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Articles

ATHENS INSTITUTE FOR EDUCATION AND RESEARCH
A World Association of Academics and Researchers
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Mission

ATINER is an Athens-based World Association of Academics and Researchers based in Athens. ATINER is an independent and non-profit **Association** with a **Mission** to become a forum where Academics and Researchers from all over the world can meet in Athens, exchange ideas on their research and discuss future developments in their disciplines, **as well as engage with professionals from other fields**. Athens was chosen because of its long history of academic gatherings, which go back thousands of years to *Plato's Academy* and *Aristotle's Lyceum*. Both these historic places are within walking distance from ATINER's downtown offices. Since antiquity, Athens was an open city. In the words of Pericles, **Athens*"...is open to the world, we never expel a foreigner from learning or seeing".*** **(**"Pericles' Funeral Oration", in Thucydides, *The History of the Peloponnesian War).* It is ATINER's **mission** to revive the glory of Ancient Athens by inviting the World Academic Community to the city, to learn from each other in an environment of freedom and respect for other people's opinions and beliefs. After all, the free expression of one's opinion formed the basis for the development of democracy, and Athens was its cradle. As it turned out, the Golden Age of Athens was in fact, the Golden Age of the Western Civilization. *Education* and *(Re)searching* for the 'truth' are the pillars of any free (democratic) society. This is the reason why *Education* and *Research* are the two core words in ATINER's name.

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President's Message

All ATINER's publications including its e-journals are open access without any costs (submission, processing, publishing, open access paid by authors, open access paid by readers etc.) and is independent of presentations at any of the many small events (conferences, symposiums, forums, colloquiums, courses, roundtable discussions) organized by ATINER throughout the year and entail significant costs of participating. The intellectual property rights of the submitting papers remain with the author. Before you submit, please make sure your paper meets the basic academic standards, which includes proper English. Some articles will be selected from the numerous papers that have been presented at the various annual international academic conferences organized by the different divisions and units of the Athens Institute for Education and Research. The plethora of papers presented every year will enable the editorial board of each journal to select the best, and in so doing produce a top-quality academic journal. In addition to papers presented, ATINER will encourage the independent submission of papers to be evaluated for publication.

The current issue is the first of the eighth volume of the *Athens Journal of Health and Medical Sciences* (AJHMS), published by the **Health & Medical Sciences Division of ATINER.**

Gregory T. Papanikos
President
ATINER

Athens Institute for Education and Research

A World Association of Academics and Researchers

20th Annual International Conference on Health Economics, Management & Policy, 21-24 June 2021, Athens, Greece

The Health Economics & Management Unit of ATINER will hold its **20th Annual International Conference on Health Economics, Management & Policy, 21-24 June 2020, Athens, Greece s**ponsored by the Athens Journal of Health and Medical Sciences. The aim of the conference is to bring together academics, researchers and professionals in health economics, management and policy. You may participate as stream leader, presenter of one paper, chair of a session or observer. Please submit a proposal using the form available (https://www.atiner.gr/2021/FORM-HEA.doc).

Academic Members Responsible for the Conference

- **Dr. Paul Contoyannis**, Head, Health Economics & Management Unit, ATINER & Associate Professor, McMaster University, Canada.
- **Dr. Vickie Hughes**, Director, Health & Medical Sciences Division, ATINER & Assistant Professor, School of Nursing, Johns Hopkins University, USA.

Important Dates

- Abstract Submission: **22 February 2021**
- Acceptance of Abstract: 4 Weeks after Submission
- Submission of Paper: **24 May 2021**
-

Social and Educational Program

The Social Program Emphasizes the Educational Aspect of the Academic Meetings of Atiner.

- Greek Night Entertainment (This is the official dinner of the conference)
- Athens Sightseeing: Old and New-An Educational Urban Walk
- Social Dinner
- Mycenae Visit
- Exploration of the Aegean Islands
- Delphi Visit
- Ancient Corinth and Cape Sounion
    - More information can be found here: https://www.atiner.gr/social-program

Conference Fees

Conference fees vary from 400€ to 2000€
Details can be found at: https://www.atiner.gr/2021fees

9th Annual International Conference on Health & Medical Sciences
3-6 May 2021, Athens, Greece

The Medicine Unit of ATINER is organizing its **9th Annual International Conference on Health & Medical Sciences, 3-6 May 2021, Athens, Greece** sponsored by the Athens Journal of Health and Medical Sciences. The aim of the conference is to bring together academics and researchers from all areas of health sciences, medical sciences and related disciplines. You may participate as stream leader, presenter of one paper, chair a session or observer. Please submit a proposal using the form available (https://www.atiner.gr/2021/FORM-HSC.doc).

Important Dates

- Abstract Submission: **22 March 2021**
- Acceptance of Abstract: 4 Weeks after Submission
- Submission of Paper: **5 April 2021**

Academic Member Responsible for the Conference

- **Dr. Vickie Hughes**, Director, Health & Medical Sciences Research Division, ATINER & Assistant Professor, School of Nursing, Johns Hopkins University, USA.
- **Dr. Carol Anne Chamley**, Head, Nursing Research Unit & Associate Professor, School of Health and Social Care, London South Bank University UK.
- **Dr. Andriana Margariti**, Head, Medicine Research Unit, ATINER & Lecturer, Centre for Experimental Medicine, Queen's University Belfast, U.K.

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A Health Disparity Study among Undergraduate Students and Graduate Students at a Historically Black College or University

By Steffani N. Driggins[*] & Daniel T. Hembree[±]

Our study consisted of surveying undergraduate and graduate students at a historically black college and university (HBCU) about their knowledge of certain health disparities that affect African Americans. Approval from the Allen University Institutional Review Board was granted to administer an online anonymous health disparity questionnaire to undergraduate and graduate students at Allen University. The questionnaire was administered using the community based participatory research (CBPR) methodology. The sampling criteria consisted of undergraduates enrolled in the Biological Sciences course, Biology I course, Biology II course, or Freshman Seminar course during the spring 2020 semester. The sampling also consisted of graduate students that were currently enrolled in the Dickerson-Green Theological Seminary. The sample size consisted of 114 participants that completed the online questionnaire. The data from the metabolic syndrome questionnaire was analyzed using descriptive statistics, utilizing percentages from a cross-tabulation of individual responses. Most of the participants were African American (89.4%), female (54.9%) and between the ages of 18 and 21 (60.5%). Between 73% and 90.4% of the participants knew that each disease on the survey disproportionately affected African Americans. However, less than 50% knew the risk factors of breast cancer, risk factors of cervical cancer, risk factors of prostate cancer, symptoms of prostate cancer, symptoms of sickle cell anemia and treatments for sickle cell anemia. The next phase of our study will consist of conducting a metabolic syndrome (MetS) questionnaire with the graduate students. The data, along with data from the MetS questionnaire conducted with the undergraduates in a previous study, and the health disparity questionnaire data will be used to construct health disparity educational workshops at Allen University.

Keywords: *health disparities, historically black colleges and universities, African American college students*

Introduction

There are several health disparities associated with African Americans. Some of the health disparities are asthma, breast cancer, cervical cancer, prostate cancer, and sickle cell anemia (U.S. Department of Health and Human Services 2020).

According to the National Health Interview Survey, African Americans had a 10.7% prevalence of having asthma (Center for Disease Control 2018). This is in comparison to Asians (4.5%), Mexicans (5.4%), Hispanics (6.5%), and Caucasians (8%). The data also indicated that African American adults had a 9.6% prevalence of having asthma. This data is significant when compared to Asians (3.8%), Mexicans (6.6%), Caucasians (6.8%), and Hispanics (7.5%).

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Between 2013 and 2017, the rate of new cases of breast cancer was 128.5 per 100,000 women (National Cancer Institute 2020a). The data also indicated that African American women had the second highest rate of breast cancer, which was 124.8 per 100,000 women, outside of the rate of 131.3 per 100,000 in Caucasian women. This is in comparison to the rates among Asian/Pacific Islander women (102.9), Hispanic women (99.1), and American Indian/Alaska Native women (79.5). The data indicated that the death rate among African American women from breast cancer was 27.6 per 100,000 women as well. This rate was significantly higher than the death rate among Asian/Pacific Islander women (11.4), Hispanic women (14.0), American Indian/Alaska Native women (14.6), and Caucasian women (19.8). It is estimated that approximately 276,480 new cases of breast cancer and approximately 42,120 deaths from breast cancer will occur in 2020 in women (National Cancer Institute 2020a).

Hispanic women had the highest rate of new cases of cervical cancer between 2013 and 2017, which was 9.2 per 100,000 (National Cancer Institute 2020b). However, African American women had the second highest rate of new cases of cervical cancer which was 8.7 per 100,000 women. The rate was higher than Asian/ Pacific Islander women (6.5), Caucasian women (7.2), and American Indian/ Alaska Native women (7.9). Also, the data indicated that the death rate from cervical cancer in African American women was 3.4 per 100,000 women. This was significantly higher than the death rate in Asian/ Pacific Islander women (1.8), Caucasian (2.2), American Indian/Alaska Native women (2.5), and Hispanic women (2.6). It is estimated that 13,800 new cases of cervical cancer and an estimated 4,290 deaths from cervical cancer will occur in 2020 (National Cancer Institute 2020b).

Unfortunately, African American men had the highest rate of new cases of prostate cancer between 2013 and 2017, with a rate of 175.3 per 100,000 men (National Cancer Institute 2020c). This was in comparison to American Indian/ Alaska Native (54.6), Asian/Pacific Islander men (56.7), Hispanic men (92.0), and Caucasian men (102.3). The death rate among African American men from prostate cancer was 37.9 per 100,000 men, which was indicated in the data as well. The death rate was drastically high in comparison to Asian/Pacific Islander men (8.6), Hispanic men (15.8), Caucasian men (17.9), and American Indian/Alaska Native men (18.7). An estimated 191,930 new cases of prostate cancer and an estimated 33,330 deaths from prostate cancer is predicted to occur in 2020 (National Cancer Institute 2020c).

The Centers for Disease Control (CDC) estimates that sickle cell anemia affects approximately 100,000 Americans (Centers for Disease Control 2020). Also, the CDC estimates sickle cell anemia occurs in 1 out of 365 African American births. In addition, 1 in 13 African American babies are estimated by the CDC to be born with the sickle cell anemia trait (SCT).

Given the statistical information regarding the prevalence of asthma, breast cancer, cervical cancer, prostate cancer, and sickle cell anemia among African Americans, it is imperative to investigate the knowledge of these health issues among African American college students. Our research study was constructed to survey undergraduate students and graduate students at Allen University, a HBCU

with a large population of African American students, about their knowledge of these health disparities. Overall, the results will provide the basis for developing an educational program to help reduce and prevent these health disparities among the undergraduate and graduate student population at Allen.

Methods

Ethical Approval

An anonymous online questionnaire on health disparities associated with African Americans was reviewed and approved by the Allen University Institutional Review Board. The questionnaire template in Google Forms was used to create the online questionnaire. The questionnaire consisted of a total of 42 questions. The first few questions on the online form consisted of the following: ethical background, age, gender, classification, major, family health history, and individual health. The questions that followed assessed the participant's knowledge regarding asthma, breast cancer, cervical cancer, prostate cancer and sickle cell anemia.

Sampling Criteria and Size of Participants

The undergraduate students that were recruited to complete the health disparity questionnaire were primarily freshman and African American. The graduate students that were recruited for the study were primarily African American. The community based participatory research (CBPR) methodology (Wallerstein and Duran 2006) was used to conduct the online questionnaire among the undergraduate students and graduate students. The undergraduate participants that participated in the study were enrolled in the Biological Sciences course, Biology I course, Biology II course, or Freshman Seminar course at Allen. The graduate participants were enrolled in the Dickerson-Green Theological Seminary at Allen. The students were invited to participate in completing the questionnaire which was administered in the spring of 2020 during their class time. The undergraduate courses were chosen because they consist of large class sizes in comparison to the upper level courses. All of the students were informed that their participation in the questionnaire was voluntary and that a written consent was required before they could complete the questionnaire. All participants were also informed that they could withdraw from completing the questionnaire at any time without any adverse consequences. Each undergraduate student that completed the questionnaire received extra credit points. The graduate students that completed the questionnaire did not receive any extra credit points. The consent form that was completed by the participants was maintained in a designated locked facility. A total of 114 participants completed the questionnaire.

Data Analysis

The data from the online health disparities questionnaire was obtained from the participants' responses that were recorded on the Google Forms survey. The questionnaire was analyzed using descriptive statistics, utilizing percentages from a cross-tabulation of individual responses.

Results

The demographics of the participants consisted of 89.4% African American, 2.65% African American/Caucasian, 1.8% Native American, 0.9% Caucasian, 0.9% Asian, and 4.35% other (two different ethnic backgrounds were chosen). Also, 55.7% were freshman, 8.0% were sophomores, 1.8% were juniors, 1.8% were seniors and 32.7% were graduate students. A total of 54.9% of the participants were female and 45.1% were male. The age of the participants consisted of 60.5% that were between 18–21 years, 4.4% between 22–25 years, 1.8% between 26–29 years, 2.6% between 30–39 years, 5.3% between 40–49 years, 11.4% between 50–59 years, and 14% between 60 years and older. The top disciplines among the participants consisted of 33.3% of the students that were obtaining a Master of Divinity degree, followed by an undergraduate degree in biology (18.4%), an undergraduate degree in sports management (12.3%) and an undergraduate degree in business (11.4%).

There was a total of 43% of participants that were athletes in comparison to 57% that were not athletes. In regards to a healthy lifestyle, the data indicated that 36% of the participants exercised 3 to 4 times a week, 25% exercised once a week, 18% exercised 2–3 times a week, 7% exercised once a month and 14% did not exercise. In addition, the data indicated that 3.5% of the participants were current tobacco smokers, 4.5% were former tobacco smokers and 92% were non-tobacco smokers. Moreover, 29.7% of the participants ate healthy, 68.5% sometimes ate healthy, and 1.8% didn't eat healthy.

The data from the online questionnaire indicated that the graduate students had a significantly lower percentage of not having a family history of asthma, breast cancer, cervical cancer, and sickle cell anemia. The percentage for the graduate participants that did not have a family history of the diseases listed above was 13.1%, in comparison to 28% among the undergraduate students. The data indicated also that there was a significantly lower percentage of a family history of asthma among the graduate participants (9.3%), in comparison to the undergraduate participants (30%). There was a slight difference between the number of graduate participants (0.9%) with a family history of sickle cell anemia in comparison to the undergraduate participants (3.7%). Interestingly, the graduate students and undergraduate students had the same percentage (3.7%) for a family history of cervical cancer. On the other hand, the percentages for a family history of breast cancer among the graduate students (11.1%) and undergraduate students (13%) was not significantly different. However, the data from the questionnaire

did indicate that the graduate students had a slightly higher rate of prostate cancer (8.3%) in their family than the undergraduate students (5.6%).

Figure 1. *Family History of Diseases of the Undergraduate Participants and Graduate Participants that completed the Online Health Disparity Questionnaire*

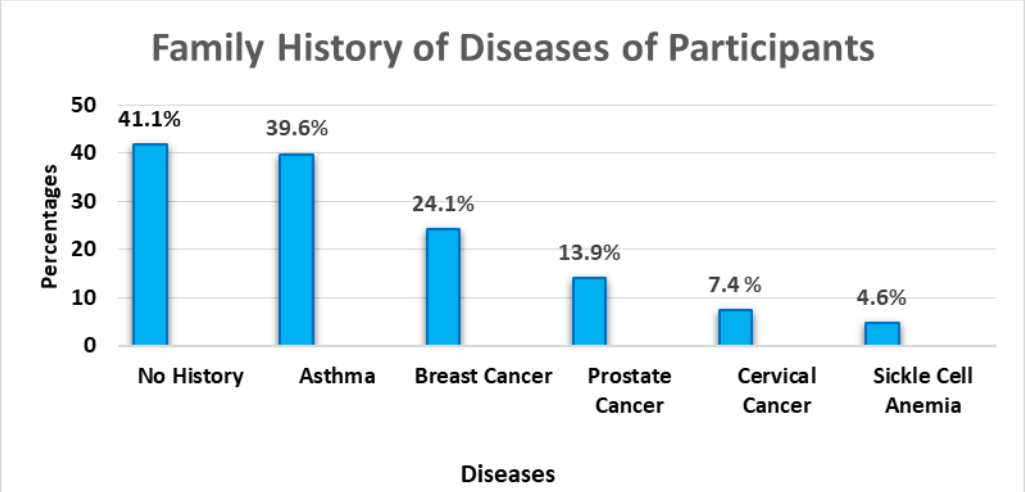
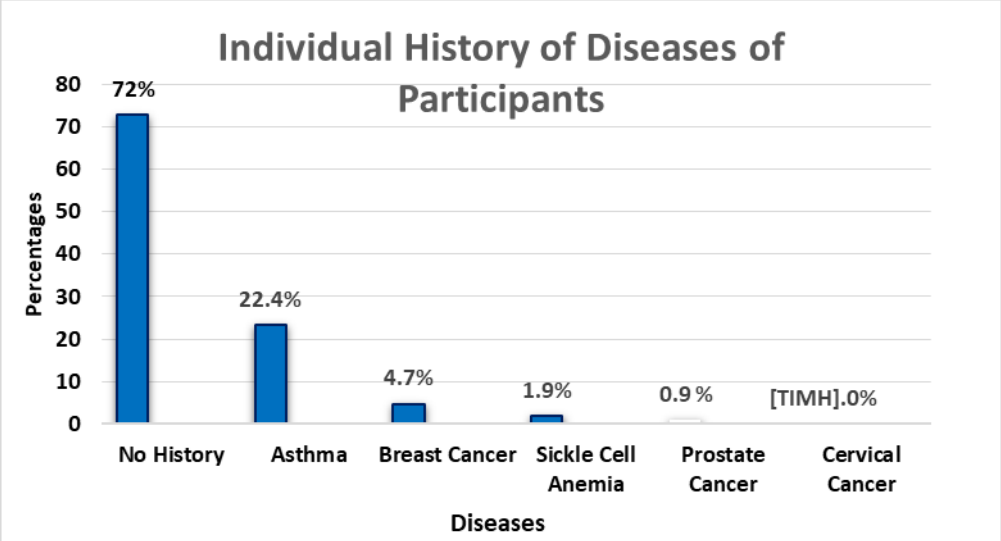


Figure 2. *Individual Health History of Diseases of the Undergraduate Participants and Graduate Participants*



The data for the individual health history indicated that the 0.9% of a personal health history of prostate cancer was solely based on the data from the graduate students. The undergraduate participants did not indicate that they had a personal history of prostate cancer. The individual health history for breast cancer indicated that the graduate students did not have a significant higher percentage of breast cancer (2.8%) than the undergraduate students (1.9%). The percentage of graduate students and undergraduate students that had sickle cell anemia was the same, which was 0.93%. However, the percentage of graduate students (5.6%) that had asthma was significantly lower than the

percentage for the undergraduate students (16.8%). The percentage of graduate students (27.1%) that did not have any of the health issues listed was significantly lower than the undergraduate students (44.8%) as well.

Table 1. *Correct Responses from the Undergraduate and Graduate Participants*

Conditions	Question	Undergraduates (n=67.3%)	Graduates (n=32.7%)	Overall
Asthma	Symptoms	45.6%	32.5%	78.1%
	Treatment	48.2%	29.0%	77.2%
Breast Cancer	Cause	39.0%	15.9%	54.9%
	Diagnosis	42.9%	32.5%	75.4%
	Symptoms	47.4%	25.4%	72.8%
	Treatment	48.2%	28.1%	76.3%
Cervical Cancer	Cause	32.7%	36.3%	69.0%
Prostate Cancer	Cause	37.2%	31.8%	69.0%
Sickle Cell Anemia	Cause	43.4%	21.2%	64.6%
	Shape of Cells	32.7%	21.2%	53.9%
	Protein Effected	38.9%	24.8%	63.7%
	Diagnosis	56.6%	31.9%	88.5%

Overall, the undergraduate participants and graduate participants did know that each disease on the survey disproportionately affected African Americans. The percentage of participants that indicated that information on the questionnaire for each disease was the following: 90.4% (asthma), 77.7% (breast cancer), 73% (cervical cancer), 75% (prostate cancer), and 81.3% (sickle cell anemia).

Table 2. *Incorrect Responses from the Undergraduate and Graduate Participants*

Conditions	Question	Undergraduates (n=67.3%)	Graduates (n=32.7%)	Overall
Asthma	Diagnosis	43.6%	15.5%	59.1%
Breast Cancer	Risk factors*	16.6%	31.6%	48.2%
Cervical Cancer	Risk factors*	26.3%	14.1%	40.4%
	Treatment*	40.4%	26.3%	66.7%
Prostate Cancer	Risk factors*	36.0%	7.2%	43.2%
	Symptoms	18.2%	23.6%	41.8%
Sickle Cell Anemia	Symptoms*	12.3%	31.6%	43.9%
	Treatment*	30.4%	13.4%	43.8%

*The answers to this question on the questionnaire consisted of more than one answer. However, the participants only chose one answer. The top answer that was chosen is indicated by the percentages listed for the undergraduate participants, graduate participants and overall.

The majority of the participants (59.1%) chose an inhaling and exhaling test for the diagnosis of asthma. However, the correct answer was spirometry test and peak flow test. Only 15.5% of the participants, 5.5% undergraduate students and 10% of the graduate students selected the correct answer.

The majority of the participants (48.2%) only chose a family history of breast cancer as the answer for the risk factors associated with breast cancer. A total of 32.5% of the participants chose an inherited gene (mutation BRCA1 and BRCA2) as the answer. However, all of the answers listed on the questionnaire were risk factors for breast cancer.

The answer for the question regarding the risk factors for cervical cancer was all of the answers listed. However, the majority of the participants (40.4%) chose the answer that pertained to having been diagnosed with other sexually transmitted infections. Also, the majority of the participants (66.7%) selected surgery as a treatment for cervical cancer rather than all of the treatments listed. In addition, the question pertaining to the symptoms of cervical cancer resulted in 34.2%, 32.5%, and 33.3% of the participants only choosing the first, second or third answer, respectively. All three answers that were listed were the symptoms. For the question regarding cervical cancer screening, both of the answers listed on the questionnaire were the correct answers. However, 66.1% of the participants only chose a Pap smear test and 33.9% only chose an HPV DNA test.

The answer regarding the risk factors associated with prostate cancer consisted of all of the answers listed on the questionnaire. However, 43.2% of the participants chose age as a risk factor for prostate cancer and 41.4% of the participants only chose a family history of prostate cancer. Also, the majority of the participants (41.8%) only chose problems urinating as the answer to the symptoms associated with prostate cancer instead of all of the answers listed.

For the question regarding the symptoms for sickle cell anemia, all of the answers that were listed were the risk factors. However, the majority of the participants (43.9%) only chose the following answer: low iron count, fatigue, frequent infections and episodes of pain. Also, the majority of the participants only chose one of the treatments listed for sickle cell anemia instead of all of the answers listed. Most of them (43.9%) chose blood transfusions as the treatment for sickle cell anemia.

Discussion

The number of participants that completed the questionnaire for our health disparity study was a total of 114. The majority of the participants were African American (89.4%), female (54.9%), and between the ages of 18 to 21 (60.5%). Also, the majority of the participants were freshman (55.7%) and 43.4% of the participants were athletes. A total of 32.7% of the participants were graduate students.

A mere 1% of the participants didn't indicate their gender, age, classification, ethnic background or if they were (or were not) an athlete. Also, 5.3% of the participants did not indicate if they had a family history of the diseases listed on the survey. A total of 6.2% of the participants didn't indicate if they had any of the diseases listed on the survey as well. Even though this data was not obtained from those participants, the percentages were not significant.

Figure 1 indicated that 41.1% of the participants didn't have a family history of the diseases listed on the questionnaire. However, a significant number of the participants that completed the questionnaire had a family history of asthma (39.6%) in comparison to the other diseases. The data indicated that 24.1% of the participants had a family history of breast cancer, 13.9% had a family history of prostate cancer, 7.4% had a family history of cervical cancer, and 4.6% had a family history of sickle cell anemia.

The data from the questionnaire also indicated that there was a higher percentage of a family history of asthma, sickle cell anemia, or no family history of the health issues among the undergraduate participants (67.3%) in comparison to the graduate students (32.7%). The high percentages were due to the fact there were more undergraduate students that completed the online questionnaire than graduate students. This also contributed to a higher percentage of undergraduate students that had asthma or indicated that they did not have any of the health issues listed.

The results of our study also indicated that the participants in the study had general knowledge pertaining to asthma (Table 1). A total of 78.1% of the participants, 45.6% undergraduate students and 32.5% graduate students, knew the symptoms of asthma. The results also indicated that 77.2% of the participants, 48.2% undergraduate students and 29.0% graduate students, knew the treatments for asthma. More than likely, this general knowledge was the result of the number of participants that had asthma (22.4%) or had a family history of asthma (39.6%). Some of the results of our study can be compared to a cross-sectional study that explored asthma knowledge and beliefs among African American adults in a Midwestern city (Tam-Williams et al. 2018). The study surveyed 158 African American adults. Among the participants, 38.3% of them had been diagnosed with asthma, 78% had family members with asthma, and 59.8% that had cared for someone with asthma. The results of their study indicated that the participants had a good general knowledge of asthma.

Figure 2 indicated that 72% of the participants did not have a personal history of the diseases listed on the questionnaire. However, 22.4% of the participants had a personal history of asthma in comparison to the other diseases listed. A personal history of breast cancer, sickle cell anemia, prostate cancer, and cervical cancer of the participants was the following: 4.7%, 1.9%, 0.9% and 0.0% respectively.

There was no significant difference in the percentage of graduate participants that had a personal history of breast cancer than the undergraduate participants. There were 3 participants that had a personal history of breast cancer. One participant was a graduate student that was 60 years or older and African American. The 2 undergraduate participants that had a personal history of breast cancer were between the ages of 18 to 21. Both students were African American, but one undergraduate student was male, and the other undergraduate student was female.

There was, however, a lack of knowledge of the risk factors for breast cancer for all participants (Table 2). The majority of the participants only chose a family history of breast cancer instead of all of the risk factors listed. The results of our study can be compared to three other breast cancer studies that involved college

students that were black. One study was conducted at Winston-Salem University among the campus community and the city/county community (Powell et al. 2008). The majority of the participants were African American (99%) and educated (31% college students; 42% college graduate and less; 14% advanced degrees and education). The study indicated that the mean score of knowledge about breast cancer was 23.25. A breast cancer study was conducted several years later in Raleigh, Durham, and Chapel Hill, North Carolina that consisted of six focus groups of African American women between the ages of 18 and 49 years (Allicok et al. 2013). A total of 33% of the participants had some college education and 53% of the participants had a college degree. The participants had little knowledge of breast cancer and thought that a family history of breast cancer could predispose a person to the disease. Sub-Saharan countries unfortunately have a high mortality rate of breast cancer in African women. This led to a study that was conducted among college students in Angola, which is a Sub-Saharan African country. In the study, the data indicated that there was a widespread lack of knowledge of the risk factors associated with breast cancer. In addition, the most known risk factor for breast cancer among the participants was a family history of breast cancer (Sambanje and Mafuvadze 2012). In Ethiopia, the incidence of breast cancer has increased. The increase influenced some researchers to conduct a questionnaire study on breast cancer among college students at the University of Gondar in Northwest Ethiopia. Their study indicated that the overall level of knowledge on breast cancer was low. Also, 75% of the participants indicated that a family history of breast cancer was a risk factor of breast cancer (Gebresillassie et al. 2018).

In our study, there was a lack of knowledge about the risk factors and treatments for cervical cancer (Table 2). All of the participants in our study only selected one risk factor for cervical cancer instead of all of the answers listed. They also only chose one treatment for cervical cancer instead of the all of the answers that were listed. The results of our study can be compared to other studies that were conducted among university students in America, South Africa and Ghana. One of the cervical cancer studies was conducted with African American women at a HBCU in the mid-Atlantic region of the United States that were between the age of 18 and 21 (Bowen-Reid et al. 2017). The results of their study indicated that the individual item analysis suggested that there were deficits in basic knowledge about cervical cancer (etiology of HPV, transmission of HPV, screening strategies and prevention strategies) among the participants. Unfortunately, cervical cancer is the second common cancer in South Africa. Thus, a cervical cancer study was conducted among university students in South Africa. The study indicated that the women that participated in the study lacked complete knowledge of cervical cancer and its risk factors (Hoque et al. 2014). Sadly, the leading cause of mortality among women in Ghana is cervical cancer. Based on this information, researchers conducted a cross-sectional cervical cancer study among college women in a university in Ghana. The study indicated that there was a lack of knowledge by the students regarding a link between smoking and cervical cancer (Abotchie and Shokar 2009). In our study, only 7.9% of the participants indicated that smoking tobacco products is a risk factor for cervical cancer.

The percentage of a personal history of prostate cancer among the participants in our study was low, which was at a mere 0.9% (Table 2). The percentage was derived from one subject that was an African American male and a graduate student. A higher percentage of the participants (13.9%) had a family history of prostate cancer which consisted of 8.3% of the graduate students and 5.6% of the undergraduate students. In regards to the risk factors for prostate cancer, our data indicated that 43.2% of the participants selected age for their answer, which consisted of 36% undergraduate and 7.2% graduate students. Two prostate cancer studies can be compared to our study. One study occurred at a HBCU in the southern United States and was conducted among 35 African American men that ranged in age between 18 and 34 years (Mincey et al. 2017). The participants of the study included freshmen (24%), sophomores (27%), juniors (15%), seniors (27%), and graduate students (9%). Approximately 15% of the participants of their study had a family history of prostate cancer, which was 1.1% higher than the percentage in our study (Figure 1). Also, their study reported that their participants felt they were at a greater risk for prostate cancer because of their ethnic background. In our study, 75% of the participants knew that prostate cancer disproportionately affects African Americans. Another study was conducted among men in Austin, Texas (Ogunsanya et al. 2017). The majority of the participants were in college (68.2%), graduate school (11.4%), or had a second degree (23.5%). A total of 95.9% of the participants in their study were black (African American, African or Caribbean). Overall, the knowledge of the participants in the study regarding prostate cancer was low, especially the knowledge related to risk factors. The mean correct responses of the participants consisted of 28.5%. The mean knowledge score was 5.25% ± 3.81, with a median score of 5.00.

The percentage of graduate students and undergraduate students with a personal health history of sickle cell anemia was the same. The data could possibly be associated with the fact that 1 out of 365 African Americans are estimated to have sickle cell anemia (Center for Disease Control and Prevention 2020). Also, the undergraduate and graduate participants only chose 1 risk factor for sickle cell anemia. Most of them (43.9%) chose the following: low iron count, fatigue, frequent infections, and episodes of pain. The participants chose only 1 treatment for the treatment of sickle cell anemia as well (Table 2). The majority of them (43.8%) chose blood transfusions as the treatment for sickle cell anemia. Two other sickle cell anemia studies can be compared to our study. One study was conducted at a North Texas campus with college students that consisted of freshman, sophomores, juniors, seniors and graduate students. Of the 15.6% of the African American students that participated in the study, 66.2% of them were knowledgeable about sickle cell anemia in comparison to 69.2% of the Caucasian students (Smith and Praetorius 2018). A non-experimental, cross sectional sickle cell anemia research study was conducted at the University of Texas at Arlington. A total of 415 college students participated that consisted of 15.7% African Americans, 16.9% Hispanics, 19.8% Asians, and 37.9% Caucasians. The study indicated that the males and the minority participants had less knowledge about sickle cell disease than the Caucasian participants (Smith and Brownell 2018).

Questions regarding diabetes and obesity, which are health disparities that also greatly affect African Americans, were not included on the questionnaire. This was due to the fact that data had been obtained from the undergraduate students at Allen in a previous study regarding diabetes and obesity (Driggins and Muhammad 2019). The results of study indicated that 41% of the undergraduate students had a family history of diabetes. In the study, 60.8% of the undergraduate students knew how diabetes is defined and 54.1% of them were able to identify the types of diabetes. Also, a total of 33.8% of the undergraduate students knew how obesity was defined and 17.6% knew the risk factors for obesity. The study, however, didn't include the graduate students at Allen since the focus for the study was the knowledge of the undergraduate students regarding the risk factors of metabolic syndrome.

The questionnaire did not include questions regarding high cholesterol, heart diseases or stroke, which are health disparities that affect African Americans as well. The questions were not included on the questionnaire since a previous study had been conducted with undergraduate students at Allen regarding those health disparities (Driggins and Muhammad 2019). The study indicated that 13.5% of the undergraduate students had a family history of high cholesterol, 15% had a family history of a heart attack, and 13.5% had a family history of a stroke. Also, 31% of the participants knew how high cholesterol is detected and 23% knew how high blood pressure is measured. More than half of the participants were able to identify the risk factors for high blood pressure and over half of the participants knew how a heart attack occurs. In addition, 20.9% knew the symptoms of a heart attack, 35.1% knew when a stroke occurred, and only 25.7% knew about the symptoms of a stroke. This study did not include the graduate students at Allen since the focus for the study was the knowledge of these health disparities by the undergraduate students.

Conclusion

Analysis of the data from our health disparity study indicates that it is imperative to improve the knowledge that our undergraduate and graduate students have about the risk factors associated with breast cancer, cervical cancer, and prostate cancer. The data also indicates that the knowledge of the undergraduates and graduates regarding the treatments for cervical cancer and symptoms of prostate cancer needs to improve. Additionally, the knowledge of the symptoms and treatments for sickle cell anemia need to increase among the undergraduate and graduate students.

Even though asthma, breast cancer, cervical cancer, prostate cancer and sickle cell anemia disproportionately affect African Americans, there is a significant lack of studies by Historically Black Colleges and Universities regarding the knowledge of African American college students about these health disparities. To our knowledge, asthma studies involving questionnaires and college students at HBCU's have not been published. Only a few survey studies have been published that are related to breast cancer, cervical cancer and prostate cancer among African

American college students at a HBCU. A few breast cancer survey studies and cervical cancer survey studies have been conducted with college students attending a university in Africa. These studies are significant because of the high rate of breast cancer and cervical cancer rates among African women, just as it is with African American women in the United States. Also, more sickle cell anemia studies need to be conducted at HBCUs. Some sickle cell anemia survey studies have been conducted with college students in the United States, but the percentage of African American participants is extremely low in both studies which is 15.6% (Smith and Praetorius 2018) and 15.7% (Smith and Brownell 2018).

An educational intervention cervical cancer study was conducted among college students at four universities, which consisted of three historically black colleges and universities. The four universities that conducted the study were Hampton University, North Carolina Central University, West Virginia State University and Marshall University. The study indicated that the knowledge about cervical cancer among the 57 participants that completed the pre- and post-intervention surveys increased significantly. The study was able to successfully improve the knowledge of the participants about HPV and cervical cancer (Staples et al. 2018). Thus, if more research regarding asthma, breast cancer, cervical cancer, prostate cancer and sickle cell anemia is conducted with African American college students at HBCU's then intervention programs could be established to educate them about these health disparities as a preventative measure.

Based on the results of our study, the next phase of our study is to administer an online metabolic syndrome questionnaire to the graduate students at Allen University to determine their knowledge of obesity, diabetes, heart disease and stroke. The data will also be compared to the data obtained from the undergraduates from a previous metabolic syndrome study (Driggins and Muhammad 2019). The data from both metabolic syndrome studies will help to determine the need to develop health disparity educational workshops that will be used to educate the undergraduate students and graduate students at Allen about health disparities that are associated with African Americans. The educational workshops will serve as preventative measures in the attempt to reduce the number of undergraduate students and graduate students from developing breast cancer, cervical cancer, prostate cancer, high blood pressure, high cholesterol, diabetes or becoming obese. The educational workshops will also help the undergraduate students and graduate students that have asthma, high blood pressure, high cholesterol, diabetes or sickle cell anemia to manage the health issue.

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Impact of Weight Reduction Measures on Obesity Reduction - The Case of Canada

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Obesity, and its related comorbidities, has become a pressing global health concern. This study follows an integrated approach of evaluating the health-related cost savings associated with the reduction of obesity incidence in Canada. A combination of meta-analysis and simulation using measured nationwide Body Mass Index data revealed that a reduction in calorie intake could lead to a 5% to 10% weight loss, which could result in a nontrivial health-related average savings of CAD$ 1.93 billion. This can be potentially achieved through the implementation and promotion of health-claims on low-calorie diets. Stronger economic policies such as the introduction of subsidies on healthy foods and taxes on high calorie diets could potentially lead to socially optimal calorie consumption. A combination of initiatives and regulatory policy options are also discussed, which could stimulate prosperity by reducing the obesity epidemic.

Keywords: *obesity, prevalence, meta-analysis, cost of illness approach, health-claims, regulatory policies*

Introduction

Obesity is one of the biggest drivers of preventable chronic diseases and healthcare costs worldwide. More than 2.1 billion people, or almost 30% of the global population are overweight or obese (Ng et al. 2014). The obesity issue is likely to worsen if the current trend continues—by 2030 it is estimated that almost half of the world's adult population will be overweight or obese (Kelly et al. 2008). In 2016, total health expenditure in Canada was about $228 billion, or $6,299 per person, representing 11% of Canada's GDP (CIHI 2017). It is no doubt that this crisis is not just a pressing health concern but also a threat to the global economy, and it requires immediate attention. This paper quantifies the potential benefits arising from the reduction of obesity incidents, potentially from weight reductions measures. The paper also attempts to analyse the potential benefits of obesity interventions measures like health claims on food products. The analysis provides context for a discussion of the potential regulatory policies and initiatives to address the obesity epidemic.

The increasing health care cost burden, morbidity rates, and mortality rates in Canada and other developed countries resulting from preventable diseases are a cause for great concern (CIHI 2013, WHO 2003). A significant number of these preventable health risk diseases are diet related. As a result of changing dietary and lifestyle patterns, certain diseases like obesity, hypertension, diabetes mellitus,

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cardiovascular disease (CVD), and many others have become increasing causes of disability and premature deaths (WHO 2003).

Mounting evidence on awareness of the strong correlation between diet and health, coupled with increasing cost of health care in Canada have kindled interest in functional foods (Malla et al. 2013)[1,2]. Governments, policy makers, and interest groups are now focusing attention on the promotion of functional foods (Health Canada 2009). Health Canada has approved the use of 16 health claims on functional foods and food products since the year 2000[3]. For example, in 2014 Health Canada approved a health claim that consumption of ground whole flaxseed would lower blood cholesterol[4]. It has been shown that excess consumption or absence of certain vital nutrients in our daily diets is the main cause of most of the preventable diseases (Health Canada 2012). Obesity, which is a preventable health risk disease, has been shown to be a major public health issue in Canada (e.g., Godin et al. 2015, Katzmarzyk et al. 2001, Roberts et al. 2012). Increased calorie consumption is positively associated with obesity (e.g., Fontana et al. 2007, Redman et al. 2007). Cutler et al. (2003) suggested that increasing obesity incidence in the U.S. could be attributed to increased caloric intake.

Obesity has been shown to be a primary risk factor to quality of life in terms of morbidity and mortality (e.g., Edwards 2007, Katzmarzyk et al. 2001). Studies have also shown that obesity is the major risk factor for diseases such as heart disease and diseases of pulmonary circulation, cancer, cerebrovascular diseases (such as hypertension and stroke), and diabetes (e.g., Alter et al. 2012, Birmingham 1999, Tan 2011). Luo et al (2007) estimated the number of deaths due to obesity in Canada in 2004 to be 8,414[5]. Katzarzyk (2001) estimated that 13.5 percent of the deaths recorded in Canada in 2001 could have been avoided in the absence of obesity.

Birmingham (1999) estimated that the direct cost of obesity in Canada in 1997 to be $1.8 billion, a figure representing 2.4 percent of the total health care expenditure in that year. In 2005, the total cost of obesity was $4.3 billion (Public Health Agency of Canada 2009). In 2008, the cost of obesity was estimated to be $4.6 billion (Public Health Agency of Canada 2011). This figure is regarded as a very conservative estimate since only eight of the diseases closely linked to

[1]Health Canada defines functional foods as "a food similar in appearance to, or may be a conventional food, is consumed as part of a usual diet, and is demonstrated to have physiological benefits and/or reduce the risk of chronic disease beyond basic nutritional functions" (Health Canada 1998).

[2]See Hobbs et al. (2014) for in-depth analysis and discussion of functional foods across a number of countries.

[3]The generally accepted definition of health claims in Canada is "any representation in labelling or advertising that states, suggests, or implies that a relationship exists between consumption of a food or an ingredient in the food and a person's health" (Health Canada 2012).

[4]For more details and complete list of approved health claims in Canada, see http://hc-sc.gc.ca/fn-an/label-etiquet/claims-reclam/assess-evalu/index-eng.php.

[5]It is important to note that there is a significant difference between the methods used in both years so care must be taken when comparing the year 2000 figure to the 2004 figure. For example, while the 2004 study was based on all adult deaths, the 2000 study was based on deaths up to 65 years.

obesity were taken into consideration. In 2006, a similar study that included the costs of 18 chronic diseases closely linked to obesity, found the total cost of obesity to be about $7.1 billion (Public Health Agency of Canada 2011). The rate of increase in health care expenditure in Canada was 7 percent per year from 2000 to 2010 (CIHI 2013). With continuous increases in health care costs, morbidity and mortality, it is important to put in place measures that minimize—if not eliminate—the incidence of obesity in Canada.

Several clinical studies have assessed the effects of calorie restriction on human body composition and weight using mainly controlled trials.[6] Other studies have assessed the effects of measures like investments in research and development (R&D), subsidies and taxes on obesity incidence (e.g., Alston et al. 2013, Cash et al. 2005, Leicester and Windmeijer 2004, Rickard et al. 2013, Mytton et al. 2007, Tiffin and Arnoult 2011). Although some studies have assessed the effects of health claims on other diseases like cholesterol levels and coronary heart disease (CHD) (e.g., Malla et al. 2016), a lot still remains to be done on the direct impacts of government-regulated health claims on obesity incidence in Canada.

It is important to empirically examine the effects of calorie restriction on obesity incidence using actual nationwide Body Mass Index (BMI) data, and further calculate the associated health-related cost savings. This study uses an integrated approach to examine the effect of calorie restriction on obesity/ overweight prevalence and the associated health care savings and related regulatory policies. In addition, this study analyses how implementation of government policies and regulations could help reduce obesity incidence, thereby resulting in a reduction of health care expenditures in Canada. Several other policy options and their implications are discussed.

The paper begins by describing the current situation with respect to regulatory policies and obesity, including discussion of functional foods, health claims, and consumers' responses. Estimates are made of the potential savings in health-related costs from potentially allowing health claims on low calorie diets and obesity. The analysis features a set of scenarios (base, low, and ideal) with different assumptions about weight loss, health impacts, and the relationship between obesity prevalence and health costs. These scenarios provide insights into the relative magnitude of potential health benefits, and explore the sensitivity of the results to key assumptions. A discussion of policy implications closes the paper.

This integrated approach allows us to systematically, consistently, and broadly analyse the issue of obesity and make policy recommendations that could significantly contribute to the reduction of the obesity epidemic. The study uses available Canadian data, but the findings are applicable to other constituencies as well. As former World Health Organization (WHO) Director-General Margaret Chan noted: "Not one single country has managed to turn around its obesity epidemic in all age groups" (WHO 2013). Obesity has become a big public health

[6]For example, Civitarese et al. 2007, Colman et al. 2009, Fontana et al. 2004, Fontana et al. 2007, Guarente and Picard 2005, Heilbronn et al. 2006, Kok et al. 2005, Larson-Meyer et al. 2006, Racette et al. 2006, Redman et al. 2007, Redman et al. 2009, Villareal et al. 2006, Weiss et al. 2007.

problem worldwide, a crisis that is not just a pressing health concern but a threat to the global economy as well. Hence, tackling obesity requires more sustainable obesity related research and policy analysis as well as a coherent, sustained portfolio of initiatives, potentially implemented on a large scale.

Regulatory Policies and Obesity

Functional Foods and Health Claims

Health Canada acknowledges that diets can alter one's risk of developing or aggravating certain chronic health conditions (Health Canada 1998). The increasing economic burden of some diet related preventable diseases and the mounting evidence of the strong correlation between diet and health have attracted several policy responses from the government and other stakeholders (Health Canada 1998). Such responses have included mandatory nutrition labelling and the promotion of functional foods and health claims. Functional food consumption has the potential to improve well-being and reduce health care cost. There is no generally accepted definition for functional foods around the world. However, Health Canada (1998) defines functional food as "*a food similar in appearance to, or may be a conventional food, is consumed as part of a usual diet, and is demonstrated to have physiological benefits and/or reduce the risk of chronic disease beyond basic nutritional functions*"[7].

Great efforts are being made to create awareness of the benefits of the nutrient content of foods such as the use of health claims. The main aim of these measures is to facilitate healthy eating choices that will, in the long run, translate into a healthier population and a reduction in steadily increasing health care costs (Malla et al. 2013).

A health claim on foods establishes a relationship between good health and the consumption of a food or food product. The generally accepted definition of a health claim in Canada is "*any representation in labelling and advertising that states, suggests, or implies that a relation exist between the consumption of food or food constituent and health*" (Health Canada 2012). According to Health Canada, health claims can take two main forms: generic claims and product specific claims[8]. Health Canada categorizes health claims into four main groups[9]: therapeutic, disease risk reduction, functional claims, and general health claims[10]. The Food and Drug Act governs health claim usage on food and food products. Before a new health claim is approved and allowed to be used, a petitioner must apply to Health Canada and provide scientific evidence backing the claim. The

[7]An example of a functional food is food high in fibre, which is noted for reducing one's risk of developing certain types of cancer.

[8]Generic claims can be used on any food item—if the item meets the criteria set out for the use of that claim—while product specific claims cannot be used for any food unless that specific food carrying the claim has undergone registration and enough supporting evidence has been provided.

[9]For more detailed discussion please see Hobbs et al. 2014.

[10]Functional claims were formerly known as structural/functional claims.

evidence submitted by the petitioner is evaluated using three main criteria: causality, generalizability, and quality assurance (Health Canada 2009). The causality criterion requires applicants to provide evidence establishing that the consumption of the food influences health outcomes. This is done mostly by providing human-based studies that establish a clear link between the consumption of the food and health. The generalizability criterion requires that the claim must be meaningfully generalizable to the broader population or a segment of the population. Lastly, the food on which the claim is used must conform to quality standards. If the claim is on a novel food, then a separate application for the novel food must be submitted either prior to, or with, the health claim application (Health Canada 2009)[11]. It is important to note that health claims that place the food under the definition of a drug needs pre-market approval and a regulation amendment (Health Canada 2009).

Health Claims and Consumer Responses

We begin by establishing a link between the use of health claims and the consumption of healthy diets. Specifically, we assert that the introduction of a health claim on low calorie diets and reduction in obesity will significantly encourage the consumption of low-calorie diets and discourage the consumption of high calorie diets. This assertion is based on the findings from numerous scientific/nutrition studies that suggest a strong correlation between the consumption of healthy (i.e., low calorie) foods and improved health; and, also, the findings from a comprehensive review of studies on health claims and consumer demand. In 2002, a joint WHO and FAO expert consultation on Diet, Nutrition and the Prevention of Chronic Diseases identified diet and lifestyle changes to be significantly related to the increasing epidemic of chronic diseases in the world (WHO 2003). Per the consultation, not only will changes in one's diet affect a person's present health conditions, it will also affect that person's future chances of developing any of the chronic diseases (like cancer, diabetes, etc.).

Health claim usage has been shown to significantly improve the understanding of the relationship that exists between diet and health (e.g., Barreiro-Hurlé et al. 2010, Williams 2005). Several studies found that consumers value health claims and health information that link the consumption of healthier foods or food constituents to reduced risk of certain diseases (e.g., Brown and Schrader 1990, Levy and Stokes 1987, Moon et al. 2011, Williams 2005). In addition, evidence suggests that consumers are willing to pay price premiums for the benefits they derive from healthy or health-enhancing food products (e.g., Barreiro-Hurlé et al. 2008, Larue et al. 2004, Marette et al. 2010, Maynard and Franklin 2003, Milligan et al. 2010, Teratanavat and Hooker 2006, West et al. 2002). The paragraph below provides evidence of instances where the introduction/promotion of health information/health claims resulted in an increase (decrease) of healthy (unhealthy) food products.

[11]According to Health Canada novel foods are foods that have been produced through new processes, that do not have a history of safe use as a food, or that have been modified by genetic manipulation (Health Canada 2020).

Ippolito and Mathios (1991) examined the market of ready-to-eat cereals for the periods preceding and after a ban on health claims usage on cereal products in the US. The authors found that in addition to the improvement of consumer awareness of the link between fibre consumption and development of cancer, there was a significant increase in fibre cereal consumption after the ban on the health claim was lifted. There was a significant shift of market share towards high-fibre cereals when health claim usage was allowed[12]. Lalor et al. (2011) examined how health claims on foods influence peoples' reactions towards those foods. It was observed that health claims had a significant impact on the purchasing power of the elderly, women with young children, and people with close friends/relatives suffering from certain diseases. Aschemann-Witzel and Hamm (2010) found that consumers preferred food products with health claims and nutritional information to those without. Consumers who purchased food products with health claims perceived the food to be much healthier than similar foods without health claims. Levy and Stokes (1987) empirically examined the influence of a claim linking the consumptions of foods rich in fibre and the prevention of certain types of cancer. Findings from the study suggested that Kellogg Company's campaign to promote the health claims led to a significant shift in market share from non-high fibre cereals to high-fibre cereals[13]. Brown and Schrader (1990) used a cholesterol information index to assess the impact of cholesterol information on the demand for shell eggs in the US[14]. Cholesterol information led to a decrease in per capita shell egg consumption from 16% to 25%. A positive interaction was observed between egg price and cholesterol, which suggested a reduction in absolute price elasticity of shell eggs resulting from availability of cholesterol information. Kozup et al. (2003) argued that health claims can have a significant impact on product attitudes and purchase intentions even in the absence of nutritional information and suggested that if health claims can be justified, their usage could be very beneficial to restaurants.

Although the studies discussed above provide evidence of a significant link between health claim usage and foods that carry the claim, it must be noted that having the health claims alone might not necessarily yield the required results. It is necessary that the claims have the endorsement of a trusted authority like the government (Wansink and Cheney 2005). Furthermore, the success of the health claim also depends on specific efforts aimed at promoting the awareness of the claim—the link between good health and consumption of the foods that carry the claims (Aschemann-Witzel and Hamm 2010).

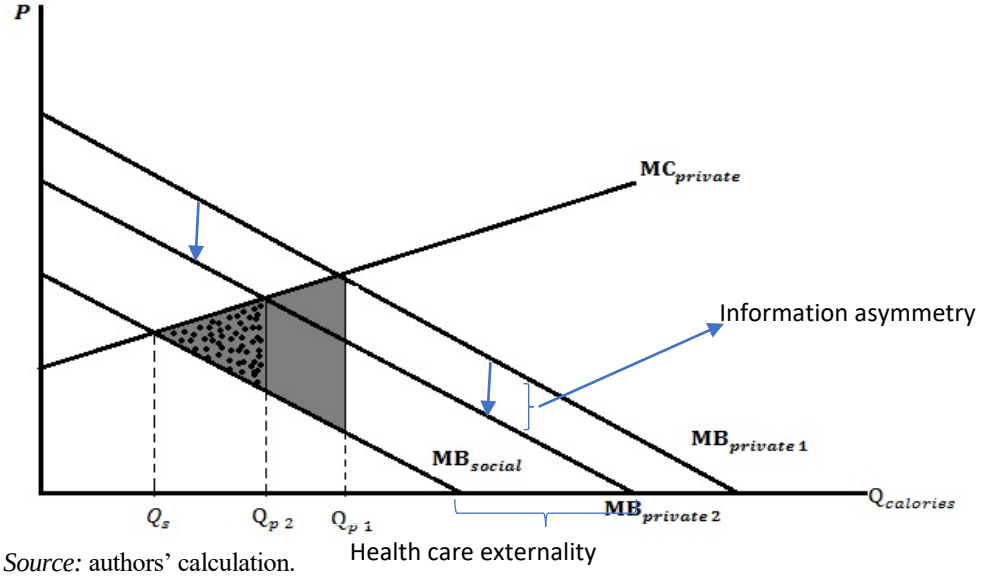
[12]Weighted fibre content increased by 7% after the health claim was allowed (i.e., an increase from 1.64 grams per ounce in 1978–1984 to 1.75 grams per ounce in 1985–1987).

[13]There was a progressive increase in the market share of high-fibre cereals during the entire 48 weeks of assessment. Twenty-four weeks into the campaign, there was also a sharp increase in the market share of Kellogg company's All-Bran product (which is very rich in fibre). An increase of market share from 0.99% to 1.46% was recorded (i.e., representing a relative increase of 47%). The sales of other high-fibre products of Kellogg Company rose by 0.3%, which represented a relative increase of about 14%.

[14]The study defined cholesterol information as the relationship between the presence of cholesterol in diet and the development of arterial diseases—diseases associated with high blood cholesterol.

Considering obesity, mounting evidence suggests that there is a strong link between calorie restriction and weight loss (e.g., Fontana et al. 2007, Redman et al. 2007, Redman et al. 2009, Weiss et al. 2007). Figure 1 graphically depicts the impact of health claims on the consumption of unhealthy diets— in this case the consumption of high calorie diets. The publicly funded nature of the health care system in Canada and many other countries leads to a moral hazard problem whereby individuals might not make private diet choices that are socially optimal as the consequences of such poor diet choices are borne by others. This implies that people might tend to under-consume healthy foods and over-consume unhealthy foods. A negative externality is created when an individual or group of people making poor diet choices fails to fully pay for the cost of their actions (Alston et al. 2012, Elston et al. 2010, Strand 2005). According to Elston et al. (2010), a significant portion of the expenditure on publicly funded health insurance programs goes towards obesity related costs.

Figure 1. *Impact of Health Claims on the Intake of High Calorie Diets*



Source: authors' calculation.

The health benefits from functional foods cannot be easily evaluated by consumers without labelling. In the absence of health information on food products that inform consumers of the benefits or dangers of the nutritional contents of foods, individuals have less incentive to make socially optimal diet decisions. Consumers might not even know the health benefits/costs of the food. Individuals might consider only the immediate satisfaction ($MB_{private\ 1}$) derived from making such diet choices (consumption of high calorie diets) without having full information of the benefits/costs associated with the food. Studies suggest that some consumers might not act rationally in their diet choices since they place more importance on the satisfaction they get from excess calorie consumption and neglect the long-term implications on their health (Ananthapavan et al. 2014, Alston et al. 2012, Efrat and Efrat 2012, Swinburn, et al. 2011, Cawley 2010, Moodie et al. 2006). Loewenstein et al. (2007) and Alston et al. (2012) suggest

that individuals place higher weights on present benefits; therefore, they easily rationalise that the immediate satisfaction from their diet choices exceeds the long-term cost of such choices. According to Efrat and Efrat (2012), not all individuals can be considered as free agents when it comes to matters concerning their diet choices (e.g., children are not able to make rational diet decisions). Likewise, because of physiological, self-control, and cognitive challenges, some adults also are not able to make healthy diet choices.

It is sometimes argued that there is abundant health information on the risk of excessive calorie intake and obesity. However, comparing the level of health information provided by food manufacturers and suppliers to that provided by the government shows a significant difference. Information from the government is significantly less (Efrat and Efrat 2012). Since food manufacturers and suppliers are driven by the profitability of their activities, the information they provide may not necessarily be in the best interest of the consumer (Cawley 2004). Furthermore, evidence suggests that mere access to this information does not necessarily guarantee that consumers will be able to fully understand or interpret the information to serve as guidance for their diet decisions (Rothman et al. 2006).

Considering the market failures that result from health care externalities, irrational consumer behaviour, and information asymmetry, it is important that some form of government intervention be introduced. If the government approves and promotes the use of a health claim on low calorie diets and obesity, it is expected that some consumers will revise their preference for high calorie diets and switch to a lower calorie one. Although consumers might not pay directly the full cost of poor diet choices, their utility for high calorie diets could be reduced when they become more aware of the health risks and costs of high-calorie diets and the benefits of low-calorie diets. In addition, the approval of a health claim by a credible source like the government will boost consumer confidence in the message that the health claim carries. Thus, the marginal private benefit curve will shift from $\mathrm{MB}_{private\ 1}$ to $\mathrm{MB}_{private\ 2}$ corresponding to a reduction in caloric intake from $\mathrm{Q}_{p\ 1}$ to $\mathrm{Q}_{p\ 2}$ (in Figure 1). This will also lead to a reduction in the loss to society (DWL) from the gray shaded area to the dotted area. Although the health claim could reduce the private optimal quantity closer to the socially optimal, further stricter policies would be needed to reach the socially optimal level (Q_s). This is because even in the presence of health information, consumers might still not consume at the optimal level because of the existence of health care externalities.

Therefore the literature suggests that health claims for low calorie diets should lead to a reduction in calorie intake, consistent with the expectation that credible health claims reduce the consumers' information problem. In this context, if it helps bolster consumer confidence, the regulatory landscape governing health claims might facilitate the establishment of credible health claims by the private sector. We now turn to an evaluation of the prevalence and determinants of obesity and of the economic benefits of the low calorie diets health claims.

Methods of Analysis

Cost of Illness approach is used to estimate the potential economic benefits of improved health resulting from obesity intervention policy in Canada[15]. The COI approach generates relatively conservative estimates and has some precedence in the literature. The COI approach is considered an effective analytical tool to estimate health-related cost savings (e.g., Gray et al. 1998, Gyles et al. 2010, Malla et al. 2007, Malla et al. 2016).

The analysis is summarized in three steps. First, if the approval of health claims for low calorie diets encourages reduction in caloric intake, the potential weight loss in the population is estimated. These estimates are based on an extensive review of the scientific literature measuring the effects of calorie restriction on individuals' weight and insights from a review of consumer literature. Second, the reduction in obesity prevalence due to restriction of calories in the daily diets of individuals is estimated, based on simulations of the dataset. Finally, the reductions in health-related costs from the reduced prevalence of obesity are estimated. These estimates are based on available data and peer-reviewed scientific literature. A "Base" scenario set of estimates is provided, along with a sensitivity analysis around the core assumptions to give "Low" and "Ideal" scenarios.

Step 1: Calorie Restriction and Weight Loss

Step one estimates the potential weight loss that will result from reduced caloric intake. We conducted a meta-analysis of medical/nutrition literature that was based on dietary intervention studies (human controlled clinical trials). Clinical trials on the influence of calorie restriction (CR) on human body composition have suggested that the reduction of caloric intake has a non-trivial influence on the weight of people who practice it (e.g., Fontana et al. 2007, Redman et al. 2007, Redman et al. 2009, Tsai and Wadden 2006, Villareal et al. 2006, Weiss et al. 2007). The restriction of calories in one's diet takes two main forms: low-calorie diets (LCD) and very low-calorie diets (VLCD). LCD is the restriction of caloric intake to about 800–1500 kcal/day while VLCD is the restriction of caloric intake to about 250–800 kcal/day (Initiative 1998). Findings from studies suggest that the effects of both interventions on weight loss after a year are not significantly different from each other (Wadden et al. 1994).

To estimate the weight loss resulting from restricting one's caloric intake, a meta-analysis of several human clinical studies assessing the impact of CR on weight was conducted. A computer search of *Medline (via OVID)* was conducted with the key words "calorie restriction" and "weight loss" or "weight reduction".

[15]Other methods to estimate the cost of illness that have been used by other researchers include Willingness to Pay (WTP), the Disability-Adjusted Life Years approach (DALY), Quality-Adjusted Life Years (QALYs), Cost Benefit Analysis, Healthy Years of Life Gained (HYLG), and Cost-Utility (cost effectiveness). While acknowledging that other methods could be used to estimate health-related cost savings, considering the nature of analysis to be conducted and the data available, the most suitable method is a variation of the COI approach.

Moreover, an extensive search of the references of relevant studies was performed. The main criterion used for accepting and including studies into the meta-analysis was that the weight intervention should include at least one form of calorie restriction in diets. This reduces the possibility of including studies where weight loss was achieved accidentally, or CR was not the intended intervention. Table A.1 in Appendix 1 gives a detailed presentation of the findings from the meta-analysis. The available results suggest that, on average, CR will result in 10.61 percent ± 1.42 percent loss in weight within a period of one year.

Based on peer-reviewed evidence of strong correlation between health claims/health information promotion and consumer demand for healthy food products, it can be inferred that if the necessary attention is given to the health claim on low calorie diets and obesity, the intake of calories could be significantly reduced. The analysis is based on clinical trials' recommended levels for calorie restriction and the associated weight loss estimates, as well as a review of consumers' economics literature.

Step 2: Reduction in Obesity Prevalence Resulting from Weight Loss

Step two involves estimating the reduction in obesity prevalence from the restriction of calories in the daily diets of individuals. A weight reduction simulation was performed on the dataset to observe the effect of the estimated weight loss in step one on obesity prevalence in Canada. In other words, the study ran a simulation of the dataset to observe the changes to obesity prevalence in Canada if overweight or obese people were to reduce their weight by 10.61 percent ± 1.42 percent. To simplify the analysis, the estimated weight loss was rounded to 10 percent. To evaluate the corresponding reduction in obesity prevalence resulting from reduced intake of high calorie diets, the weight loss estimate in step one was deducted from the actual weights of Canadians who are either overweight or obese. The BMI of everyone in the dataset was then recalculated to evaluate the "new" prevalence of obesity in Canada resulting from the estimated weight reduction. The new obesity prevalence estimate was then compared to the obesity prevalence prior to the imposition of the weight reduction restriction to evaluate the reduction in obesity prevalence associated with the reduction of caloric intake. To ensure robustness of the estimate, the analysis was repeated by considering another scenario. A modest weight loss of 5 percent was used to re-run the simulation. According to the U.S Food and Drug Administration (FDA), a weight loss of even 5 percent is considered as clinically significant (Moyer 2012).

Step 3: Health-related Cost Savings Resulting from Reduction in Obesity Prevalence

The final step in the analysis is to estimate the potential health-related cost savings to Canada resulting from calorie restriction. In 2006, obesity was estimated to cost Canada a total of $7.1 billion (Public Health Agency of Canada 2011). Out of this amount, $3.2 billion was in direct cost, while the remaining $3.9

billion was indirect[16]. In order to estimate the potential health-related cost savings, the 2006 obesity cost estimate was adjusted to reflect current monetary values. The consumer price index for health and personal care data from Statistics Canada was used to adjust the 2006 estimate of $7.1 billion to a 2018 level of $8.44 billion (Statistics Canada 2019). A similar adjustment of disease cost was done by Gyles et al. (2010) and Malla et al. (2016).

To estimate the potential health-related cost savings, we established the relationship between reduction in obesity prevalence and reduction in health care expenditure on the disease. Although a reduction in prevalence will result in a reduction in cost, the magnitude of the change in health care expenditure that would result from reduction in overweight/obesity prevalence is unclear. We consider different scenarios to estimate the potential health-related savings. The first scenario, "Ideal", assumes an optimistic relationship between reduction in prevalence and health-related cost savings. It is assumed that there is a linear 1:1 relationship between reduction in the incidence of a disease and health-related cost savings (i.e., a 1 percent reduction in the prevalence of obesity will result in a 1 percent reduction in cost). This is consistent with the approach used in Gray et al. (1998), Malla et al. (2007) and Malla et al. (2016).

A second scenario, "Base", was considered where the various cost components of the disease (direct cost: hospital care, physician, drugs, all other health costs; and indirect costs) were taken into consideration in establishing the relationship between changes in prevalence and changes in health cost savings (a similar approach was used by Gyles et al. 2010)[17]. Table A.2 in Appendix 2 provides a summary of the percentage reduction in the various components of health care cost resulting from a 1 percent reduction in obesity prevalence. To make the analysis comparable to the "Ideal" case scenario, a weighted average of the percentage reductions in the various components of obesity cost resulting from a 1 percent reduction in the prevalence of obesity is evaluated[18]. This gives a 1:0.83 relationship between reduction in disease prevalence and reduction in health care expenditure. That is, a 1 percent reduction in the prevalence of obesity will result in a 0.83 percent reduction in health care expenditure on the disease. In evaluating the weighted average, we used the total cost of each obesity cost component as its respective weight. The evaluated weighted average was then used to estimate the total health-related cost savings corresponding to the total percentage reduction in obesity prevalence.

Finally, a third scenario, "Low", which considers a more conservative relationship between reduction in disease prevalence and health-related cost savings was examined. The "Low" scenario assumes that there is a 1:0.5 relationship between reduction in the incidence of a disease and health-related cost savings (i.e., a 1 percent reduction in the prevalence of obesity would result in a 0.5

[16]Direct cost includes hospital care expenditure, physician services, drug cost, health research cost, cost of services of other health professionals, and other health care cost. The indirect cost is mainly the cost incurred due to productivity loss resulting from mortality and morbidity (Public Health Agency of Canada 2014).

[17]For more details on "Base" scenario calculations, see Appendix 3.

[18]The expenditure incurred on each component of the total health cost is used as its weight.

percent reduction in health-related cost). In summary, the scenarios are based on a wide-ranging set of assumptions and the results will necessarily be sensitive to these assumptions. Where possible the assumptions are based on insights from peer-reviewed scientific literature. To ensure the estimates are as robust as possible, and consistent with previous studies using the COI method (e.g., Gray et al. 1998, Gyles et al. 2010, Malla et al. 2007, Malla et al. 2016), different scenarios provide a range of outcomes.

Data

Different sources of data were used for different aspects of the analyses. For the estimation of obesity prevalence, confidential micro-level data from the 2015 Canadian Community Health survey (CCHS) provided by Statistics Canada were used. Furthermore, a combination of data from the 2015 CCHS and data obtained through reviews of medical and nutritional literature based on human clinical trials was used to perform the weight reduction simulation. The 2015 CCHS data were based on measured heights and weights. It has been shown that data based on self-reported heights and weights tends to underestimate the prevalence of obesity (Bélanger-Ducharme and Tremblay 2005, Goldman et al. 2011, Le Petit and Berthelot 2005, Tjepkema 2006, Torrance et al. 2002).[19] A possible explanation of this problem is that people are more inclined to increase their height estimates and reduce their weights when self-reporting (Tjepkema 2006). Hence, it is essential to use data based on measured heights and weights.

Even though more recent versions of the CCHS are available, this study uses only the 2015 CCHS. The decision was made based on two main reasons— the annual versions provide data on mostly self-reported heights and weights of Canadians and the focus of the data is not on nutrition. The 2015 CCHS dataset compiled information from all 10 provinces in Canada focusing on people aged 1 and over. A total of 20,487 people were sampled. The sampling strategy used ensured that the data fairly represented the Canadian population. Among the groups of people excluded from the study are people under the age of 18 years, full-time members of the Canadian Forces, people living in the Territories, First Nation Reserves or Crown Lands, in prisons or care facilities and some remote areas. The final sample sized after eliminating individuals with only self-reported heights and weights, non-responses and missing information was 9,300. The study made use of the sampling weight provided by the 2015 CCHS.

[19]The comparison of the 1978–1979 Canada Health Survey (measured data) to the 1981 Canada Fitness Survey (self-reported data) by Torrance et al. (2002) indicated that, while the latter reported the percentage obese to be 9 percent, the former reported the percentage of people obese to be 13 percent. Moreover, comparing the 1988 Campbell Survey on Well-Being (self-reported data) with the 1986–1992 Heart Health Survey (measured data) also revealed that the percentage of people obese was 10 percent and 14 percent respectively. In addition, the estimated percentage of Canadians obese in 2003 (estimate based on self-reported heights and weights) was 15.2 percent, which is significantly below the 2004 estimate of 23.1 percent, which was based on measured heights and weights (Tjepkema 2006).

Results

Two main results from the COI analysis are presented in this section. The first part of this section presents findings from the weight loss simulations resulting from possible implementation and promotion of the health claim on "low calorie diets and obesity". The second part presents the results of the potential health-related cost savings estimations corresponding to the evaluated reductions in obesity prevalence. Various cases were considered in evaluating the potential reduction in obesity prevalence resulting from a weight loss simulation of the 2015 CCHS dataset. The cases considered include 10 percent and 5 percent weight loss simulations performed on 100 percent, 60 percent, and 30 percent of overweight and obese individuals in the 2015 CCHS to estimate the potential reductions in obesity prevalence in Canada. Table 1 gives the details of 10 percent and 5 percent weight loss simulations on all persons overweight or obese. The process was repeated by performing the simulation on 60 percent and 30 percent randomly selected individuals who are overweight or obese, respectively. The simulation on the randomly selected people was repeated several times to estimate the final overall impact of the 5% and 10% weight loss.

Table 1. *Simulation Results after Weight Loss Estimate is Applied to Overweight and Obese Individuals*

Prevalence of overweight and obesity after weight loss is applied to all persons overweight or obese						
Percentage Weight Loss	Prevalence before weight loss		Prevalence after weight loss		Percentage change in prevalence	
	Overweight %	Obesity %	Overweight %	Obesity %	Overweight %	Obesity %
5%	35.24	26.97	32.14	20.01	-9	**-26**
10%	35.24	26.97	26.55	14.55	-25	**-46**
Prevalence of overweight and obesity after weight loss is applied to 60% randomly selected individuals who are overweight or obese						
5%	35.24	26.97	33.29	22.84	-6	**-15**
10%	35.24	26.97	29.64	19.53	-16	**-28**
Prevalence of overweight and obesity after weight loss is applied to 30% randomly selected individuals who are overweight or obese						
5%	35.24	26.97	34.34	24.87	-0.3	**-8**
10%	35.24	26.97	32.51	23.21	-8	**-14**

Source: authors' calculation.

Table 1 shows that by imposing a 10 percent weight loss restriction on all persons overweight or obese, overweight and obesity prevalence reduces from 35.24 percent to 26.55 percent and 26.97 percent to 14.55 percent, respectively. This results in a reduction of the overweight and obesity prevalence by 25 percent and 46 percent, respectively. Similarly, after imposing a 5 percent weight loss restriction on the data, overweight and obesity prevalence reduces from 35.24

percent to 32.14 percent and 26.97 percent to 20.01 percent, respectively. That is, overweight and obesity prevalence reduces by 9 percent and 26 percent, respectively.

To test the sensitivity of these results, we relaxed the assumption that the health claims will be successful in persuading all overweight and obese persons to reduce their weight (i.e., 100 percent success rate). Assuming a 60 percent success rate of the health claim, we repeatedly and randomly selected 60 percent of the overweight and obese people to apply 5 and 10 percent weight loss restrictions on them. Overweight and obesity prevalence were reduced by 16 percent and 28 percent, respectively, after a weight loss restriction of 10 percent was imposed. Similarly, a 5 percent weight loss restriction resulted in overweight and obesity prevalence reduction of 6 and 15 percent, respectively.

Finally, the process was repeated by considering a more conservative success rate of a health claim. After a weight loss of 10 (5) percent was randomly and repeatedly applied to 30 percent of the overweight and obese people, overweight and obesity prevalence were reduced by 8 percent and 14 percent, respectively (3 percent and 8 percent, respectively).

Potential Health-Related Cost Savings Resulting from the Reduction in Obesity Prevalence

The results from all three scenarios of the simulations are presented in Table 2 (i.e., the situation where the weight loss simulations are performed on all, 30%, and 60% of people overweight or obese). When a 10 percent weight loss simulation was performed on all overweight or obese persons, the potential health-related cost savings for the ideal, base, and low scenarios are $3.89 billion, $3.23 billion, and $1.94 billion, respectively. Similarly, when a 5 percent weight loss simulation was performed on all overweight and obese persons, the potential health-related cost savings for the ideal, base, and low scenarios are $2.18 billion, $1.81 billion, and $1.09 billion, respectively. Moreover, when a 10 percent weight loss simulation was performed on 60 percent randomly and repeatedly selected overweight or obese individuals from the dataset, the potential health-related cost savings for the ideal, base, and low scenarios are $2.33 billion, $1.93 billion, and $1.16 billion, respectively. Likewise, when a 5 percent weight loss simulation was performed on 60 percent of individuals, the potential health-related cost savings are $1.29 billion, $1.07 billion, and $650 million for the ideal, base, and low scenarios, respectively. Finally, when a 10 (5) percent weight loss simulation was performed on 30 percent randomly and repeatedly selected overweight/obese individuals, obesity health-related cost reduces by $1.18 billion, $980 million, and $590 million ($660, $550, and $330 million), respectively.

The results are summarized in three main scenarios and presented in Table 3. Obesity health related cost of $3.89 billion could be saved if "all" individuals overweight/obese lose 10 percent of their weight, based on an optimistic assumption that a 1 percent weight loss would result in a 1 percent reduction in obesity health related cost. Similarly, for the base/expected scenario, $1.93 billion in health-related cost could be saved, if "60%" of individuals (overweight/obese)

lose 10 percent of their weight, based on 1:0.83 ratio between prevalence change and cost. Lastly, regarding the pessimistic or very conservative scenario, health related cost savings could be $330 million if "30%" of overweight/obese individuals lose 5% of their weight, given a prevalence change to cost ratio of 1:05. In summary, health related cost savings due to the reduction of obesity/ overweight prevalence, potentially due to implementation/promotion of health-information/health-claims on "low calorie diets and obesity", could be very significant and could be projected to amount to $1.93 billion (base case/expected).

Table 2. *Health-Related Cost Savings Estimation*

Reduction in health-related cost after weight loss is applied to all persons obese/overweight								
Scenario	Percentage reduction in obesity prevalence as a result of:		Total health care cost of obesity in Canada (billion CAD $)	Relationship between change in prevalence and cost	Percentage reduction in health care cost as a result of:		Total reduction in health expenditure on obesity as a result of: (billion CAD $)	
	5% weight loss	10% weight loss			5% weight loss	10% weight loss	5% weight loss	10% weight loss
Low	26	46	8.44	1:0.5	13	23	1.09	1.94
Base	26	46	8.44	1:0.8	21	38	1.81	3.23
Ideal	26	46	8.44	1:1	26	46	2.18	**3.89**
Reduction in health-related cost after weight loss is applied to 60% randomly selected individual who are obese/overweight								
Low	15	28	8.44	1:0.5	8	14	0.65	1.16
Base	15	28	8.44	1:0.8	13	23	1.07	**1.93**
Ideal	15	28	8.44	1:1	15	28	1.29	2.33
Reduction in health-related cost after weight loss is applied to 30% randomly selected individual who are obese/overweight								
Low	8	14	8.44	1:0.5	4	7	**0.33**	0.59
Base	8	14	8.44	1:0.8	6	12	0.55	0.98
Ideal	8	14	8.44	1:1	8	14	0.66	1.18

Source: authors' calculation.

Table 3. *Summary of Cases/Scenarios of Health-Related Cost Savings*

Groups	**Cases/Scenarios**	**Health care savings**
Optimistic	All individuals overweight/obese + 10% weight loss simulation + 1:1	$3.89 billion
Expected	60% randomly and repeatedly selected overweight/obese individuals + 10% weight loss simulation + 1:0.83	$1.93 billion
Pessimistic	30% randomly and repeatedly selected overweight/obese individuals + 5% weight loss simulation + 1:0.05	$330 million

Source: authors' calculation.

Policy Implication

Findings from this study confirmed that implementation and promotion of a health claim on low calorie diets and obesity as an intervention policy to tackle the obesity menace could have significant implications on consumption of calories, obesity incidence, and health care expenditures in Canada. Our findings suggest that obesity incidence could be reduced by 8 to 46 percent if the health claim were implemented and promoted. Accordingly, health care expenditures could be reduced by a base amount of $1.93 billion, ranging between $330 million and $3.89 billion. Therefore, attention should be given to the health claim and, if possible, implemented and promoted.

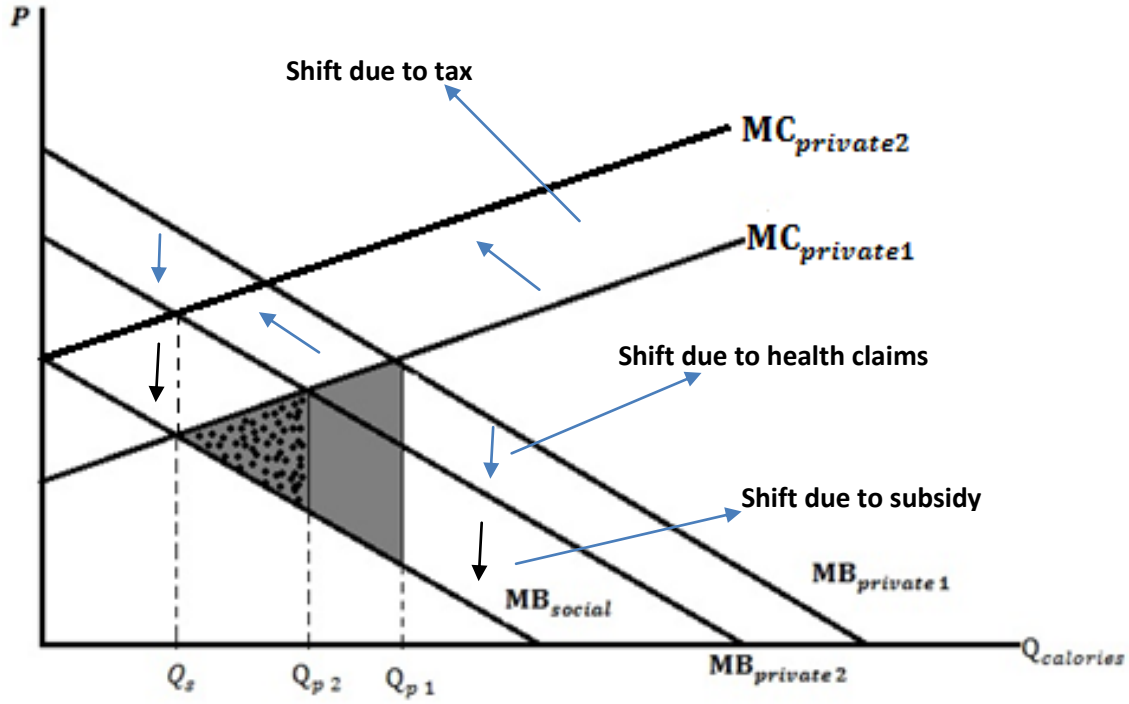
Three main types of market failures could be associated with the problem of obesity: information asymmetry, irrational consumer behaviour, and health care externalities. While education of the general populace and the introduction and promotion of health claims on low calorie diets and obesity could address the problem of information asymmetry and irrational consumer behaviour, policies such as subsidies and taxes could address the problem of the health care externalities. The existence of these three types of market failures provides an economic justification for the government to introduce stronger policies like taxes on high calorie foods and subsidies on low calorie foods. Information on both the health benefits and the potential public health-related cost savings could provide further bases for such intervention. Freebairn (2010) argued for government intervention by citing two main sources of obesity spillover effects—the use of revenue generated from general taxes to finance health care costs and the insufficient contributions by obese individuals in the form of income taxes to government revenue (i.e., obese people take too many sick days so they are less productive).

These policies could significantly reduce the incidence of obesity since it could discourage excess consumption of high-calorie foods and encourage the consumption of low-calorie ones. Studies suggest that price reduction of healthy foods significantly encourages the consumption of such foods (e.g., Epstein et al. 2006, French 2003). Goldman et al. (2011) found that increasing the prices of high calorie foods resulted in the reduction of obesity in the long run in the U.S. Such intervention policies are important because some individuals will make diet choices that are privately but not socially optimal. Even in the presence of perfect information and health claims, consumers will consume more foods with high calories than the socially optimal amount due to health care externality. Consumers over-consume unhealthy products if they do not bear the full cost of their poor diet choices. This results from the nature of the publicly funded health care system in Canada. Hence, the privately optimal level might be significantly higher than the socially optimal level, as depicted in Figure 2.

The introduction of specific policies like subsidies on low calorie diets could further discourage the intake of high calorie diets and could result in a socially optimal outcome. Figure 2 shows how a subsidy on low calorie diets could result

in further reduction of caloric intake following a reduction due to a health claim[20]. With the appropriate amount of subsidy, the marginal private benefit curve will shift from $MB_{private\ 2}$ to MB_{social} (where the marginal private benefit curve coincides with the marginal social benefit curve), corresponding to a reduction in caloric intake from $Q_{p\ 2}$ to Q_s. At Q_s, people will consume at the socially optimal level where there is no loss to the society. It is, however, important to note that not all subsidies will result in the above outcome. For instance, it is argued that the introduction of subsidies on certain food products like corn and other cereal products in the U.S. contributed to the problem of obesity (Pollan 2007, Ludwig and Pollack 2009). Such subsidies are believed to make high calorie foods cheaper and more abundant. On the other hand, findings from studies (e.g., Chang and Lauderdale 2005), including this present study, suggest that obesity is correlated with income. As such, "thin subsidies" might be regressive and in the long run contribute to the obesity epidemic (Muller et al 2017).

Figure 2. *Impact of Subsidies and Fat Taxes on Caloric Intake*



Source: authors' calculations.

An alternative to a subsidy on low calorie foods would be a government-imposed Pigovian tax on high calorie diets. Okrent and Alston (2012) found taxing of calories to be a significant way to reduce obesity prevalence and increase net social benefits. An example of such taxes is a "fat tax", which is intended to discourage the consumption of unhealthy foods that likely lead to obesity and its

[20]All other things being equal, the introduction of subsidies on foods that are low in calories but are close substitutes to those that are high in calories might entice consumers to substitute the low calorie diets for the high calorie ones.

related health problems (e.g., Cash et al. 2005, Leicester and Windmeijer 2004, Mytton et al. 2007). Similar to such a policy is the tax on tobacco products, which has led to a significant reduction of tobacco consumption and improved health in the UK (e.g., Mytton et al. 2007). Other countries with such taxes include Hungary (where there is a public health tax on sugary drinks and unhealthy foods) and Mexico—where there is 10% tax on sugary drinks and 8% tax on unhealthy snacks (FPI Australian Governments 2017). Figure 2 shows the impact of a fat tax on the price and quantity of unhealthy foods consumed, such as high calorie diets. Imposition of the appropriate amount of tax on high calorie diets (or foods high in fats) increases the price of high calorie foods, causing the marginal cost private curve to shift upwards to the left from $\mathrm{MC}_{private1}$ to $\mathrm{MC}_{private2}$, as depicted in Figure 2. Therefore, the quantity demanded of high calorie foods will be reduced from Q_{p2} to Q_s. At Q_s, and there is no deadweight loss to society[21].

Proper implementation of fat taxes on high calorie foods could discourage the consumption of unhealthy foods. Giesen et al. (2012) found taxes on high calorie diets to be more effective than subsidies on low calorie diets. However, numerous studies have shown that if such taxes are not properly implemented, they could cause more harm than the intended good, as in the case of Denmark (e.g., Chouinard et al. 2007, Taylor 2013). Denmark abolished the "fat tax" just a year after its implementation. Among the challenges of using taxes as an intervention measure to address obesity problems are the substitution effect and the elasticity of demand for the food product on which the tax is imposed. Imposing taxes on certain food products might lead to the substitution of unhealthier foods which could further worsen the obesity problem. Moreover, depending on how responsive consumers are to changes in the price of such products, an intervention policy based on tax might or might not be successful. For example, a tax on food products with fairly elastic demand might be successful in reducing the quantity demanded of such products. However, irrespective of how high a tax on an unhealthy food may be, if the product is highly inelastic, the impact of the tax might be minimal or totally ineffective. The challenge for policy makers is to accurately measure the responsiveness of the demand for the unhealthy diets. Another challenge associated with the implementation of taxes on unhealthy diets is how to accurately measure the "healthiness/unhealthiness" of a food product. Thus, a tax intervention policy might be successful or not depending on factors like the nature of the product (i.e., necessity, luxury, availability/proximity of close substitutes, time period, etc.).

Conclusion

Increasing mortality and morbidity rates, in addition to the continuous rise in health care costs, have become significant health and policy concerns in Canada

[21]In practice, though the introduction of tax might cause a reduction in caloric intake towards the socially optimal level, such reduction might not necessarily coincide with the socially optimal level.

and the world at large. The total economic impact of obesity is about $2 trillion a year or 2.8% of world GDP, while nearly 30% of the global population is overweight or obese. Obesity, which is strongly associated with several diseases, is increasingly becoming a pressing health care concern. We assessed the potential economic benefits of the reduction of obesity incidence, which, potentially, could be achieved by the successful implementation and promotion of the health claim on low calorie diets and obesity in Canada using nationwide Body Mass Index data. The study followed an integrated approach that enabled us to systematically, consistently, and broadly analyse the issue of obesity and, in turn, to make policy recommendations that could significantly contribute to the reduction of the obesity epidemic.

Findings from the simulation of actual data on measured heights and weights of Canadians suggested that a 5 to 10 percent weight loss arising from a reduction in caloric intake due to potential implementation and promotion of health-information/health-claim on "low calorie diets and obesity" results in nontrivial health-related cost savings. The mean health-related average cost savings was projected to be $1.93 billion (base case). Based on the findings, several policy recommendations were discussed. It was shown that even a modest weight loss resulting from lower caloric intake (i.e., 5 percent), could significantly reduce the incidence of obesity in Canada and thereby lead to a reduction in the health care expenditure on the disease. This study recommends the following main intervention measures to tackle the obesity problem: the implementation and promotion of a health claim on low calorie diets and obesity; nationwide introduction of obesity education campaigns; the introduction of subsidies on healthy foods with low calorie contents; and the introduction of taxes on unhealthy foods with overblown calorie contents.

Obesity has become a crisis that is not just a pressing health concern but also a threat to the global economy. In general, in order to reverse the health burden of obesity, a systemic and sustained portfolio of initiatives that could be delivered at scale is needed— no single intervention is likely to have a significant overall impact. Education and personal responsibility are critical elements of any program aiming to reduce obesity incidence and related health care costs; however they are not sufficient on their own. Hence, a combination of initiatives and co-operation of all sectors involved (e.g., media organizations, educators, healthcare providers, consumers, public sector), as well as government interventions, will be required to change public health outcomes and to reduce health costs.

In closing, this study provides vital findings and recommendations regarding the pressing health and economic concern of obesity. It generated reasonable estimates of the potential benefits from the reduction of obesity incidents, potentially from health claims, as well as followed an integrated approach of examining the obesity epidemic while emphasising the regulatory policies and initiatives to address the issue. However, we acknowledge some unavoidable limitations and fruitful areas for further research regarding the available market data on products carrying health claims and the extent to which a health claim has actually stimulated increased consumption of low-calorie diets. As more information regarding the efficacy of specific health claims and updated nationwide

BMI data become available, it will allow a further refinement of the estimates presented in this paper. However, it is expected that the core findings will remain the same; as well as the direction of the effect with even larger magnitude of the health cost savings.

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Appendix 1

Step 1

Table A.1. *Results of the Meta-Analysis to Determine the Average Weight Loss Resulting from CR*

Authors(S)	Year	CR intervention period (months)	Type of CR	Reduction in weight (%)	Deviation ± (%)	Range	
						LOW (%)	HIGH (%)
Hagan et al.	1986	3	LCD	8.5***	0.7	7.8	9.2
Franssila-Kallunki et al.	1992	2	VLCD	10.5	0.1	10.4	10.6
Puddey et al.	1992	4.5	LCD	10.8*	1	9.8	11.8
Wing et al.	1994	12	LCD	9.7	0	9.7	9.7
Miller et al.	1997	3.8	LCD	11.1	0.4	10.7	11.5
Wadden et al.	1998	5	LCD	13.2*	5.7	7.5	18.9
Ross et al.	2000	3	LCD	8	0	8	8
Kok et al.	2005	4	VLCD	14.6*	0.4	14.2	15
Villareal et al.	2006	12	LCD	10.7	6.3	4.4	17
Heilbronn et al.	2006	6	LCD	10.4	0.9	9.5	11.3
Racette et al.	2006	12	LCD	10.7	0	10.7	10.7
Larson-Meyer et al.	2006	6	LCD	10.1	1	9.1	11.1
Tsai et al.	2006	1	LCD	9.7	2.4	7.3	12.1
Redman et al.	2007	6	LCD	10.4	0.9	9.5	11.3
Weiss et al.	2007	9	LCD	10.7	1.4	9.3	12.1
Fontana et al.	2007	12	LCD	10.9**	2.1	8.8	13
Redman et al.	2009	6	LCD	10.4	0.9	9.5	11.3

Average Weight Loss = 10.61% ± 1.42%

NB: *calculated by authors. **calculated by authors from BMI changes. ***calculated by finding the average weight loss between men and women.

Source: authors' calculation.

Appendix 2

Step 3: Second Scenario, "Base"

Cost of obesity can be grouped into direct and indirect. As less incidence of obesity will result in fewer cases of obesity related mortalities and morbidities, it is assumed that a reduction in obesity prevalence will result in a proportionate reduction in the indirect cost of obesity.

"Hospital care" expenditure represents the highest component of the direct cost of obesity. Generally, irrespective of the level of disease incidence, there will still be some cost incurred in the running of the hospital (Gyles et al. 2010). It has been estimated that more than three fourths of hospital expenditure is fixed. Approximately 84 percent of hospital expenditure has been estimated to be fixed with the remaining 16 percent being variable (Gyles et al. 2010, Roberts et al. 1999). Since the fixed cost component of the hospital expenditure may not immediately respond to the reduction in the prevalence of obesity in the short run,

it is assumed that only the variable component of the cost will change proportionally to the change in obesity prevalence. That is, a 1 percent reduction in obesity prevalence will lead to a 0.16 percent reduction in hospital cost.

"Drug" cost of obesity is the second highest component of obesity cost. Taking total drug cost into consideration, approximately 84.9 percent is prescribed and the remaining 15.1 percent is non-prescribed (CIHI 2014). Since lower cases of obesity will result in lower prescription of obesity drugs, a linear relationship (i.e., 1:1) is therefore assumed between changes in obesity prevalence and changes in the prescription of drugs. Non-prescription drugs, which are mainly over-the-counter (OTC) drugs and personal health supplies (PHS), were not included in the analysis because it may not immediately respond to a reduction in obesity prevalence. Therefore, the relationship between obesity prevalence reduction and reduction in drug cost becomes 1:0.85.

'Physician' services may not be required if one is not sick or ill. As such, it is expected that fewer cases of obesity and its related comorbidities will result in fewer physician visits. Fewer physician visits will also imply a reduction in physician service expenditure. It is, therefore, assumed that a reduction in the prevalence of obesity will lead to a proportionate reduction in the cost incurred on the services of physicians (i.e., 1:1 relationship).

"All other health cost" represents the expenditure on services of "other health professionals", "other health care", and "research". The expenditure incurred for the services of "other health professionals" can be grouped into three main categories: namely "dental care cost", "vision care", and "others". The "others" category comprises expenditure on massage therapists, chiropractors, physiotherapists, podiatrists, and psychologists (CIHI 2014). It is expected that a reduction in the prevalence of obesity will not necessarily result in a reduction in the expenditure incurred on dental care and vision care. As such, they are excluded from the analysis. The proportion of expenditure on the services of other health professionals that go to dental care and vision care are 61.1 percent and 19.2 percent respectively. Therefore, the relationship between the reduction in obesity prevalence and reduction in expenditure on other health professionals becomes 1:0.20. Furthermore, expenditure on "other health care" mostly includes expenses on home care and medical transportation (CIHI 2014). The majority of this expenditure is considered fixed and, as such, a reduction in the prevalence of obesity may not affect it in the short term. Finally, expenditure on health "research" is also considered largely fixed and was excluded from the analysis.

The weighted average of all direct and indirect costs is equal to 0.83 (weighted by the expenditure incurred on each component of the total health cost).

Table A.2. *Percentage Reduction in Health-Related Cost Components Resulting from a 1% Reduction in Disease Incidence*

Obesity cost components	Percentage reduction in cost	Cost (million $)
Hospital care	0.16	9757.9
Physician	1.00	2480.0
Drug	0.85	4960.5
All other health cost*	0.20	4462.4
Indirect cost	1.00	52600.0

Weighted average = 0.83

*"All other health cost" represents the expenditure on services of other health professionals, other health care, and research. The cost of the various subcomponents of the "all other health cost" category are: other health professionals- $396.9, other health care- $3729.7 and research- $335.8 (all amounts are in millions of dollars).

Source: Anis et al. (2010) and authors' calculation.

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The Impact of COVID-19 Epidemic on Immunization Activities in Italy

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COVID-19 has led to disruption in routine immunization programs around the globe. In Italy, we assessed the impact of COVID-19 epidemic on immunization activities using a questionnaire to explore reasons for decrease in vaccination and measures implemented. Sixteen Regional Health Services over 21 answered (76.1%). A decrease in immunization activities was mostly recorded after the notification of the first local cases in Italy and during the peak of the epidemic. About one-fourth (28%) of immunization centres suspended their activities and more than 33% of health workers in immunization centres were shifted to the COVID-19 response. Specific training on COVID-19 was generally reported. Children above 1 year of age until adolescence were the most affected by disruption of immunization services followed by adults indicating that primary series vaccination were prioritized. Several measures were implemented, such as immunization only under appointment, give priority to some immunization/ subjects and extend the hours of work to avoid overcrowding; telephone call to families; developing a list of children who have missed their vaccine doses; preparing a targeted action plan to ensure rapid catch up of children who are not up to date with their vaccination. Information and awareness raising activities were also indicated, even if in a lesser extent. The results of the survey were used to collect and disseminate best practices in order to minimizing the effect of the pandemic on vaccine preventable diseases.

Keywords: *COVID-19, routine immunization, immunization catch-up activities, vaccination services, Italy*

Introduction

Epidemiology of COVID-19 in Italy

Since the first reported cases in China in December 2019 and until 29 January 2020, in Italy the infection with SARS-CoV-2 was not detected. On 30 January, the same day in which the World Health Organization declared the new coronavirus epidemic a public health emergency of international concern, two imported cases were confirmed in Latium Region. The day after, the Italian Government declared the national emergency in response to COVID-19 epidemic. On 21 February, the first local case was registered in Lombardy Region. In the following weeks, the infection spread all over Italy despite the timely implementation of public health measures. The peak of new cases was reached on 21 March, followed by a slow and irregular decrease until the current transition phase characterized by a more stable number of daily reported cases and no overburden of health services.

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Some regions, in particular Lombardy, Veneto, Emilia-Romagna and Piedmont were affected earlier and more severely by the epidemic especially during the early phases. Shortage of health workers was a common key problem.

COVID-19 emergency had a strong impact on people and the national health system. Public health measures focused on stay at home policies, social distancing, closure on non-essential services, including schools, until complete lock down, to reduce the spread of SARS-CoV-2. Limiting movement outside the home to essential activities could have influenced the decision to postpone immunization. In few weeks, the number of hospital beds, both in intensive care unit and in medicine wards sharply increased, with *ad hoc* facilities dedicated to the care of COVID-19 patients. Part of the healthcare resources have been shifted to the COVID-19 response, with a presumable impact on the routine immunization activities.

The immunization services are an essential part of the national health system and the Ministry of Health issued guidance to maintain their operation as far as possible. Nevertheless, disruption of immunization activities during COVID-19 pandemic was reported in literature and we decided to evaluate the situation in Italy.

Immunization Activities in Italy

Immunization activities are a core component of the public healthcare assistance: the Italian immunization policy applies across the life-course, with ten mandatory routine immunization for children aged 0–16 years and unaccompanied foreign children: polio, diphtheria, tetanus, hepatitis B, pertussis, *Haemophilus influenzae* type b, measles, rubella; mumps, varicella, chickenpox. In teenagers, further recommended vaccinations include anti HPV and *meningococus*, while in the elderly over 65 years, influenza, herpes zoster and pneumococcus immunization are recommended. Generally, vaccination is offered free of charge by the public immunization services, including general physicians and paediatricians. Seasonal influenza vaccine can also be administered in pharmacies.

Italy is endemic both for measles and for rubella, with large outbreaks occurring in the last years.

Literature Review

The World Health Organization (WHO 2020, WHO EURO 2020, WHO and UNICEF 2020) issued guidance on routine immunization services during COVID-19 pandemic, warning about the risk of vaccine preventable disease outbreaks due to the disruption of immunization services, even for limited period of time, which could cause further pressure on health services. During COVID-19 pandemic, it is critical to ensure trust of the population in the health system guaranteeing that activities are performed under safe conditions, implementing optimal infection prevention measures during immunization sessions and adequate observation of adverse events following immunization (AEFIs). Primary series vaccination and

other vaccination for vulnerable groups should be prioritized. Communication plays an important role and should clearly explain the benefit of vaccination even during a health emergency to address community reluctance. WHO recommends resuming and restoring immunization services as soon as possible when SARS-CoV-2 transmission decreases to close immunity gaps created during the epidemic.

In the Americas, the Pan American Health Organization (PAHO) (2020) conducted a survey in 38 countries and territories of the region to monitor the functioning of immunization services and the main challenges during COVID-19 pandemic. After lessening the lockdown measures, immunization activities resumed, but the demand remained low due to people's concern about the risk of exposure in healthcare settings, restrain in public transport and other public health measures. Several innovative strategies were implemented by countries such as drive-through vaccination, mobile vaccination centres, vaccination in homes, vaccination with prior appointment, vaccination in strategic locations, and communication strategies. Difficulties were recorded in several countries in delivery of vaccines and other supplies and in maintaining epidemiological surveillance due to laboratory services shifted to COVID-19 testing.

Hungerford and Cunliffe (2020) welcomed the launch of the European Vaccination Information Portal in conjunction with the European Immunization Week 2020, as it is important to ensure sufficient resources and priority to delivery of routine immunization especially in COVID-19 time. In fact, preventive measures, such as lock down, quarantine and social distancing represent a big challenge for delivering immunization. To mitigate COVID-19 effects, it is important to monitor immunisation rates at all levels.

Santoli et al. (2020) examined two data sources to assess the impact of the pandemic on paediatric immunization in the United States. The first is the cumulative doses of vaccines ordered by healthcare providers. The second is the aggregate counts of measles-containing vaccine doses administered between two paediatric age groups: children aged ≤ 24 months and children aged >24 months through 18 years. Both data sources compared the same period of 2019 and 2020. The authors found a considerable decline both in orders and in administered doses, starting the week after the national emergency declaration. Children ≤ 24 months were less affected by the decrease in immunization. According to their study, parental concern about possible exposure during vaccine session might contribute to the drop registered.

Another study conducted in Michigan (Bramer et al. 2020) found that vaccination coverage decreased in all age cohorts except for birth-dose hepatitis B coverage, which is generally administered in the hospital setting. Compared to 2019, the 16-months age cohort suffered a decline of 5.2% in 2020, while children aged 5 months experienced a decrease of about 17% of all recommended vaccines. They called for concrete efforts to ensure a quick catch-up for children that missed their scheduled vaccination.

In Canada, a life-course vaccination policy applies, in line with WHO recommendations (WHO 2019). In this country, Mac Donald (Mac Donald et al. 2020) reported a disruption in routine immunization programs due to COVID-19

and identified three components to improve catch-up: find who has been missed; detect delivery gaps and develop tailored strategies for catch-up; and communicate, evaluate and adjust programs taking into account the evolving situation.

According to Adamu et al. (2020), COVID-19 disrupted routine immunization services for children and this is of particular concern because coverages in many African countries are suboptimal. The authors reported that it was demonstrated by scientists that the benefit of routine immunization in Africa is greater than the risk of COVID-19 death that could result from attending a vaccine session. They suggest affording the immunization system as a whole because all components are interdependent. In addition, they warn against the effect of preventive measures adopted for combating COVID-19 on poverty, because these actions can wider socioeconomic inequalities with implication on immunization coverage. Also in this context, information plays a key role to combat misinformation and contrast vaccine hesitancy.

Despite concerns have been raised on the effects of COVID-19 on routine children immunization, also older adult immunization is at risk, as described in the study of Privor-Dumm et al. (2020). In particular, they support the need to build a global system for both routine and pandemic/epidemic older adult immunization. Several vaccines against other pathogens, such as influenza, pneumococcus and herpes zoster, can keep adults in good health conditions and prevent co-infection with COVID-19. They call for a wide communication initiative focused on the importance of older adult immunization, as recommended in the Immunization Agenda 2030. In addition, they recommend integrating older adult immunization with other country priorities, including emergency preparedness plans for infectious threats. The authors underline the opportunity that the new COVID-19 vaccines will represent for exploring innovative strategies in delivery immunization to older adults to avoid potential risks such as the need to travel to reach the vaccination centre or spend time in waiting rooms.

Methodology

We conducted a survey from 28 May to 9 July 2020 using a questionnaire to understand the impact of COVID-19 on immunization activities and measures implemented at local level, in order to identify best practices to share at national level. The tool was organized in five sections respectively on general data; effects of COVID-19 emergency on vaccinations; organization measures; reactive activities and vaccine supply. We mostly used pre-defined multiple or single choice answers, with the possibility to add comments, in order to catch up further information. The specific aims of the survey were to explore:

- immunization decrease due to the suspension of activities and to staff reduction or reallocation due to COVID-19 emergency;
- specific training of staff on COVID-19;
- the period of highest disruption of immunization services;
- the most affected age and type of vaccination;

- the organization and contrast measures implemented at local level;
- the impact of COVID-19 on vaccine supply and use of doses.

Due to the semi-federal Health System in Italy, the Ministry of Health transmitted the questionnaire to the Regional Health Services, which collected information from the Local Health Agencies (LHAs) belonging to their territory. Then, the Regional Health Services sent the compiled questionnaires back to the Ministry of Health. As the number of LHAs for each Region varies according to the organization model, this factor can have partially biased the results.

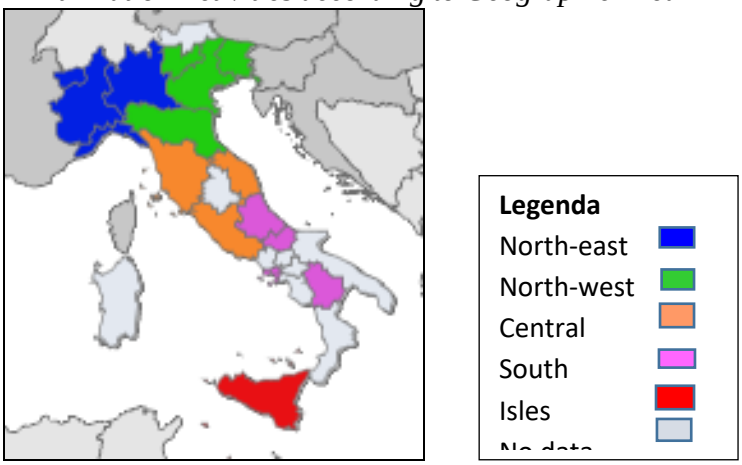
We analysed data, using MS Excel tools. All the variables included in the survey were described using the appropriate statistics: categorical variables were described with proportion and percentages, while ordinal variables using the mean value. In addition, we made a semi-quantitative analysis of comments, to complement the information.

Data were investigated at national level, and for geographic area according to the National Institute of Statistic classification: North-west (Piedmont, Aosta Valley, Liguria, Lombardy); North-east (Trento, Bolzano, Veneto, Friuli Venezia Giulia, Emilia Romagna), Central (Marches, Tuscany, Umbria, Latium), South (Campania, Abruzzo, Molise, Apulia, Basilicata, Calabria) and Isles (Sardinia, Sicily).

Results

Overall, 16 Regions over 21 answered (76.1%) (Figure 1): in total we collected 97 questionnaires from LHAs.

Figure 1. *Italian Regions Participating in the Survey on Impact of COVID-19 on Immunization Activities according to Geographic Area*



Decrease of Immunization Activities

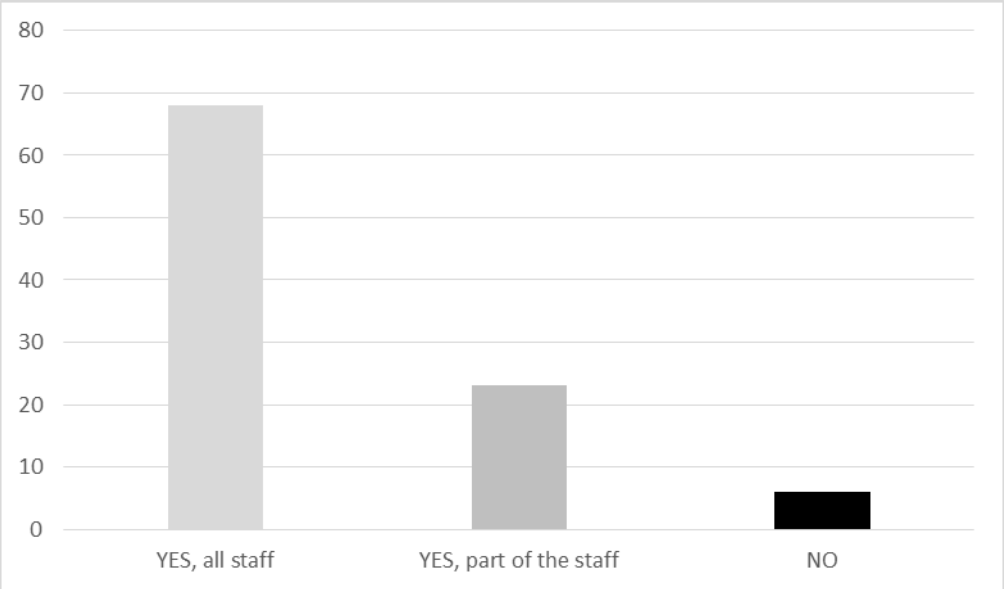
Almost all LHAs (94/97 = 96.9%) affirmed that immunization activities have decreased during COVID-19 emergency, compared to the same period of the previous year.

At national level, about one-fourth (28%) of immunization centres suspended their activities: the closing period, when reported, was limited in time, maximum 17 days. In Lombardy, the number of immunization centres that suspended the activities due to COVID-19 was higher (more than 50%) while it was lower in the Isles (about 11%). The shifting of the health workers to the COVID-19 response from the immunization centres (more than 33% at national level) concerned all professional categories, including physicians, nurses, administrative staff, but mostly the health assistants (more than half of those on duty). About 5.5% of staff working in the immunization centres was infected by SARS-CoV-2.

Specific Training on COVID-19

As shown in Figure 2, the great majority of answers (91/97 = 93.8%) affirms that the staff of the immunization centres received a specific training on COVID-19. This training generally concerned the whole staff (n=68; 70.1%) or only part of the staff (n=23; 23.8%). It must be underlined that about 6% of answers were negative, showing the need to continue and complete training activities.

Figure 2. *Specific Training on COVID-19 at National Level (Total 97 Answers)*

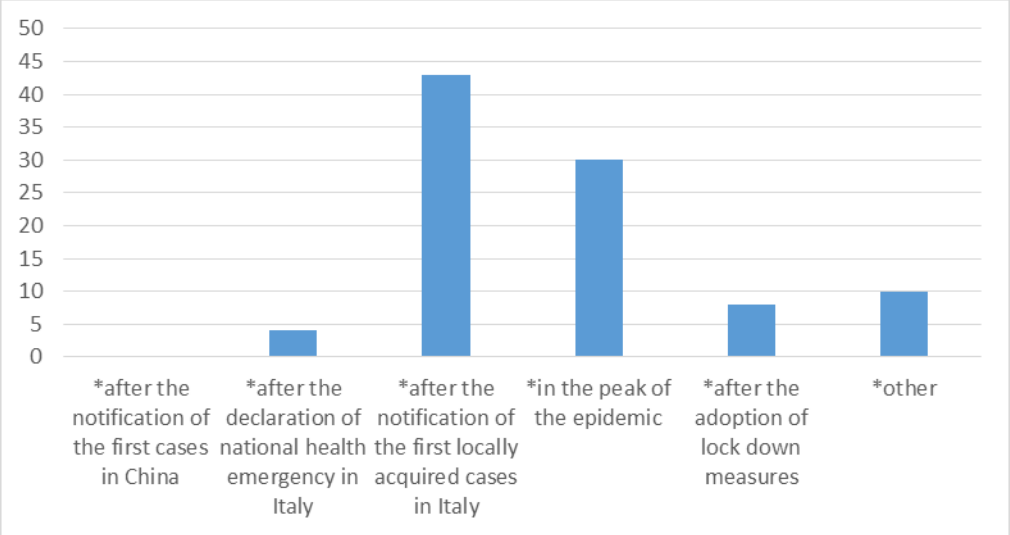


Period of Highest Disruption

A decrease in immunization was mostly recorded after the notification of the first local cases in Italy and during the peak of the epidemic (Figure 3). The lock-

down measures implemented at national level, adopted on 22 March 2020, seem to have had a less relevant impact on routine immunization. In the questionnaires collected in the South, the decrease of immunization activities was noted earlier, especially after the declaration of national health emergency on 31 January 2020.

Figure 3. *Stage of COVID-19 Epidemic Most Affecting Immunization Activities (Total 95 Answers)*



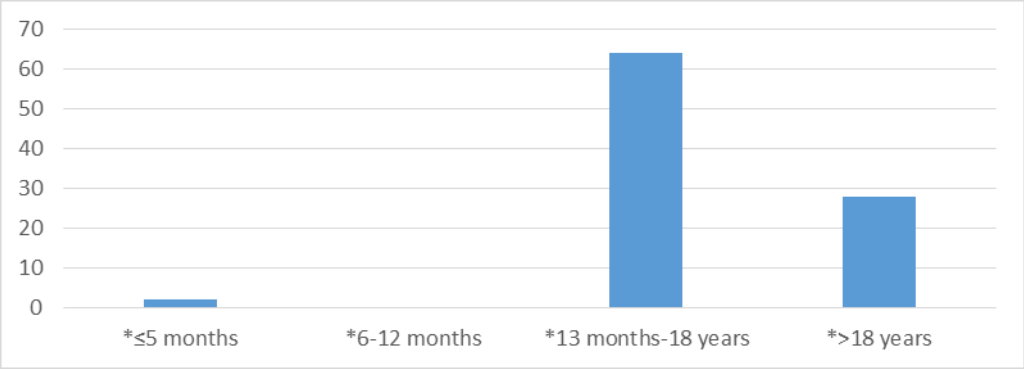
Most Affected Ages and Type of Vaccine

We recorded 94 answers on this topic, whose results are shown in Figure 4. At national level, children above 1 year of age until adolescence are the most affected by disruption of immunization services (n=64/94; 68%) and, less frequently, adults (n=28/94; 29.8%). Only 2 times children < 1 year were mentioned. This result is confirmed by the analysis of open comments, indicating that primary immunization cycles, pregnant women, at risk people, and urgent immunization (for bites, accidents, etc.) were prioritised.

The results show some geographic differences: in the North-east the impact is higher in the adult population, while in the Central, South and Isles areas the impact is almost entirely on children aged 1 year or more.

With respect to vaccines, at national level anti-HPV was mentioned as the most affected, followed by Herpes Zoster, DTPa and meningococcal B. The decrease in other antigens was reported a very limited number of times. In the North-west area, a relevant reduction of polio (IPV) immunization was referred while in the Central area both IPV and measles, rubella, mumps (MPR) immunizations.

Figure 4. *Classes of Age Experiencing the Highest Reduction in Immunization Activities at National Level (Total 94 Answers)*



Organization and Public Health Measures

Almost all answers (n=95/97; 98%) show that some extra organization measures during COVID-19 emergency were implemented, most generally consisting in: immunization only under appointment, give priority to some immunization/subjects and extend the hours of work to avoid overcrowding. A limited number of answers indicated other organization models. Home vaccination and mobile vaccination posts were never mentioned.

To contrast the disruption of immunization, the measures more frequently reported were: telephone call to families; developing a list of children who have missed their vaccine doses; preparing a targeted action plan to ensure rapid catch up of children who are not up to date with their vaccination. Information and awareness raising activities were also indicated, even if in a lesser extent, while the following measures were rarely described: targeted action plan for at risk categories and strengthening vaccine preventable disease (VPD) surveillance. Information and awareness raising activities seem to be particularly implemented in the South area, where they rank first among the countermeasures.

The analysis on comments regarding organization measures indicates that the health staff optimized all available spaces also through active research of new vaccination sites in order to avoid overcrowding, guarantee social distancing, implement safety measures to minimize risk of infection, prolonged opening hours, controlled and limited entry or only upon advanced scheduling, telephone triage. In addition, they focused their efforts in contacting families both before vaccination and in case of missed vaccination to re-programming of scheduled appointments with active call, and in strengthening collaboration with paediatricians.

Impact on Vaccine Supply and Use of Doses

Supply shortage was very rarely mentioned (n=3/97; 3%), while an increase of wasted doses was reported in about one third of respondents (36%), with

highest values in Lombardy (60%) and in the North-east area (47.6%) and minimum values in the Isles (0%) and in the North-west area (5.5%).

Discussion

In Italy, we implement a life-course policy of immunization, with most of vaccinations offered for free by public health services. In addition, some vaccinations, especially those for preventing outbreak-prone VPDs, are mandatory for accessing schools.

As recommended by WHO, during the epidemic primary series vaccinations were prioritized in the whole country, reducing the risk of VPD outbreaks, due to an accumulation of susceptible persons, the same finding reported by Santoli (Santoli et al. 2020) in her survey in the United States. According to the surveillance data collected by the European Centre for Disease Prevention and Control (ECDC), the reported cases of measles in the first trimester of 2020 in Italy were 102 compared to 581 in the same period of 2019. This reduction in the number of notified measles cases during COVID-19 seems to suggest a lack of major gaps of immunization in outbreak-prone VPDs coupled with a reduced risk of spread due to social distancing measures, stay at home and lock down policies. In Italy, schools were closed in the early phase of SARS-CoV-2 epidemic, replaced by on-line teaching activities. Schools are recognised as common setting for the spread of outbreak-prone VPDs.

It is important to note that for other antigens, such as HPV, the impact was worse. In this case, catch-up activities could be easier to manage, as the vaccination, both for females and males, can be done from 11 until 14 years and over, depending on the type and schedule of the vaccine. In addition, the Italian vaccination plan recommends its use also in women of 25 years of age, at the moment of the first PAP-test.

Older people are those most seriously affected by COVID-19 in terms of morbidity and mortality, and several VPDs, including influenza, pneumococcal disease and herpes zoster represent a significant concern, and programs to deliver these immunizations are more urgent than before and should be prioritized, as reported by Privor-Dumm et al. (2020). In Italy, anti-herpes zoster vaccination was reported as the second most reduced. This can be due to the fact that older people were strongly recommended by the Government to stay at home since the beginning of the national epidemic. Considering the coming influenza season, special efforts should be put in communication strategies to encourage a wide adhesion to seasonal influenza vaccination in older adults, and to take this opportunity to propose other immunizations.

In our study, we found that the disruption of immunization services was reduced by the prompt adoption of organization and response measures at local and regional level. Almost all respondents reported more than one measure, including pre-scheduled in person appointments for vaccination and extend the hours of work to avoid overcrowding; telephone call to families; developing a list of children who have missed their vaccine doses; preparing a targeted action plan

to ensure rapid catch up of children who are not up to date with their vaccination; and in strengthening collaboration with paediatricians. These finding are in line with recommendations from international organizations (WHO 2020, WHO EURO 2020, WHO and UNICEF 2020) and with reports from other countries (PAHO 2020, Bramer et al. 2020, MacDonald et al. 2020).

Our study suggests that the number of health workers in vaccination centres during COVID-19 pandemic was reduced in many cases: on the other side, they needed to develop and implement new strategies to cope with the new reality, with extra efforts to ensure that safety protocols were respected and to address the concerns of families. Their wellbeing should be monitored to avoid risks of burnout.

To ensure the highest level of safety during immunization activities, the Ministry of Health recommended to:

- prioritize on-line schedule, using the dedicated regional telephone lines (Regional Centre of Reservation), the affiliated pharmacies or the website of the health facilities, with priority given to children for mandatory vaccinations and to people at higher risk;
- permit entry into the waiting rooms only to one accompany person for each child, non-self-sufficient or fragile persons, and for persons with cultural-linguistic difficulties;
- remain in the facility under observation for AEFIs at least for 15 minutes, according to Italian guidelines;
- activate effective logistic measures in order to guarantee social distancing especially in case of free or mixed access to vaccination services;
- take body temperature and check respiratory symptoms before entrance;
- ensure procedures for hand hygiene (alcohol-based hand sanitizer, poster with clear indication of hygienic services, poster displaying how to wash hands);
- use of masks in people above 6 years of age;
- applicate appropriate measure for the safety of health workers;
- define effective protocols for cleaning and disinfection of environment with special attention to ventilation of premises;
- implement specific training on COVID-19 for all staff, irrespective of their role and profession.

Information and awareness raising activities were also reported in Italy, even if in a lesser extent. As mentioned in several studies, correct and widespread information of parents regarding the continued need for vaccination during COVID-19 and its safety, plays a key role in reducing immunization gaps both for routine childhood and adult immunization. Despite its recognised importance, social communication initiatives were jeopardized, therefore the Ministry of Health advised to reinforce these activities with a focus on:

- informing clearly on the need to vaccinate also during COVID-19 emergency to keep people in good health, and describing what organization changes were introduced;
- stressing the safety and preventive measures adopted to avoid SARS-CoV-2 transmission.

Especially during COVID-19 time, it was recommended to use the increased opportunities to contact families to re-schedule missed vaccinations and recall for outreaching. Communication activities at local level can be implemented in collaboration with other public administrations and stakeholders, with targeted initiatives for marginalised groups.

The vaccination schedule can be applied with some flexibility, adopting the more appropriate protocol according to the current scientific evidence, to facilitate catch-up.

Another recommendation concerned the need to have an updated analysis of staff requirements, taking into consideration its reinforcement, whenever possible, and introducing new organization models, aiming at developing the professional autonomy of non-medical staff in the management of immunization sessions.

Collaboration with general practitioners and paediatrician should be strengthened through specific agreements based on the local situations.

To broaden the possibilities of vaccination, it could be useful to find new spaces, guaranteeing the application of safety and preventive measures, also using, whenever possible, mobile immunization services and immunization at home.

Conclusion

COVID-19 had a nationwide impact on immunization services, despite some regions were much more challenged by the epidemic. Italy was the first and one of the most affected countries in the European Union to be affected by COVID-19. In our study, we found that immunization activities decreased during COVID-19 emergency, compared to the same period of the previous year, and this is in line with finding of other studies all over the world.

During the most acute phase of the epidemic, more than one fourth of the centres suspended their activities, also if for a limited period of time, being the maximum reported value 17 days. Disruption of immunization services was worsened by the shifting of healthcare workers to the COVID-19 response, which affected about one third of the staff, irrespective of their profession.

Both national and local lever developed training activities for COVID-19: the possibility to access on-line fostered participation as shown by more than 90% positive response. Nevertheless, further efforts are required to let no staff without appropriate training, as this is a key element to protect the health of patients as well as of healthcare workers.

The decrease of immunization activities was observed at different times in different areas. While in general it was noted mostly after the notification of the first local cases and during the peak of the epidemic when social distancing and

stay at home policies were implemented, in the South it was perceived earlier especially after the declaration of national health emergency.

At national level, children above 1 year of age until adolescence were the most affected by disruption of immunization services (n=64/94; 68%) and, less frequently, adults (n=28/94; 29.8%). With respect to vaccines, at national level anti-HPV was mentioned as the most affected, followed by Herpes Zoster, DTPa and meningococcal B.

In our study, we found that the disruption of immunization services was reduced by the prompt adoption of organization and response measures at local and regional level, most generally consisting in: immunization only under appointment, give priority to some immunization/subjects and extend the hours of work to avoid overcrowding. On the contrary, supply shortage was generally not observed.

Based on the results of the survey, the Ministry of Health disseminated best practices for effective catch-up in Italy, considering the epidemiological situation still diversified at local level and the regional organization of health services. At present lockdown policies have declined and relaxed and the supply of vaccination services can resume in full.

The Italian Government approved adequate legislative measure to strengthening primary health care, allocating more resources and improving coordination and integration with other actors, such as general practitioners and paediatricians in the case of immunization activities. Further opportunities for innovation could be explored when one or more COVID-19 vaccines will be available.

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How can Simulation Coaching Improve Emotional Intelligence Skills and Situational Awareness in Child Protection Professionals?

By Mari Salminen-Tuomaala[*]

Emotional intelligence (EI) and situational awareness (SA) are important attributes for child protection professionals. In this qualitative study conducted in Finland, the aim was to explore how simulation-based learning could improve EI and SA of child protection professionals. Based on a learning needs assessment, a simulation-based educational intervention was provided for 36 professionals in 5 private providers of substitute care services for under 18-year-old children. Directly after the intervention, the participants were asked to recount in a short essay how the educational intervention had affected their EI and SA and other professional competence. Inductive content analysis was used to analyze the essays. The analysis revealed that the simulation coaching had been meaningful to the participants from four perspectives, increasing their awareness of their own and others' emotions; making them better prepared to project themselves into another person's position; increasing team intelligence, and as a form of work supervision. The results indicate that simulation coaching can be considered a useful tool for the development of EI, SA and related competencies in child protection professionals. Other professionals, whose work essentially involves close interaction with clients, may also consider the transferability of the findings to their work.

Keywords: *child protection, emotional intelligence, situational awareness*

Introduction

Emotional intelligence, empathy and situational awareness are considered to be essential attributes for health and social care professionals. These were also among the most important self-assessed learning needs of the child protection professionals, who took part in the simulation coaching programme and qualitative study addressed in this article.

The simulation coaching and study described in this paper were part of a larger research, development and training project carried out in a western region of Finland in 2017–2019. The project aimed at improving the competence of staff working for private providers of health and social care services in the region.

The overall project involved a combination of learning needs assessments, educational interventions and research, carried out with 20 private small or medium-sized companies operating in child protection, geriatric care, mental health services and disability services. In all, 230 health and social care professionals took part in the project, which received support from the European Social Fund.

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This sub-study concentrates on an intervention and study carried out with 36 professionals from 5 providers of substitute care services for children. In this study, as in Finnish child protection legislation, the term child refers to anyone under 18. Based on the results of a learning needs assessment, the professionals took part in a simulation-based coaching and an ensuing qualitative study. The research question was:

> How can simulation coaching improve emotional intelligence skills and situational awareness in professionals working for private providers of child protection services?

The study methodology was based on the concept and training developed by teachers at two educational institutions in western Finland: Seinäjoki University of Applied Sciences and Sedu Vocational Education Centre. The University is a multidisciplinary institution of higher education with Bachelor and Master-level degree programmes, including degree programmes in nursing, public health nursing, physiotherapy, elderly care and social work. The University has approximately 4,800 full-time students (Seinäjoki University of Applied Sciences 2020). The Vocational Education Centre offers upper secondary-level vocational qualifications in various fields of study for over 5,000 students, including practical (enrolled) nurses and emergency medical technicians (Sedu Vocational Education 2020).

The simulation-based coaching provided in the five companies was based on the participants' self-assessed continuing learning needs. The participants had wished to develop interaction with the children through the development of their emotional intelligence, empathy skills and situational awareness.

In the literature review, the topics of child maltreatment, child protection services and competence required from child protection professionals are addressed first, with special reference to the situation in Finland. This is followed by a discussion of the concepts of emotional intelligence (EI) and situational awareness (SA), considered essential qualities for professionals working with children in need of protection. The latter part of the article presents the methods and findings of the qualitative study conducted with the professionals, starting with a description of the simulation coaching intervention carried out with 36 child protection professionals wishing to improve their EI and SI. The final section of the paper discusses the findings and their implications for practice and education.

Literature Review

Child Maltreatment

Maltreatment of children is a worldwide problem. Physical, sexual or emotional abuse, and neglect and exploitation experienced by children (persons aged under 18 years) has been found to have lifelong consequences, manifested in behavioural, physical and mental health problems (WHO 2020, Rantanen and Paavilainen 2018). According to the World Report on Violence and Health (Krug et al. 2002), there are four levels of risk factors that make children vulnerable to

various types of violence: individual, close relationship, community and society-level. In addition to influence within a single level, the interaction between these factors can place children at risk.

In Finnish literature on child maltreatment, the accumulation of risks in the family, as well as the transfer of risks from one generation to another have been discussed by Paavilainen and Flinck (2013, 2015, Flinck and Paavilainen 2016). They have described the intergenerational transmission of social disadvantage and social exclusion often connected with multiple problems like long-term unemployment, poor health, intoxicant abuse and domestic violence. The investigators also note, however, that although there is no denying that social disadvantage and the accumulation of multiple problems is associated child maltreatment, the cause-effect relationship is more complex than what one might expect. Some families are more vulnerable, some respond to adversity with more resilience (Flinck and Paavilainen 2016).

Paavilainen and Flinck (2013) have also developed a clinical nursing guideline, based on a review of 77 research articles and review and discussion papers, to help nurses to identify and intervene in child maltreatment. The investigators list risk factors which may manifest themselves in the child, the parents or the whole family, and discuss physical and other signs caused by maltreatment. They also point out that home and health clinic visits provide a good opportunity to discuss child-rearing practices, family relationship and potential violence present in family life (Paavilainen and Flinck 2013).

Child Protection Services

Goal

In 2019, almost 20,000 children were placed in out-of-home care in Finland (population 5.5 million). In addition, over 50,000 home-living clients received support and various child protection services. These services, where the focus is very much on prevention and early support, are commonly referred to as child welfare services in English translations of Finnish texts (Finnish Institute for Health and Welfare 2020a).

According to the Child Welfare Act (2007), in the assessment of child protection needs and implementation of services, the best interests of the child should be a primary consideration. The quality recommendation for child welfare of the Finnish Ministry of Social Affairs and Health (2019) stresses the importance of recognizing children's distress and providing help, irrespective of where they live or what services they already receive. Appropriate measures and solutions should be sought to safeguard the following for the child:

> "1) balanced development and wellbeing, and close and continuing human relationships; 2) the opportunity to be given understanding and affection, as well as supervision and care that accord with the child's age and level of development; 3) an education consistent with the child's abilities and wishes; 4) a safe environment in which to grow up, and physical and emotional freedom; 5) a sense of responsibility in becoming independent and growing up; 6) the opportunity to become involved in

matters affecting the child and to influence them; and 7) the need to take account of the child's linguistic, cultural and religious background" (Child Welfare Act 2007).

Besides promoting the child's development and wellbeing, the child welfare services are obliged to support parents, other custodians and persons responsible for child care and upbringing. Prevention and early intervention are included in the concept of child welfare, and governed by law (Child Welfare Act 2007). The work of child welfare professionals must be based on the fairness (rights enshrined in the Convention on the Rights of the Child); openness and reliability (transparent knowledge, predictable and justified practices); safety of the child, and the principle of proportionality. This means that official actions should meet the child's needs at the lowest level of intervention (Finnish Ministry of Social Affairs and Health 2019).

Substitute Care for Children in Finland

Municipalities, which are urban, semi-urban or rural areas with a population range of 690 to over 650,000, are responsible for organizing social and health services. Finland has currently 310 municipalities (Association of Finnish Municipalities 2020). In Finnish child welfare, supporting children in their homes must be given precedence over substitute care. Even when substitute care is provided, the aim of reuniting the family should be taken into account as far as possible (Child Welfare Act 2007).

The municipal bodies responsible for social services have a duty to take a child into care and provide substitute care if the child's health or development is seriously endangered due to lack of care or other circumstantial factors, or if the child has been found to abuse intoxicants, commit illegal acts or engage in other comparable behaviour, which endangers his or her health or development. After a child has been taken into care, the municipal body responsible for social services decides about the child's placement, care and other necessary services, seeking cooperation with the child's parent or guardian (Child Welfare Act 2007).

In Finland, children taken into care can be placed in family care, professional foster homes or institutions. Family care is the primary form of substitute care. The foster parents, also called family carers, provide 24-hour care in their own homes. The aim of family care is to provide a safe environment and close relationships for the child, and to promote the child's social development and sense of security (Family Care Act 2015). Institutional care in children's homes is only arranged if the child's foster care cannot be arranged in home care (Child Welfare Act 2007). The third form of substitute care is provided by professional foster homes, which resemble family care, but in which the foster parents and often staff members have a social or health care qualification. The entrepreneur or manager responsible for a professional foster home must hold a Bachelor's of social work degree or equivalent. These homes can accommodate children with special needs (Finnish Institute for Health and Welfare 2019b). Most of the participants in this study represented professional foster homes.

Competence Required in Substitute Care for Children

Foster parents and professionals working within child protection are accountable for their work to the child, the child's family, the organization where they work, and society. Important attributes required in this work involve, but are not restricted to, client knowledge, interaction competence and personal and professional development.

First, client knowledge refers to a good understanding of child development, risk and protective factors, trauma and psychological disorders. Those working in child protection must also know how to encounter diversity and different cultures (Rantanen and Paavilainen 2018).

Second, a wide range of interaction skills are necessary. Respect, humanity and empathy are required when working with children typically affected by trauma, neuropsychiatric disorders or difficulty interacting with others (Finnish Ministry of Social Affairs and Health 2019b). It can be argued that good interactions skills are based on emotional intelligence and situational awareness. The child is entitled to age-appropriate information, and the child's opinion must be listened to and taken into consideration (Child Welfare Act 2007). In addition, the foster parents or professionals need to allocate sufficient time for transparent, constructive interaction with the child's family, and for collaboration with a number of health and social care authorities and professionals. Support from other multiprofessional collaboration, for example through crisis intervention, therapy and other social and health care services is required especially when dealing with the consequences of domestic violence, child abuse and other traumatic events (Finnish Institute for Health and Welfare 2019b, Finnish Ministry of Social Affairs and Health 2019).

Third, personal and professional development here refers to opportunities for continuous learning and reflection on one's and the team's work (Rantanen and Paavilainen 2018). The Finnish Ministry of Social Affairs and Health (2019) stresses the importance of providing workers an opportunity to stop to evaluate their contribution, to examine their experiences, challenge existing beliefs and learn new practices and ways of thinking. Critical self-evaluation, reflection and continuous learning should also take place at the level of teams and organizations. Collective professional knowledge constructed within teams shapes the thinking of individual workers, at best improving the work quality, at worst leading to dead routines. Reflective practice can make the work more meaningful and it is essential for the renewal of work and consolidation of professional competence (Finnish Ministry of Social Affairs and Health 2019).

Emotional Intelligence and Situational Awareness

The need to consciously develop emotional intelligence (EI) and situational awareness (SA) is increasingly recognized in health and social care research, practice and education (Freshwater and Stickley 2004, Stamer 2017, Karimi et al. 2020, Salminen-Tuomaala 2020). EI and SA were among important self-assessed learning needs of the child protection professionals, who took part in the

simulation coaching programme and qualitative study described in this article. EI and AI can also be considered relevant from the perspective of the three attributes required in substitute care for children, discussed above: client knowledge; interaction competence, and personal and professional development. Emotional intelligence is required in the establishment of client relationships, and in seeking to understand client's mood, experiences and emotions. EI, which is a combination of emotional and cognitive components (Salovey et al. 2004), is also an important component in problem-solving and decision-making (Akerjordet and Severinsson 2004) and in recognizing and understanding clients' individual needs (Kooker et al. 2007).

Emotional intelligence has been conceptualized as "the ability to recognize and manage one's emotions, to recognize other people's emotions and to use this information to guide one's thinking and action" (Salovey et al. 2004). According to this definition, EI is rather seen as an ability or a form of intelligence than a personality trait. Salovey et al. (2004) have proposed that EI can develop through four levels, from the ability to accurately perceive emotions, to conscious, reflective management or regulation of emotions. Another definition, proposed by Mikolajczak (2009), combines the conflicting perspectives of ability EI and trait EI in a Three-Level Model of EI: knowledge- abilities –dispositions. The first level refers to a person's knowledge about emotions and emotional skills, the second to the ability to apply knowledge in emotional situations, and the third (trait-level) to the tendency to use emotional skills/competences in daily life.

A systematic review of 46 EI intervention studies (Kotsou et al. 2018), conducted with various adult groups including medical and nursing professionals, provided some support for the efficacy of the interventions. The findings from the review suggested that various aspects of EI competencies could be improved in a way that benefits psychological health. Even a brief intervention can result in positive changes in psychological well-being, self-reported health, social relationships and employability (Nelis et al. 2011). Investigators stress the need for more research in order to confirm that EI interventions improve work and academic performance (Kotsou et al. 2018).

To move on to the other important concept in this study, situational awareness (SA) has been defined as the "perception of the elements in the environment in a volume of time and space, the comprehension of their meaning and the projection of their status in the near future" (Endsley 1995a). In other words, elements are perceived, their meaning understood in relation to the situation at hand, and an estimate or forecast of what will happen next is conducted. SA is essential for safe practice in high risk and stress situations (Lowe et al. 2016). It is dynamic, ongoing and iterative in nature, with new information received by professionals informing their new actions (Busby and Witucki-Brown 2011).

Situational awareness does not only refer to an attribute of individual professionals; it is considered to occur at team and organizational levels as well. The concept Team Situational Awareness or TSA is used for the cognitive processes and behaviours of team members acquiring and sharing information and knowledge about a situation (Endsley 1995b).

In medical and nursing sciences, early research on situational awareness focused on medical settings using measurement frameworks from aviation industry. Situational awareness is regarded as an important non-technical skill that helps to ensure patient/client safety. It has been proposed, for example, that SA education should be included in nursing curricula (Stubbings et al. 2012). The use of high fidelity simulation has been recommended for the training of situational awareness and teamwork skills (Eddy et al. 2016, O'Meara et al. 2014). The recognition that situational awareness is a precursor of, or a primary basis for clinical judgment and decision-making, has led to an increasing body of healthcare literature (Stubbings et al. 2012, Endsley and Jones 2012). Clinical judgment has been defined as "interpretation or conclusion about a patient's needs, concerns, or health problems and/or the decision to take action (or not), use or modify standard approaches, or improvise new ones as deemed appropriate by the patient's response" (Tanner 2006).

Simulation Pedagogy

In adult education, immersing the learner in an event that simulates the real world is considered to be an effective approach. Simulations, preceded by preparation and followed by feedback and debriefing of the experience, have been found to enhance active learning and the likelihood that the learners will be able to apply the knowledge and skills later, when confronted with similar situations in "real life" (e.g., Bethune et al. 2011, Banerjee et al. 2016).

One of the definitions for simulation is "artificial representation of a phenomenon or activity that allows participants to experience a realistic situation without real-world risks" (Larew et al. 2006). Well-planned simulation-based learning allows an opportunity to reflect on the learning experience and real-life practice in a safe, motivational learner-centred environment, supported by expert educators (Kneebone 2005). The methods used and the levels of difficulty can and should vary according to the context and learning objectives (e.g., Doolen et al. 2014, Williams et al. 2017).

Simulation-based learning has a long history in healthcare education, and it has been proposed that social work education should learn from medical and health science education to develop simulation-based teaching and learning (Dodds et al. 2018). A recent scoping review of 52 articles showed an increase in simulation-based learning in social work education. The review also revealed that facilitators reported in the articles to simulation-based learning were similar to best practice standards in medicine and nursing: immediate feedback, reflection, adequate preparing, clear learning objectives and supportive learning environment. In both social work and healthcare professions, simulations can be useful tools for learning holistic competence (Kourgiantakis et al. 2019), specialized competencies, and for learning to deal with infrequent clinical situations or safety risks (Brown 2008, Kourgiantakis et al. 2019).

Health and social work professions share many competencies that can be practised using simulation-based learning. These include, but are certainly not limited to, emotional intelligence, situational awareness, therapeutic

communication, crisis management and clinical judgment (Brown 2008, Decker et al. 2008, Salminen-Tuomaala 2020). Emotional intelligence skills can be achieved through simulation-based learning, because it provides an opportunity for learners to confront a dilemma and explore their emotional and intellectual reactions without clinical responsibility. In other words, it could be argued that fostering self-awareness is an essential component in simulation-based learning (Brown 2008).

The Study

Here it is described the educational intervention and study carried out with 36 professionals from 5 providers of substitute care services for children in Finland. The coaching applied in the simulation provided in the five companies was based on the method developed by Seinäjoki University of Applied Sciences and Sedu Vocational Education according to the self-assessed continuous learning needs of the participants. The purpose of the research was to explore how simulation coaching could improve emotional intelligence skills and situational awareness in professionals working for private providers of child protection services.

Participants

The study was conducted in western Finland. The 36 participants, 18 women and 18 men, represented private providers of child protection services. They worked in four professional foster homes and one children's home, located across four municipalities. All the participants had completed a Bachelor's degree or equivalent in nursing (n = 30) or social services (n = 6). They were mainly involved in guiding and helping the children, supporting their health, development and education. In three companies, the entrepreneurs took part in the simulation sessions. Their duties included administrative tasks in addition to guidance and education. The length of the participants' work experience varied between 2 and 20 years.

The Simulation Coaching Concept and Intervention

Based on the participants' wishes and on the assessment of learning needs, two teachers (called coaches), usually one representing health care and the other social work, planned and implemented the simulated scenarios as team work. A non-authoritative mentoring and coaching approach was applied. The concept very much relied on the ideas of learning from peers and on multi-professional collaboration between social and healthcare. Special attention was paid to participants' background. Their earlier work experience was appreciated and used as a foundation for the learning. The coaches made an effort to create an open and warm atmosphere. Ethical principles for the sessions were also discussed during the preparation stage; it was agreed that sensitive issues brought up during the

sessions were confidential and should not be taken up after the sessions, unless specifically agreed with all participants.

The coaching was mainly implemented in the participants' own facilities, which can be thought to facilitate transfer to the workplace context and allowed several persons from the same workplace to participate simultaneously. The coaches limited the number of participants to 16 to ensure that everybody had the time and space to become intensively involved. Ideally, 10 participants would be a suitable group size. All simulation sessions started with preparation and ended with debriefing; that is feedback discussions and shared reflection (Salminen-Tuomaala 2019, Salminen-Tuomaala et al. 2020).

The simulation sessions took place mostly in multi-professional groups. One or two days were arranged in each company. One day involved no more than three scenarios, because the experience of role-playing was often considered intense or demanding. The scenarios, led by the two coaches or teachers specialized in the topic, revolved around various interaction situations between the children and personnel. Before acting out the scenarios, definitions and models related to emotional intelligence and situational awareness were introduced. The participants also discussed factors that had shaped their emotional intelligence and personal development, and factors that had burdened them and caused stress at work.

The length of individual scenarios was approximately 20 minutes. The scenarios were always followed by 60 minutes provided for reflection and discussion. Before the scenarios, the participants were briefed about an initial situation involving carefully constructed challenging roles, and asked to respond to the situation as it evolved. One of the coaches simulated the role of the child or teenager, two participants acted out the scenario, and the other participants observed the situation carefully. During the debriefing session, the participants discussed their thoughts, emotions and ways of developing interaction, emotional intelligence, situational awareness and presence.

To give a few examples of the scenarios conducted: In one scenario, a teenager, whose role was played by the coach, had smuggled drugs into her room and now exhibited restless and aggressive behaviour. Two professionals were trying to resolve the incident by talking to the teenager. The rest of the participants were asked to observe the situation and especially to concentrate on issues related to emotional intelligence and situational awareness. Another scenario portrayed a child, diagnosed with attention deficit hyperactivity disorder that was swearing and throwing books on the floor and against the walls. Two staff members were working together in order to help him calm down. In yet another example, a girl acted out her frustration and aggression by kicking and screaming. The pair of professionals reacted by expressing understanding and setting limits on the uncontrolled behaviour.

Data Collection

Emotional intelligence and situational awareness may be considered elusive concepts and difficult to operationalise. Because of this, and since there is little previous research on the development of EI and SA through simulation in child

protection services, it was decided to use a qualitative research design and an interpretive paradigm to explore the first-hand experiences of the participants (Puusa and Juuti 2020).

Before taking part in the study, the participants had been involved in three stages of simulation coaching: discussion on relevant concepts as preparation, the actual scenarios and debriefing; that is discussion, feedback and reflection on the actions and processes involved in the scenarios. Directly after the last debriefing discussion, voluntary participants were asked to write down their thoughts in a short essay about how they had experienced the simulation scenarios from the perspective of their professional competence, emotional intelligence and situational awareness.

Data Analysis

Inductive content analysis was used to analyze the essays. Based on the rich body of material (48 transcribed pages using font 12), the aim was to capture, interpret and understand meanings attached by participants to the simulation coaching situation. The data was first read and re-read several times, and some preliminary observations were noted (Puusa and Juuti 2020). The meaning units or significant statements that appeared to relate to the research question and provided an understanding of how the participants experienced the phenomenon were picked out, written in Word files and rewritten as reduced expressions. An effort was made to still retain the original meaning of the text. The reduced expressions were grouped into categories according to content. These categories were grouped under new, higher order headings and, as the last step, combined into main categories. During this process, the investigator returned to the original data multiple times to strengthen the analysis.

Ethics, Rigour and Limitations

The ethical guidelines of the Finnish National Board on Research Integrity – TENK (2012) were observed throughout the research process. The topic was selected because there is little previous knowledge of the development of emotional intelligence and situational awareness through simulation from the perspective of child protection professionals. Participation was voluntary and based on informed consent. Permission to use the data was obtained from all the child protection companies involved in the educational intervention. Only the investigator used the material and it was destroyed after the analysis. The essays were written anonymously. The data provided by the participants cannot be traced back to them (Kuula 2006).

The detailed descriptions in this report can help readers assess the transferability of the findings. In other words, the readers can better decide if the findings are applicable to contexts relevant to them. The carefully conducted descriptions of the research process, participants and setting, combined with good scientific practice, can also help readers assess the credibility and confirmability of the findings, or judge if the results could be corroborated by other investigators.

The confirmability may have been affected by the fact that the investigator worked alone. It is also acknowledged that her previous experience of nursing and simulation teaching may have influenced the interpretation in two ways; in one hand, the previous knowledge and experience may have facilitated the work, on the other hand, it may have resulted in bias or preconceived preferences or inclinations (Polit and Beck 2012).

The study was conducted in a limited, relatively homogenous geographical area with a population of 200,000. Despite this and the limited number of participants (36), the study offers contributions and insight into the development of emotional intelligence skills and situational awareness through simulation (Cf. Puusa and Juuti 2020). The findings can be of interest to other providers of child protection services in Finland and possibly other countries, and potentially to service providers, whose clients suffer from mental health problems, abuse and traumatic experiences. Nurse and social work educators, providers of continuing education and anyone interested in the development of emotional intelligence and situational awareness through simulation may also consider the transferability of the findings to their work.

Results

The analysis revealed that the simulation coaching had been meaningful to the participants from at least the following four perspectives, expressed in the main categories Awareness of emotions; projecting oneself into another person's position; Team intelligence, and Supervision of work.

Awareness of Emotions

According to the respondents, one of the essential outcomes in simulation coaching was learning to recognize and name one's emotions. The coaching was found to increase self-knowledge and helped participants become better aware of their mind-set. They had difficulty admitting that many of their emotions were not positive. On the other hand, they pointed out that negative emotions involved important information about the situation, encouraging reflection on how to respond, and why. The need to bring "self-compassion" and "accepting presence" into the demanding work in child protection was also recognized. The participants indicated that empathy towards oneself was a prerequisite for finding the resources to put oneself in the client's position. However, naming one's emotions and telling about them to the other professionals was considered demanding and made the participants feel vulnerable. They also felt that they had discovered what they called "mirrors" for their thoughts in other people.

In addition to becoming aware of one's own emotions, awareness of other group members' emotions was considered important for building up effective team work and for improving the collective atmosphere. The participants reported having been surprised at learning how many different emotions had been evoked by the scenarios, depending on the participant roles and the professionals' earlier

experiences. They also found that other people's emotions could be contagious, and reflected on their own role in the group from this perspective. Becoming aware of other workers' negative emotions being caused by stress or various worries or concerns, was mentioned as essential for understanding the working atmosphere and team situations. The participants pointed out that stress and exhaustion could undermine concentration and situational awareness. Especially Scenario 3, originally planned with the regulation of emotions and awareness of others' emotions in mind, was found useful.

Projecting Oneself into Another Person's Position

Secondly, simulation coaching was found to increase empathy skills, putting oneself into another person's position. According to the participants, "lack of genuine encounters" was one of the key challenges in child protection and foster care. The participants reported having become aware of too many "superficial encounters" that were "lacking in humanity". The simulated scenarios sparked reflection on how too shallow encounters with the children or their parents could lead to feelings of insecurity in the clients, acted out as challenging behaviour. One of the respondents described such behaviour as "loud shouting and attention-seeking", another participant mentioned children avoiding contact and seeking isolation. A third respondent described adults (the children's parents) sometimes seeking to present themselves as "superhuman". The recognition of the perceived lack of genuine contact made the participants ponder how to establish a good contact and dialogue with clients.

According to the participants, the simulated scenarios reminded them of how important it was to project oneself into the client's position. "Accepting presence", concentrating more carefully and expressing interest in what the clients were saying verbally or non-verbally were mentioned as a good starting point for contact. The participants also wrote that "situational sensitivity" and "emotional literacy", or ability to understand other people's emotions and interaction, were required. They felt that for example scenario 1, could help them better understand other people's perspectives and opinions, and place themselves in the client's position. According to the participants, simulation sessions should be repeated from time to time to remind them of the importance of genuine empathy and listening, often forgotten or lost during the daily routines. The participants said that the simulation coaching helped them improve their conversational, listening and feedback skills and increased their courage in expressing their opinions. They had, for example, started to look for new ways to provide encouraging feedback to their clients.

Team Intelligence

One of the outcomes in this simulation coaching intervention was the participants' experience of increase in what they called "team intelligence" and greater sense of togetherness. According to the respondents, the intervention had made them realize how besides their explicit individual knowledge, their

workplace was home to a great deal of knowledge owned by other people, including "tacit (silent) knowledge". Acting out the scenarios and the feedback discussions had made the participants aware of how important it was to bring together all competence in the workplace and to make better use of the tacit knowledge in order to reach the common goals. The simulation sessions had inspired them to look for ways to use team intelligence in the daily life at the workplace. In addition, the respondents felt that the simulation coaching had increased tolerance, the feeling of security and open interaction between the professionals.

All these changes or the building up of team intelligence by sharing of knowledge were considered to encourage creativity and flexibility at the workplace. It was recognized that making better use of the professionals' different work experience and competencies would ultimately benefit the whole personnel and company.

Supervision of Work

Last, the participants felt that the simulation coaching, especially the debriefing sessions, could be regarded as a form of work supervision. The participants welcomed the opportunity to commonly reflect on the challenges encountered in daily interaction with the clients. The debriefing sessions were experienced as a chance to engage in open dialogue on topics that were usually not discussed in everyday life at the workplace. According to the participants, simulation coaching was a method that allowed them to evaluate their work and development needs, and to determine if their aims or objectives defined for the work had been achieved. The coaching made it possible to share and interpret experiences and emotions related to one's role and expertise, to the work community and to the content of their work in a safe atmosphere. The participants also pointed out that the feedback sessions had reduced their anxiety and helped them cope better at work.

Discussion

This qualitative study was conducted in Finland with 36 professionals from 5 private providers of substitute care services for children. In a learning needs assessment, the most important self-assessed learning needs listed by the professionals had involved the development of emotional intelligence and situational awareness. EI and SA are also mentioned as important attributes for child protection professionals in the National quality recommendation for child welfare (Finnish Ministry of Social Affairs and Health 2019). Emotional intelligence and situational awareness, which include both cognitive and emotional components (Salovey et al. 2004), are most probably best learnt through reflection combined with experiential methods, such as simulation and contextualized learning. For this study, a simulation-based educational intervention, based on a non-authoritative, peer-supported mentoring and coaching approach, was provided

for the participants of this study to increase their EI and SA. Directly after the intervention, the participants were asked to recount in a short essay how the educational intervention had affected their EI and SA and other professional competence.

The results of this study suggest that simulation-based coaching can be an effective and meaningful method for learning emotional intelligence, situational awareness and teamwork skills. The participants reported increased awareness of their own and other people's emotions; better ability to project themselves into the client's position, and increased team intelligence. They also pointed out that simulation coaching appeared to be useful as a form of work supervision.

According to the participants, the acting out and observation of simulated scenarios combined with shared reflection increased their self-knowledge. Recognition and acceptance of one's own and others' emotions, even negative ones, made the participants better aware of their need for empathy towards themselves as a prerequisite for empathy towards clients. It would seem, based on the results, that the simulation sessions made the participants better aware of their own role and responsibility for the regulation of emotions and success of client and teamwork in the work community. They realized, for example, that daily client encounters could easily become too routinised and unfeeling. The participants described a need to stop and concentrate on better listening and interpretation of verbal and nonverbal cues in clients, and to give them more encouraging feedback. The simulation sessions seem to have not only increased their awareness of these issues, but also improved their interaction skills.

The participants used the terms genuine and accepting presence to describe the desired attributes of client encounters. In Finland, the concept of genuine encounters has been discussed by Kallio (2017), who states that to engage in a genuine encounter with a child, one needs to find the courage to walk alongside the child as a human and incomplete person, but still offer safety and compassion. This approach is based on the understanding that in their incompleteness, emotions, needs and wishes, people resemble each other. The need for contact and the need to be seen and accepted are shared by all humans (Kallio 2017). These needs are pronounced in children who use child protection services.

The participants in this study also used the term increased team intelligence when they described the outcomes of the simulation coaching. The term came from them; it was not among the topics discussed during the preparation phase. The participants talked about sharing of knowledge and sense of togetherness in this context. In literature, the concept of team or collective intelligence has been used in different fields, including psychology, education and business. An attempt has also been made to conceptualise collective intelligence specifically for primary healthcare (Jean et al. 2019). In this framework, what is called a collective dimension includes the components sharing, co-constructing (of knowledge) and constructive conflict of crisis solving, whereas an intelligence-learning dimension involves the components mutual learning, reflective observation, active experimentation and boundary crossing (Jean et al. 2019).

To cite Finnish literature, Hiila et al. (2019) argue that team intelligence and collective situational awareness are the result of collaborative action and potential

of individual team members, fostered by self-knowledge; shared team direction; tolerant atmosphere; permission to act and responsibility for action, and enriching (encouraging) interaction. Both descriptions, those of Jean et al. (2019) and Hiila et al. (2019), seem to resemble many of the elements described by the study participants as a result of the simulation coaching. These elements involve, for example, increased self-knowledge and becoming aware of the importance of reflection, tolerance/acceptance and encouraging feedback in the work community. According to Hiila et al. (2019), in the increasingly digitalized world, the development of team intelligence and human interaction becomes all the more important (Hiila et al. 2019). The need to provide opportunities for critical self-evaluation, reflection and continuous learning at the team and organization level has also been recognized in the Quality recommendation for child welfare, issued the Finnish Ministry of Social Affairs and Health. Collective professional knowledge constructed within teams and reflective practice can improve the work quality and make the work more meaningful to the professionals (Finnish Ministry of Social Affairs and Health 2019).

Last, the participants of this study found simulation coaching a form of work supervision, which allowed them take time to look at their daily routines from a new perspective and to share their thoughts and emotions in a safe atmosphere. They also had an opportunity to reflect on their professional competence, motives and attitudes. The participants wished that simulation sessions should be repeated from time to time.

All in all, it seems that simulation coaching can be considered a useful and meaningful tool for the development of emotional intelligence, situational awareness and related competencies. The first two categories of findings, awareness of one's own and other's emotions, and the ability to project oneself into another person's position, might primarily be considered as typical features of emotional intelligence. The third category, team intelligence, can perhaps be connected to both emotional intelligence and situational awareness, and the fourth category, simulation coaching as supervision of work, could be seen as a tool to enhance both EI and SA. This is said knowing that there is most probably a complex association between the two concepts, EI and SA.

The findings of this study can be of interest to child protection professionals in Finland and possibly other countries, and potentially to service providers, whose clients have been affected by mental health problems and traumatic experiences. In the context of child protection services, future simulated scenarios could also be constructed around the staff's interaction with the child's parents and significant others. Early childhood educators and staff of primary and secondary schools may also consider the transferability of the findings to their work. The potential differences between women and men's experiences of learning EI skills through simulation-based coaching could be a potential new research topic.

Conclusions

The results of this study indicate that simulation coaching can be considered a useful and meaningful tool for the development of emotional intelligence, situational awareness and related competencies in child protection professionals. The coaching can help participants become aware of the risk of becoming routinised and unfeeling, and remind them of the importance of self-empathy, listening and genuine and accepting presence in the daily client encounters. The coaching also provides an opportunity for individual and collective reflection and for the development of professional competence. Reflection, which must always be included in simulation-based education, can be claimed to be an essential element in the process of developing such non-technical skills as EI and SA. In addition to the providers of child protection services, many other professionals, whose work essentially involves close interaction with clients, may consider the transferability of the findings to their work.

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