

# The Future of Preventative Medicine: Health Promotion Programs as a Tool to Reduce Administrative Costs and Improve Health Outcomes

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## Abstract

Patient-centered care evolves around proper coordination between healthcare providers in consultation with patient needs. Often times, children play a passive role in their health care because of the controversy around age and lack of consensual abilities. The impact of engaging children early on to empower decision-making skills has been proven to influence their ability to make informed and knowledgeable decisions. Consequently, if not provided with support, a child can make unwise decisions in the realm of their healthcare. In academia, children may develop the skills needed to make informed decisions with the adaption of inquiry-based and discovery learning methodologies. Particularly, science educators emphasize investigative skills using micro-science in the public-school curriculum. Generally, healthcare providers have relied on the traditional approach of intervention when treating conditions instead of engaging children early on with preventative approaches like the utilization of health promotion programs. As a result, healthcare systems are extremely strained due to higher rates of preventable conditions across Canada and the United States.

This literature review examines recent research on 1) inquiry-based learning, 2) micro-science outreach and 3) health promotion programs linked to the reduction of healthcare costs. Next, a case study of Dalhousie University's COVID-19 Vaccine Hesitancy Outreach Project is dissected to see its impact on children's overall scientific comprehension and health care decision-making procession. Subsequently, the exploration of micro-science combined with inquiry-based learning as a psychological tool to increase cognitive agility is debated. Upon conclusion, the synthesizes of recent research led to a proposal of how a healthcare administrator could utilize micro-science in health promotion programs to lower healthcare costs.

**Keywords:** Children • Informed decisions • Inquiry-based learning • Micro-science • Health promotions • Preventative care • Cognitive agility • Behavior change theory • Return on Investment (ROI)

## Introduction

### How we learn impacts our decision-making

Inquiry-based learning and discovery learning can be easily mistaken as the same learning methodology. The key differentiator is inquiry-based learning involves answering a series of questions or solving problems based on facts and observations, whereas discovery learning focuses on finding the concept through experimentation [1]. When adolescents take science classes with inquiry-based learning, they tend to acquire higher science achievements [2]. Though contrary, other studies have shown emotional intelligence has a heavier weight against learning methodologies on academic performance suggest that a student's quality of life and ability to overcome existing social problems could be attributed to taking science classes [3,4]. The effects of inquiry-based learning may trickle down to the progression throughout post-

secondary studies and adulthood when making healthcare-related decisions.

Science literacy and comprehension can be attributed to the development of the ability to transfer knowledge from within the classroom in unknown situations [5]. A study conducted by Brickman reinforces that inquiry-based learning is best for deeper procession of material covered in class, leading to higher recognition and recollection during testing. However, inquiry-based learning may not be the best methodology to utilize if students experience the complexity and frustration associated with scientific inquiry beyond tolerance. The traditional approach to learning does not provide opportunities for deeper cognitive processes such as applying existing knowledge to the acquisition of new knowledge.

According to Burden and Burch, there are five definitive processes involved in inquiry-based learning: 1) Identifying and Formulating Problems, 2) Formulating Hypotheses, 3) Collecting Quantifiable and/or Qualitative Data, 4) Analyzing the Data to form Interpretations related to Hypotheses and 5) Drawing Conclusions. This process is very similar to the manner in which scientific phenomena are discovered by professionals [6].

Now, let's apply this learning methodology to making a healthcare decision. For instance, a child may receive unfortunate news that they have kidney stones. A decision on how to handle the situation can look like: 1) Finding out about Kidney Stones and its impact on you, 2) Weigh the treatment options, 3) Determining to undergo surgery with consultation of doctors and family, 4) Seeing how you feel compared to others who underwent the same surgery, and 5) Drawing your conclusions about that experience. In this example, the inquiry-based learning approach helped a child with deciding which treatment option to undergo and this process could improve their health outcomes. There may have been hurdles to overcome if stuck in the consultation phase with conflicting views between parties.

Healthcare decisions can exert the same frustration that a scientist would face in the field. Broadly speaking, it has been widely accepted practice for community-driven design and delivery of healthcare to reduce internal friction and tension that individuals face when making healthcare decisions [7]. A student's healthcare decision and educational progression are two separate realms in life to juggle. However, students can often use their knowledge obtained in academia to make informed healthcare decisions. Globally, the science educational curriculum reform has focused its efforts on teaching students to make informed and balanced decisions in their lives using their scientific knowledge acquired during instruction [8]. In the example above, the child could avoid the occurrence of kidney stones by applying their knowledge on nutrition, if previously educated on the role of diet before developing kidney stones.

Inquiry-based learning is deeply rooting in constructivism as learning occurs when one's own conceptions are constructed through intellectual activities. The decision-making process around your health should be as intellectually stimulating and provoke you to take an active role in your healthcare delivery. Even with limitations, inquiry-based learning is found to improve confidence with low ability students when it comes to making decisions in the context of solving problems [9,10].

The next section of this article will examine a particular case study of Dalhousie's Vaccine Hesitancy Outreach Project attempting to instill this decision-making process with the adaption of micro-science activities structured with inquiry-based learning methodologies [11]. Before diving into the case study, it is important to discuss preventative medicine and healthcare delivery, as the project's outcomes evolve around prevention of COVID-19 viral outbreaks.

### Preventable conditions routed in poor decision-making

Preventative medicine is the application of medical sciences in the absence of disease or in an attempt to prevent the occurrence or halt the onset of a disease [12]. Health promotion is the profession evolving around preventative medicine that seeks to promote healthy living surrounding nutrition and hygienical care to individuals. The goal is to reduce the occurrence of preventable conditions by educating the general public on self-care and identifying the onset of symptoms and interventions to improve prognosis.

Health promotion programs should be evaluated to routinely determine their effectiveness for achieving the desired health outcome. Clarke noted a famous example of a health promotion program for anti-smoking propaganda

targeted at youth [12]. The following factors were compounding influences on the student's receptivity: 1) parental influence on smoking habits outweighing any impacts on the campaign and/or, 2) socio-economic status. Thus, this means health promotion programs require action to be taken from community members in the communities themselves to lead change initiatives. This involves all community members including the aging population to play a role in promoting change. So, what about the aging population? Do health promotion programs tailored to the aging population help with targeting youth?

In the United States, Goetzel et al. examined how health promotion programs in general with or without inquiry-based learning methodologies integrated, could potentially reduce the cost to Medicare [13]. The prevention of the onset of chronic disease for senior populations has become the increasing focal point to reduce suffering and ailment [14]. A summary of experimental and quasi-experimental studies suggests that health promotion programs using behavior change theory with tailored delivery may produce positive ROI outcomes for the target audience [15-17]. In fact, Aldana found in 28 studies reporting cost savings, with 7 studies showing expended calculations for cost-benefit ratios and financial returns averaging \$3.48 for every dollar.

Notably, these studies were conducted by well-established companies such as Johnson & Johnson, Citibank, Bank of America, Duke University, Procter and Gamble, and more [18-22]. In addition, a RAND report concluded that health promotion programs using health risk assessments with ongoing tailored interventions have the potential to be cost-beneficial [23]. Table 1 summarizes two studies that found performing programs to slow the onset of developing preventable conditions in the aging population.

Developing and delivering health promotion programs in aging versus youth populations can vary in approach and tactics when conveying complex medical and scientific knowledge. After reviewing the literature, health promotion programs using inquiry-based learning methodologies or not, offer a promising approach to reducing healthcare costs. One could only ask if the influence of programming structure played a substantial role in cost reduction.

What if we can cut the costs drastically by reducing the demand and need for healthcare with health promotion programs? Although cutting the need for healthcare is not feasible, we can theoretically discuss how re-engineering the mindset of community health can reduce the higher admission rates to clinics of preventable conditions and the strain on the healthcare system.

**Re-engineering healthcare delivery for reducing the need and demand**

Health Promotion Practices: The traditional approach in healthcare is to diagnose and provide treatment to patients. The field of health promotion acts as an integral part focusing on self-management and behavior modification. Fries et al comprised 3 complementary models of health promotion programs to reduce the need for healthcare [24]. The factors affecting the need are composed of a conceptual base for need (Figure 1). This base includes specific factors involved in the decision-making process such as Compression of Morbidity, Self-Efficacy, Long-term/Short-term Outcomes, Nature of Need, Nature of Demand, Self-Management, End-of-Life Care, Health Outreach Programs, and Expanded Definition of Health Promotion [24].

Health Promotion should be defined to encompass all activities needed to educate, guide, and motivate the individual to take personal action to improve their likelihood of sustained good health and reduce the need to seek medical care unless needed [24]. A three complementary model was established to improve: 1) the long-term outcomes of healthcare delivery, 2) Complete Disease Management, and 3) Five Lines of Health Defense (Figure 2).

From the literature, the structure of health promotion programs should be deeply rooted in behavioral theory and applying learning methodologies. An approach using behavioral theory and learning methodologies would focus on changing the mindset of the target audience from a passive to an active role in their healthcare delivery. Our health can be thought of as being inseparable from our behavior. In the fifth edition of Health Behavior: Theory, Research, and Practice, it provides roadmaps in which conceptualization,

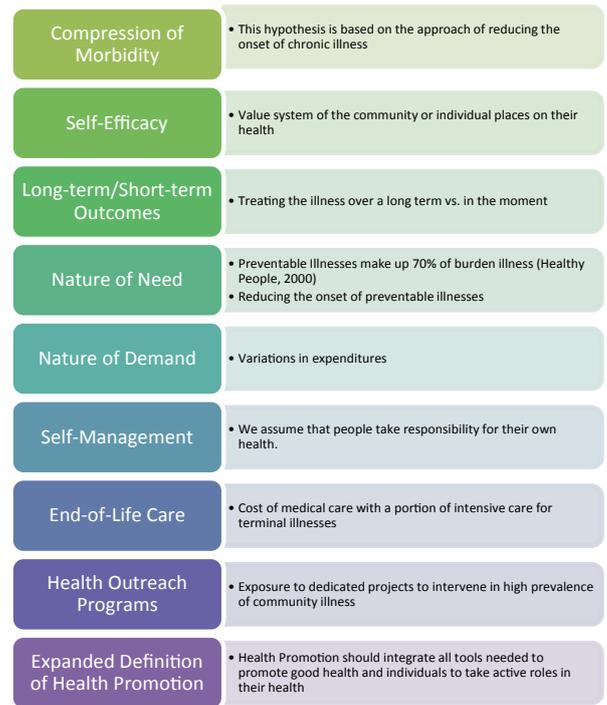


Figure 1: Conceptual Base of Need in Healthcare Organizations [24].

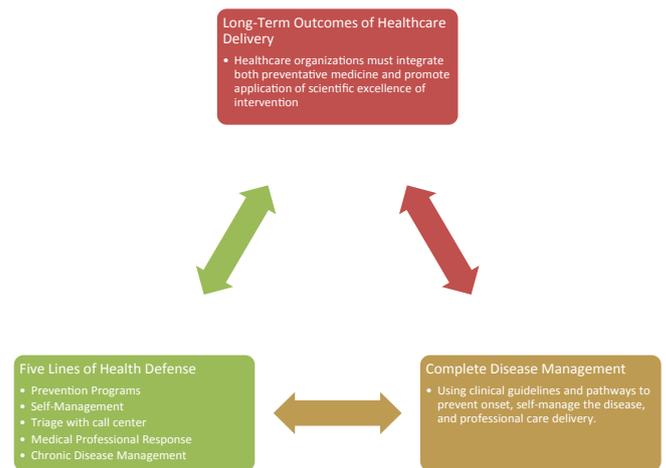


Figure 2: Three Complementary Model for Healthcare Organizations [24].

measurements, and alteration of health behaviors could positively impact health outcomes. Most systematic approaches using health behavior theory (i.e., encompasses behavioral theory and learning methodologies) produce more profound results than programs developed without [25]. While some studies have shown an improvement, others produced results to the contrary which suggest there is a heavier weight on delivery by individuals and dissemination of information in communities, among other social influences [26].

**Health Promotion Programming Structure:** A broader overview of health behavior entails the examination of health promotion and education programs that correlate to improving coping skills and enhanced quality of life. Up until this point, preventative health behavior with health promotion programs was discussed as an option for the reduction in administrative costs. Now, we will explore the origins of the theory, research, and practice and the tension arising when implementing effective strategies like health promotion programs to alter health behavior.

Aristotle defined theoria and praxis. Theoria signifying the science concerned with knowing for own sake whereas praxis means the application of science. Western society has propagated that the two: theory and practice, are opposites with no reconciliation [27]. Over the years, Dewey (2012) attempts to reconcile the differences with insights into "experiential and experimental knowing" emphasizing empirical investigation, and research, as the common ground for practice and theory. That brings us to the present day where the application of health promotion programs provides unique experiences to engage communities while experientially altering delivery based on the context [28].

Table 1: Health Promotion Program Studies in Aging Populations

Health Promotion Studies	Summary of Findings	
	Expenditure Variable	ROI (USD)
Citibank (Ozminkowski et al, 1999)	Independent Variable (Controlled)	\$4.70 for every dollar
Bank of America (Leigh et al, 1992)	Independent Variable (Controlled)	\$5.00 for every dollar
General Motors (Goetzel et al, 2007)	Does not contain precise expenditure information (varies)	Does not contain ROI information but, it suggests \$101 USD in savings

Depending on the objective of the health promotion program, it should be deeply rooted in the theories developed from predecessors to achieve outcomes. Thus, the context involving the audience, medical condition, culture, and program delivery will be the determining factors for program outcomes. For example, if an organization's objective is to promote weight loss strategies to those at risk of becoming obese, it is essential to understand the theories of the Transtheoretical Model (i.e., Social Cognitive Theory) to structure the program, including efforts to understand the patient's upbringing and culture. Then, proceed with the delivery to optimize the patient's outcome. Wouldn't you take your weight more seriously if this preventative care approach was applied? In fact, this seems like the medical practitioners are going the extra mile to improve their patient outcomes. This should really be the way that patient-centered care is approached and not considered an extra stride. However, society follows the traditional approach to healthcare with no onus on innovation integrated into the thread of health policies and programs to enhance patient experience and quality of care [29-30].

Health promotion programs should be extensively researched by health scientists and clinicians for determining potential framework architecture. It is simply human nature to create correlations and generalizations to translate our knowledge into applications. We should tread with caution to not become over-reliant on correlational design models when determining programming demands [25]. There will always be difficulty in finding reliable ways to translate theory for applications in health promotion programs to improve patient health outcomes. As a result, clinicians should actively use innovative ways to disseminate information into communities with an eye for sampling pragmatic real-world case studies. Therefore, it is suggested that future health promotion programs should focus more on the translation of knowledge in communities to reduce the prevalence of preventable conditions, both in clinical and community settings (Rothwell, 2005; Rohrbach et al, 2006).

The case study of Dalhousie University's COVID-19 Outreach Project will serve as an example of an attempt to improve community health outcomes using a micro-science educational outreach project (interchangeably known as a health promotion project). In the next section, we will examine the details of this case study from inception to close out of the project and how it could have been improved to achieve objectives.

**Case study: Encouraging vaccination confidence project**

Background: COVID-19 Impact on Mental Health of Youth: Children can be malleable and shaped by their experiences in life. The need for stability is essential for them to master their environments [31]. As we age, cognitive functions and abilities become less malleable with time, making it essential to influence children early in their decision-making processes through support and guidance in a nurturing environment. The COVID-19 pandemic disrupted the stability of youth, making it difficult for them to adapt, thrive, and conquer their environments [32]. UNESCO estimated that 80% of children would be impacted by school closure globally [33]. This rate increased into the pandemic, and still, presently, more than half of schools are partially or fully closed [34]. In Canada, 5.7 million children and youth in elementary to secondary school have been impacted [35].

Although school closures were implemented to stop the spread, youth have suffered the burden after the lack of social interactions led to a deficit for cognitive development. These skills are fundamental to the growth, wellness, and overall development of a child. When deprived, the academic scholastic achievement is negatively affected, and less play-social interaction behavior with an immediate effect on their mental health [36,37]. Studies show that this type of trauma has a long-term negative effect on physical health, mental health, academic performance, and relationship formation [38-41].

With technological advancements, social media is used by youth to collect information and steer the social constructs of the next generation. It can be weaponized to disseminate misinformation around COVID-19 vaccines with the goal of increasing vaccine hesitancy. For example, TikTok is a well-established social media platform and there has been a high occurrence of memes dedicated to discouraging COVID-19 vaccination. A recent study by Basch et al, 2020 scanned TikTok using the #covidvaccine for videos, showing 38 videos discouraging the vaccine. Approximately, 25 (65.79%) showed a parody of an adverse reaction and 22 videos (57.89%) falsely conveyed that a vaccine was available, as they were not at the time of the study. Overall, this anti-vaccination propaganda may undermine efforts to ensure widespread uptake of the various COVID-19 vaccines, particularly for young people who are more likely than other age cohorts to use TikTok [42].

Strasser et al (2022) conducted an examination of 13 research studies with over 760, 474 participants between ages 10-29, across seven countries [43]. These studies collected data on how COVID-19 News on TV could lead to elevated distress levels in youth. There are several factors involved in creating distress such as information overload, negative content, and misinformation creation [44,45]. From these studies, assessments of depression, anxiety, and stress symptoms were carried out with self-reporting practices. Table 2 summarizes the findings of two studies: one in Canada and the United

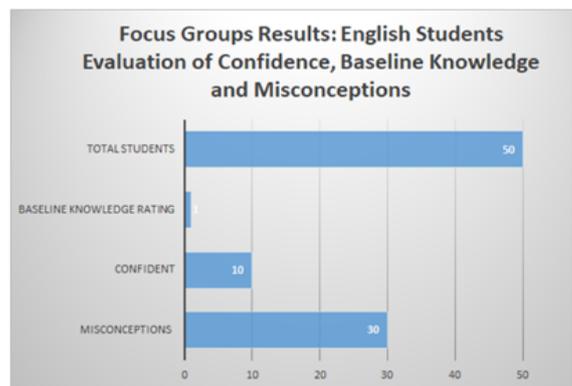
States. Regardless of the context, COVID-19 news discouraging vaccination showed to elevate symptoms of depression, anxiety, and distress by creating a sense of false hopelessness in the target audience (Table 2 depression, anxiety, and distress by creating a sense of false hopelessness in the target audience (Table 2).

Impaired mental health can impact decision-making abilities, resulting in poor judgment [46,47]. The Encouraging Vaccination Project was conceived to address misinformation circulation causing distress around COVID-19 vaccines in youth [11]. The objective was to provide information in an interactive format to youth for them to consider when making informed decisions related to vaccinations. This approach indirectly was thought to improve mental health through teaching valuable skills with identifying credible sources and improving confidence with instilling scientific inquiry abilities. This project ran between July 2021-March 2022 and it received a tremendous amount of publicity [48-51].

**Design, development and delivery:** The project was designed to deliver science activities about COVID-19 virology and vaccinations to African Canadian youth in Nova Scotia. After the realization, that public health initiatives need to engage all community members for optimal community outcomes pertaining to reducing viral outbreaks. Later, the reach expanded to an all-inclusive group representation of the general public.

The science activities were developed after conducting focus groups with 60 African Canadian students to determine comprehension of vaccinology, immunology, epidemiology, and sources of vaccine hesitancy. These focus groups were conducted with open-ended questioning and led by students in an informal discussion. The conductor asked 3 questions about the determination of how many students held misconceptions, felt confident about vaccines, and possessed basic knowledge around vaccinations.

The focus group students were composed of ages 6-18 from Halifax, Digby, and Cape Breton regions with 50 students English-Speaking and 10 French-Speaking. Approximately, 10% were already vaccinated but, may or may not recommend COVID-19 vaccines, and, 90% younger than 16 years old. The findings suggested that students lacked a rudimentary understanding of the fundamental concepts around vaccinology and epidemiology [11]. It was even more alarming when students indicated a lack of resources such as booklets, pamphlets, and dedicated personnel at their local clinics to help them with vaccination questions. Clearly, this created a void, resulting in misinformation circulation from social media becoming more prominent within this age group. Figures 3 and 4 show the findings broken down separately for English-Speaking and French-Speaking students.



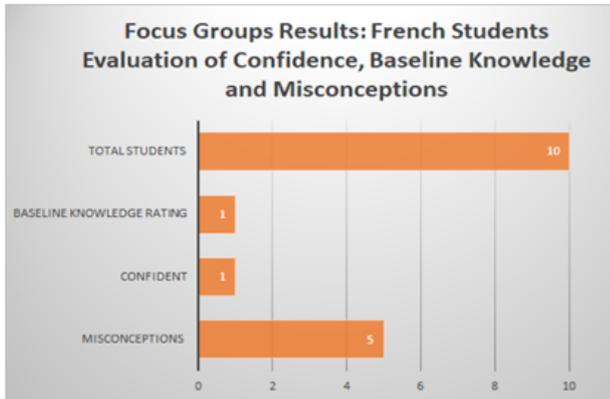
**Figure 3:** EVC Project: Focus Groups English-Speaking Results

Approximately, 2% of ANS students showed basic knowledge related to vaccinology and epidemiology, 20% of ANS students rated themselves as being confident in vaccine effectiveness and resources, and 60% were

**Table 2:** COVID-19 News Consumption and Mental Health Youth Studies in Canada and the United States

Country	Study Design	Sample Size	Summary
Canada (Gill, 2021)	Cross-sectional	84	Significant higher level of psychological distress and depression symptoms with daily-to-hourly use of social media to obtain COVID-19 news
United States (Kecojevic, 2020)	Cross-sectional	162	Significant higher positive association between time spent searching COVID-19 information with anxiety and somatization levels. Higher anxiety levels with longer time spent on social media platforms.

predisposed to misinformation via social media channels (e.g., Facebook, Instagram, Twitter, etc.) and believed the information they received. Baseline Knowledge Rating was calculated based on how many bullets points out of 10 were correctly identified from the fact sheet [11].



**Figure 4:** EVC Project: Focus Groups French-Speaking Results

Approximately, 10% of ANS students showed basic knowledge related to vaccinology and epidemiology, 10% of ANS students rated themselves as being confident in vaccine effectiveness and resources, and 50% were predisposed to misinformation via social media channels (e.g., Facebook, Instagram, Twitter, etc.) and believed the information they received. Baseline Knowledge Rating was calculated based on how many bullets points out of 10 were correctly identified from the fact sheet [11].

With this data, the developers created 8 science activities broken down into Grades 4-6, Grades 7-12, and All Grade Levels. In total, the breakdown of these activities shows: 3 explained vaccine mechanisms, 1 explained viral mutations, 2 explained how masking/social distancing worked, and 2 explained herd immunity. These science activities were conceived with the application of inquiry-based learning methodologies when presented to students. Thus, students played an active role in performing activities, developing, and testing hypotheses, and drawing conclusions based on their findings [11]. In a sense, these interactions promoted students' analytical thinking and taking active roles in making informed decisions around their vaccinations.

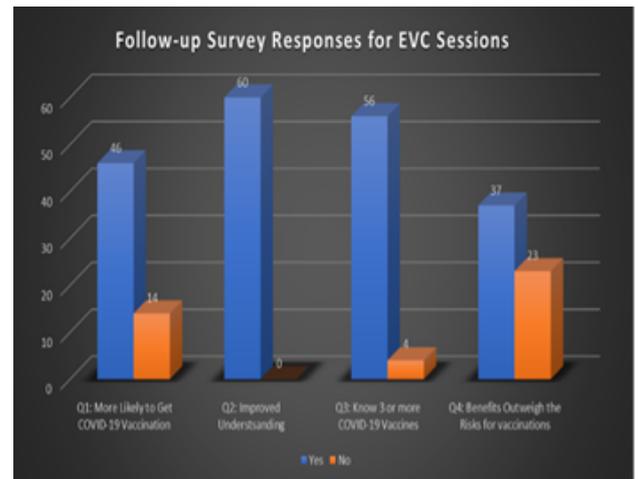
Even when training mentors, it was attempted to apply the testing effect. This theory was first coined by Edwina E. Abbott in 1909 [52]. The project manager/lead developer, Matthews, used roleplay techniques where trainee mentors acted as students during a mock session. Subsequently, the trainees attended a live session to observe how to engage students and observe first-hand what they could possibly encounter. Thereafter, the trainees were tested by taking on the role of presenter and the project manager/lead developer acted as an observer providing delayed feedback. The mentor's performance was determined by how many questions they could answer correctly, teacher affect, and ability to direct students to resources [53]. If the trainee's performance was satisfactory, they would be cleared to conduct sessions on their own without supervision. If not, they were retrained with the entire process.

Ultimately, it was determined the best delivery was to select 3 science activities, watching videos to reinforce learned concepts, and immediate testing in a discussion forum for a 1.5-hour session [54]. Additionally, the application of micro-science enabled efficient budgeting and expense adjustments since all science activities utilized common household commodities.

The use of micro-science to reduce costs is yet another administrative approach to being cost-effective in improving health outcomes. Ogunleye et al. (2019) explored the micro-science as a cost-effective way to reach more students in remote and impoverished areas. Experiences in developing countries and remote communities demonstrate that the quality of science education is often unsatisfactory, especially with respect to the use of imported equipment thereby draining limited foreign currency, without an apparent positive effect [55]. Therefore, the need to develop and curate science activities with affordable kits was essential for delivering high-quality sessions for the EVC project.

**Outcomes, improving science comprehension:** The EVC sessions concluded in March 2022. A total of 900 students were engaged with 78% identified as African Heritage. An optional follow-up survey was conducted to evaluate the changes in student science comprehension and confidence ratings related to vaccinations. Collectively, 60 surveys were returned, providing insights into the effects of the outreach initiative (Figure 5).

During sessions, mentors observed that African Heritage students tended to be less engaged in sessions and more likely to conform to group consensus due to polarization in multi-racial groups [11]. Applying the inquiry-based learning theory did not neutralize the effects of group polarization. Even once students drawn their own conclusion from the activities, they continued to proceed to agree verbally with other students about vaccinations. However, they are more likely to express a difference of opinion behind closed doors. This suggests that social influence plays a dynamic role in students' decision-making around vaccinations and may with other health-related decisions. In addition, there is a long history of medical racism and lack of access to proper healthcare in African Canadian communities [56]. African Canadian students highlighted the importance of family influence and perceived lack of trustworthiness in the scientific process behind vaccine development related to the historical medical racism events in the past.



**Figure 5:** EVC Project: Post-Session Survey Responses

Follow-up Survey Results for Q1: more likely to get a COVID-19 vaccination, Q2: understanding of the science behind viruses and vaccines improved, Q3: know 3 or more vaccines available in Nova Scotia as of October 2021, and Q4: the benefits outweigh the risks of getting vaccinated [11].

The survey results show that students self-reported an increase in understanding and confidence ratings after the presentations (Figure 5). Despite the promising self-reporting of improvement in comprehension, there was no way to verify this as true and students still provided lower ratings in benefits outweighing the risk of vaccinations.

Misconceptions about COVID-19 vaccines stem from the circulation of misinformation [57, 58]. In fact, some students apart of the EVC project were misled to believe that vaccines changed their DNA and caused blood clots, after viewing content on social media [11]. It was hypothesized through engaging students using inquiry-based learning methodologies (i.e., a type of experiential learning) in science activities would address the clarification of misinformation. The manner in which would be encouraging students to be analytical thinkers and question the credibility of information sources [11]. Through the advocacy of analytical and critical reasoning skills, students could become active agents in their vaccination decisions and acquire the skills necessary to make an informed decision. It is suggested that future research using experimental conditions and rigorous study design should be explored to investigate if this upholds a statistically robust evaluation.

Though the EVC project is not a research study, it did provide viable insights into what drives vaccine hesitancy in African Canadian communities in Nova Scotia. The students participating in the sessions expressed a variety of factors influencing their decision-making process for getting COVID-19 vaccines. Matthews et al (2022) synthesized the student feedback and formulated 5 standard questions, also known as the 5D's in decision-making around vaccine hesitancy which includes (Figure 6):

- Do I have confidence in the information provided?
- Do my family members have confidence in vaccines?
- Do I have confidence in healthcare providers throughout this process?
- Do I have confidence in the science behind making the vaccine?
- Do I feel confident with my understanding of the benefits and risks of getting vaccinated?

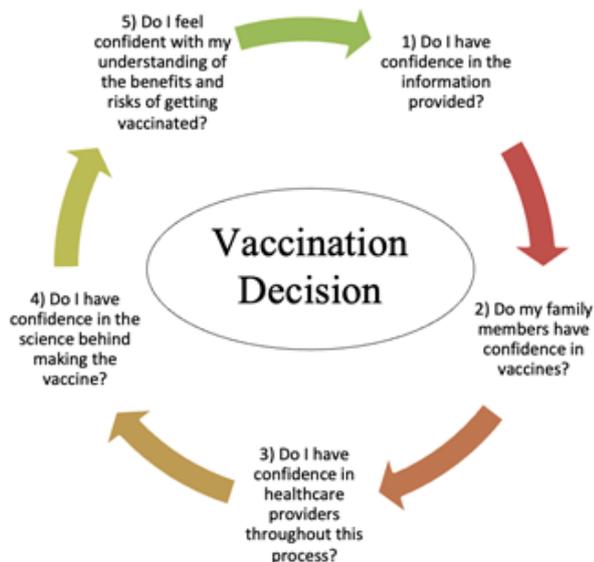


Figure 6: 5Ds of Decision-Making around Vaccine Hesitancy [11].

Upon the conclusion, the EVC project published a final project report detailing the findings from outreach efforts. In particular, the findings reinforce what we already know about the impact medical racism has on African Canadian communities, highlight how misinformation can impact health decisions, and emphasizes the discovery of a potential linkage between social influences on health decisions of African Canadian youth.

**Opportunities for improvement:** As noted, the EVC project was a science outreach project and only sought to see how science activities could improve comprehension. It was not developed as a research project, meaning there were holes in data collection and demographic information to draw conclusions. Also, there was no controlled conditions setup to separate students based on multi-racial or African Heritage groups to examine the potential effects of the project activities in different subgroups. Lastly, the survey results were based on self-reporting of students in surveys that their comprehension had increased. This may be an inaccurate read as there was no standardized test provided to score comprehension levels before and after sessions to see if the improvement correlates to attending the sessions.

An expansion of this project should be further pursued to examine the social influences (e.g., family members, peers, social media) in depth. An option explored by the EVC project was creating a spin-off program targeted at intermediate family members. The approach is to educate family members on vaccinology, virology, epidemiology, and related topics to make informed health decisions. It was noted that the art of persuasion for promoting vaccinations may actually deter community members by showcasing bias. In theory, this would encourage community members to stay on the fence or at worse, make a health decision that they later regret. In psychological terms, this is known as reverse psychology or reactance which is the main reason why outreach programs fail as they ignore the guideline to tread lightly and not present unbiased opinions to achieve their objectives.

Basch and Strasser conducted studies specifically looking at social media and news outlets, respectively [42,43]. From the literature review conducted, there are yet to date any studies being conducted to see how the combination of all social influences could play a role in vaccine hesitancy and particularly, youth making informed health decisions. Matthews hypothesized the possibility that integrating cross-provincial educational pandemic preparedness programs structured with learning theories in mind may improve pandemic preparedness before future outbreaks.

## Discussion

Health promotion programs can serve as an innovative approach for preventative medicine. The research conducted by Clarke (1974) and Goetzel et al (2007) provides insights into youth and adult health promotion programs. From the literature review, social influences, and community dynamics impact healthcare decisions. Moreover, these programs must be structured to effectively convey medical information in communities to ensure that they have the right information to make informed decisions. Applying inquiry-based learning methodologies could help the target audience improve their comprehension of the subject area.

It can become overwhelming if we leave youth and community members at their own accord to make healthcare decisions. Often, they turn to social media outlets as information providers or scientific knowledge agents, leading

to the development of distortions, misconceptions, and the circulation of misinformation. The COVID-19 pandemic is one example of how youth could develop symptoms of distress, anxiety, and depression when bombarded with information from social media related to healthcare decisions around vaccinations. The long-lasting impacts on the mental health of the future generations due to COVID-19 may trickle down into impaired decision-making in their overall healthcare decision-making processes Georgiades et al. 2021.

The case study of Dalhousie University's Vaccine Hesitancy Outreach program serves as an attempt to investigate into an innovative approach to disseminate reliable and credible information around the COVID-19 pandemic for improving the healthcare decision-making process of African Canadian youth. From this case study, this project provided valuable insights into the complexity of the decision-making process for youth around their vaccinations and how innovative programming with learning methodologies can increase subject matter comprehension used in decision-making.

From a healthcare administrative standpoint, health promotion programs can require higher investment upfront for running initiatives. Ozwminkowski et al, 1999 and Goetzel et al (2007) ran health promotion programs showing an increase in ROI when programs have risk assessments with ongoing tailored interventions, leading to potential cost-beneficial incentives [13, 20]. Health promotion programs could reduce the occurrence of preventable conditions if structured to address communities using effective strategies. Healthcare Administrators could focus efforts on lowering the need and demand of healthcare services for preventable conditions to reduce administrative costs and strain on the overall healthcare system.

Historically, the evaluation and structuring of health promotion programs have been done poorly due to the lack of embedment of psychological theories and false belief of causality [59]. The most effective approach to evaluate a health promotion program is to measure the health outcomes in relation to the activities. This literature review produced a summary of the research studies on health promotion programs. These health promotion programs for preventative medicine have been fruitful for healthcare reduction in costs over time Ozwminkowski et al, 1999; and Goetzel et al, 2007 [13, 20]. It was challenging to locate studies providing standardized testing on study participants' decision-making process and changes in comprehension under controlled conditions.

Fries et al (1998) were amongst the first to hypothesize 3 complementary models with a conceptual base of need in healthcare organizations, using behavioral theories and learning methodologies to promote cognitive agility in patients making complex healthcare decisions. Through this understanding, we can theorize that educating and disseminating health information can be a tool used by administrators for the reduction of costs while staying true to the field of preventative medicine [60,61].

## Conclusion

Several conclusions can be drawn from exploring the literature and examining the case study. Additional research is needed to explore the nature of health promotion program designs, implementation, and social influences on the decision-making process with a keen eye on examining their usage in the field of preventative medicine.

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## Conflict of Interests

No conflicts of interest disclosed by the author. This article references the psychological theories applied in the development and conception of the Encouraging Vaccination Confidence (EVC) project conducted by Imhotep's Legacy Academy. The EVC project was not a research project and only serves as an example of a micro-science educational outreach project.

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