that seek to increase physical activity target a range of determinants involving social connections and community setups. Interventions with similar purposes incorporate sporting events with national, traditional, and religious festivals (Cargo et al., 2011), establish regular walking groups (Reilly et al., 2011), and facilitate hunting trips (Rowley et al., 2000). In addition to contributing to health, these initiatives help to consolidate social connections (Lehmann et al., 2003). SLHDP could integrate social connections that provide social networks to create a safe and comfortable environment for people to share information on practicing healthy choices regarding foods and physical activities. Besides, adopting such translational strategies beyond the school could put the program objectives into public practice and add up to better gains (Tabak et al., 2015).

Deficient Cultural Adaptation. A systematic review of 21 different health programs targeting Australian Aboriginal people found interventions like returning to the traditional lands, hunting and gathering, family harvesting, establishing a community footy league, sponsoring sports carnivals, and constructing traditional houses promoted indigenous knowledge and practices (Johnston et al., 2013). Another example of deep cultural adaptation could be to organize some healthy lifestyle festivals that build and support interorganizational and community linkages; and thereby, stimulate a healthy social environment where behavioural changes become easier and rewarding (Haikimi, 2010). Such innovations could increase the dose, intensity, and widen trajectories for SLHDP with concomitant program gains (Ilott et al., 2013).

Lacking a Decolonizing and Reconciliation Agenda. Community-based decolonizing theory offers a convincing standpoint that could help explore Indigenous peoples' social suffering and potential ways to alleviate it (Howard, 2014). Decolonization entails liberating the mind from the idea that colonized people are inferior to others (Darity, 2008). Adopting a convivial approach in all policy, research, and program initiatives can address the issues of racism and exclusion at the interpersonal, community, and societal levels (Browne, Smye, & Varcoe, 2005). With this in mind, more reflective discussions with community elders might reveal the impression that past trauma has had on them, helping to promote relational processes (Final Report, 2015) for the alleviation of chronic suffering.

Recommendations on How the Program Could Do Better

Having a Well-Defined Theoretical Framework. Systematic reviews showed that the failure of many community-based interventions to demonstrate significant impacts was, in part, due to the lack of a well-fitted theoretical framework (Frohlich, Ross, & Richmond, 2006; Merzel & D'Afflitti,

2003). A suitable framework helps to tailor the interventions to the local context to maximize the outcomes. Although a combined social cognitive theory and an ecological model were applied in the school program, the broader application of an ecosocial framework or any medical anthropological theory was not explicit in SLHDP. The ecosocial theory of "disease distribution" that focuses on how people factually and biologically embody their societal and ecological contexts at across the life course and across generations, could be a good fit to explore the population patterns of disease (Krieger, 2011). Integration of medical anthropological theories could further help with the creative understanding of sociocultural phenomena and designing of interventions where people can make informed choices about healthy behaviors (Howard, 2014).

Nurturing Aboriginal Concept of Health. Population health interventions must pay due regard and nurture the Aboriginal concept of health to ensure greater overall wellbeing by achieving a balance between the physical, emotional, cognitive, and spiritual aspects of health. As per the United Nations Declaration on the Rights of Indigenous People (UNDRIP, 2008), all research projects, program activities, public health policies, and implementation strategies must be fully collaborative through broad-based partnerships with the Aboriginal communities to ensure their full enjoyment of human rights related to health.

Addressing Social and Structural Determinants of Health. A systematic review recapitulates that the increase in chronic illnesses among FNCs is associated with changes in lifestyles related to loss of hunting practices, less intake of traditional foods, and more intake of processed foods (Johnston et al., 2013). Additionally, they face high emotional stress from communal living and the breakdown of traditional family structures that have occurred over the past 50 years (Ho et al., 2006). These underpin the need to address relevant social and structural determinants of health such as Aboriginal status, income, and place (Frohlich et al., 2006). Poverty, food security, and environmental influences should also be considered at the macro-, meso- and micro-levels (Swinburn et al., 2011) with advocacy efforts based on empirical evidence (Potvin, Cargo, McComber, & Delormier, 2003). Similarly, improving a community requires addressing the upstream social determinants of health by paying attention to the historical as well as contemporary dynamic influences, incorporating them across all policies and programs.

Engaging the Community Authentically. Authentic engagement is an empowerment approach leading to autonomous decision-making by community members, ensuring accountability between communities and corresponding key stakeholders (Wallerstein, 2006). Adopting such a transparent decision-making process allows the partners to have equal inputs in the program, thereby closing the intersectoral gaps (Edwards & Di Ruggiero, 2011). Close partnerships across community groups demonstrates respect for local leadership and esteem for their self-governance, which underlies authentic community engagement.

Targeting Health Inequities. Keeping in view the most flagrant health inequities between Aboriginal and non-Aboriginal Canadians, any population health intervention must address this issue explicitly. As per Edwards and Di Ruggiero (2011), tackling the structural influences perpetuating health inequities requires approaches that join forces from different disciplines and bridge traditionally distinct research paradigms. There is a need to integrate medical anthropology with public health, social science, and other disciplines for a holistic analysis of historical, global, and dynamic contexts. This transdisciplinary approach allows multilevel quantification of intersecting influences, thus addressing structural determinants to reduce health inequalities (Edwards & Di Ruggiero, 2011).

Adopting Multilevel Interventions. A multilevel approach that maintains congruence among intervention components can create momentum in a population health program. Thrasher et al. (2004) illustrated the importance of social incorporation of programs targeting diet and physical activity rather than delivering it from an institution. Similar studies provided evidence that parental involvement in child-targeted health programs creates synergy and strengthens positive behaviours not only in children but also in parents (Rasanen et al., 2003). Pragmatic evidence indicates that targeting at-risk people in multiple settings and at various levels increase the odds to meet the program objectives (Merzel & D'Afflitti, 2003).

Conclusion

The SLHDP addressed some key determinants of population health. It realized the fundamental values of public health, accomplished core functions, and delivered most of the essential services in a culturally appropriate manner. Long-term, this community-based intervention allowed the consolidation of partnership, the building of momentum, and the emergence of a policy window (Merzel & D'Afflitti, 2003). Integrating the community as an equal partner helped develop mutual trust and respect that expedited community buy-in and resulted in smooth rolling out of the program. These features strengthened contextual adaptation and uptake of the intervention elements, and in the

long run, allowed reciprocal capacity building for both the key community stakeholders and program organizers. Eventually, these competencies added up to the program success and sustainability (Chambers, Glasgow, & Stange, 2013).

The notable success of SLHDP was manifested by a gradual reduction in the prevalence diabetes from the baseline rate of 26.1% down to 17.5% (Kakekagumick et al., 2013). Similarly, there was a significant improvement in knowledge, awareness, and psychosocial behaviors related to healthy eating among students (Saksvig et al., 2005). The culturally-sensitive school curriculum proved useful, thus, it was adopted and scaled up in many FNC schools across Canada (Saksvig et al., 2005).

These successes could be augmented by integrating medical anthropological theories with public health theories that would help integrate intervention elements both vertically and horizontally across sectors and systems to make it a comprehensive population health program (MacLean et al., 2010). Hence, we conclude that a multilevel systems approach using an integrated conceptual framework based on both public health and medical anthropology could better address key health determinants. Such a strategy would produce improved health outcomes and contribute more towards health equality; thus, it would be able to address the goal of population health programs which is to ensure overall community health and wellbeing (Shaw, Holland, Pattison, & Cooke, 2016).

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