

Revue YOUR Review

Volume/Tome 6/7 (2019/2020)



York Online Undergraduate Research

Intended to showcase York University (Toronto, Canada) student research, *Revue YOUR Review* is an annual, refereed e-journal offering an opportunity for York University students to prepare a paper for publication. The journal is multidisciplinary, open-access, and bilingual: articles are published in English or in French.

Revue York Online Undergraduate Research Review is associated with York University's annual, multidisciplinary Undergraduate Research Fair. Articles are revised from top projects submitted for York University credit courses and accepted as poster presentations at the juried Research Fair. Submissions are reviewed by an Editorial Board comprised of York University faculty members, writing instructors, librarians, and students, and may also be sent to expert readers within the discipline. Together, the Research Fair and its associated e-journal offer students an educational experience in researching, writing, preparing an abstract, designing and presenting a poster session, and revising a paper for publication—all components in the cycle of scholarly knowledge production and dissemination. Author rights are governed by Creative Commons licensing.

Revue **YOUR** Review

York **O**nline **U**ndergraduate **R**esearch

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[photograph, printed on photopaper, 36"x18"; mask, cedar, 24.2"x13.75"x10"]



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Stepping into Tomorrow

Editorial

Browsing through the morning news, probably online, you may well read about the latest progress to putting humans back on the Moon or how you can sign up for a tourist flight into (or close to) Earth orbit. Alternatively, you could read about the latest efforts to combat the pandemic and the advantages of mRNA vaccines. Of course, the continuing debate over efforts to curb climate change and the rising temperatures of the planet may be of more immediate concern to you. My point is simple: understanding and appreciating the science relating to the aforementioned topics are an important part of our daily lives.

It goes without saying that, from an historical perspective, we live in the most technologically advanced society to date. That technology is driven by the underlying scientific research that enables researchers to probe the very small and the very large structures in our universe and propose theories to better simulate and represent what we observe. This in turn allows the development of technologies that improve our daily lives. Whether it be the increase in the human lifespan that arises from biological research, the ability to provide clean drinking water on demand in a remote environment, or locating a missing person via GPS (Global Positioning System), science is irreversibly integrated into humanity's activities.

It is incumbent upon all of us to be scientifically literate. This does not mean we all need to become scientists. People can enjoy music without being able to play a musical instrument. People can read books without ever having become an author. I would suggest that having enough of an understanding of the scientific method to appreciate what a scientist may be proposing is an essential goal for everyone. Politicians in particular must have a clear appreciation of what is best in a given situation, based upon the scientific evidence available to them. There are no "fake facts." Evidence collected in an unbiased manner—subjected to peer review and debated by the scientific community to produce a rigorous result—should not be conveniently ignored because it does not conform to a political agenda. We, as the electorate, must hold our politicians accountable for their decisions and that is best achieved by ensuring our own scientific literacy.

As you read through the pages of this journal, you will find many young scientists honing their skills. From biology to psychology, many of the sciences are on display,

Editorial

as is the scientific method, the way science progresses. These authors have engaged in original research or literature searches, answering a question or evaluating the evidence amassed by others. They have their results on display, prepared to be argued with, told their methodologies are flawed or incomplete. The peer review process is at the heart of the scientific process and it is essential for the accuracy of scientific results. To be a scientist is not for the faint of heart. Your results could be found wanting or your interpretation of the evidence incorrect. It is part of the job though to be told to go back to the drawing board. However, this provides the reassurance to society that, when science stakes a claim to a result, it is not just one person's view but rather the consensus of many who have analyzed, probed, iterated, rejected, and finally concluded that a given result is accurate and a verifiable interpretation of an observation.

As citizens of the future, read and enjoy these contents and know that you are doing your part to become more scientifically literate and thus engaged in humanity's tomorrow.

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The Editors-in-Chief

MARISSA MAGNESON &
JOSHUA PRESCOTT

Reflections (2017)

[On the cover: Artists' statement](#)

Print on photopaper, 36"x18"; mask, cedar, 24.2"x13.75"x10"

Reflections is a collaboration between two artists: Toronto photographer Marissa Magneson and North West Coast carver Joshua Prescott. The photograph depicts Joshua's partially completed cedar mask floating on the bank of a river in Port Alberni, British Columbia. The mask and its reflection in the water mirror a discussion between two cousins that considers past, present, and future in one.

Reflections began as a dream and was brought into existence through my cousin Joshua and me (Marissa). Just before the piece was created, I had made the decision to embark on an independent study project using photography as a way of documenting my own journey towards reclaiming my cultural identity. As part of this, my mom introduced me to Joshua, who was on his own journey to reclaim the language of his children, Nuu-chah-nulth, which has fewer than 20 fluent speakers—most, over the age of 65. Inspired by Joshua's work as a language activist and artist, I proposed that the two of us collaborate on an artistic project. In Joshua's dream, we submerged one of his carved cedar masks in the river as a way of giving back to the land. I immediately felt that this was a dream we had to honour and so, in December 2017, I travelled to meet my cousin for the very first time.

Walking through the forest to a river that Joshua visits often, we stepped together into the frigid winter water, and quickly learned that the buoyant cedar mask simply could not be submerged as planned. And so, trusting in the process of collaborative art-making, we created something different.

Reflections symbolizes two artists, two cousins, coming together to engage in ancestral knowledge systems that inspire them to create. It also symbolizes an act of reclamation, as neither Joshua nor I had grown up with our cultures or languages. Colonization attempted to erase who we are but, through art, we are bringing back what was once lost but never forgotten.



Reflections: Artists' Statement

Métis activist and language and culture defender Louis Riel once said: “My people will sleep for 100 years and, when they awake, it will be the artists who give them their spirit back.”

When I first learned about the impacts of colonization on Indigenous peoples and cultures, I turned to photography to express the emotions I was feeling and to process what I'd learned. Out of this, the photograph *Frozen Chains of Childhood* (2017) was born ([published on the cover of volume 5 of *Revue YOUR Review*](#)). That photograph depicts a schoolyard swing encapsulated in ice and illustrates the pain Indigenous children endured in the residential school system.

Much like *Frozen Chains of Childhood*, *Reflections* was the last photograph I took on the days of each photoshoot and, in both instances, I knew I had captured something special. While *Frozen Chains of Childhood* looks to a past where Indigenous peoples were not allowed to express their culture(s), *Reflections* looks to the future, as we carve a path forward where future generations know what it means to be Indigenous and are proud to share who they are.

As the ice is melting, the earth beneath us is thawing, bringing undeniable truths to the surface. Canada is thrown into a time of reflection when we must look back to understand where we are now and where we are heading.

To quote an ancient Nuu-chah-nulth saying:

hišukniš c̄awaak c̄awaack^winiš, ḥaaʔak^waq̄łna miilinkš̄iłqun mamuuk

We are all one, everything is interconnected. We are incredibly strong when we work together.

About the photographer: Marissa Magneson

Marissa Magneson is a Cree-Métis artist, photographer, educator, and workshop facilitator. She has a BFA honours degree from York University (Toronto, Canada) and a Master's degree in Canadian and Indigenous Studies from Trent University (Peterborough, Canada). Her re-search explores Indigenous methodologies using beadwork as visual storytelling. Marissa's work is centred around decolonizing education, strengthening community and cultural reclamation. In her collaborative work with various organizations, Marissa works towards photographing, consulting, educating, and creating programming in meaningful ways. Marissa would like to acknowledge her maternal grandmother, Elaine Jessop, whose life-long work on Indigenous women's rights inspires her own journey.

Instagram: [@MagnesonStudios](#) / [@MarissaMagnesonPhotography](#)

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Reflections: Artists' Statement

About the mask carver: Joshua Prescott, *t̓aqums̓ʔaq̓λ*

Joshua Prescott is a North West Coast style carver and Nuuchahnulth language activist from Vancouver Island, British Columbia (Canada). He apprenticed under John Livingston for seven years. A graduate of North Island College's Cabinetry and Joinery program (Vancouver Island, B.C.), Joshua assisted master carver Luke Marston with the bronze sculpture *Shore to Shore*, a public art project unveiled in Vancouver's Stanley Park in 2015. As assistant carver for Tim Paul, he worked on a 63-foot totem pole, raised on the traditional territories of the *Ćiṣaaʔath̓* and *Hupačasath̓* Nations (Port Alberni, B.C.). Although he is of Cree-Métis ancestry, Joshua was adopted into a Nuuchahnulth family (the Lucas family) at a potlatch and was given the name *t̓aqums̓ʔaq̓λ*, which means, "he will continue forward in a good way no matter what obstacles are in his path." Joshua excels in detail carving and painting, and prides himself on clean craftsmanship as well as on honest and respectful business ethics rooted in his cultural teachings. Joshua acknowledges Julia Lucas (*tupaat*) for teaching him the language and traditional stories which inspire his artwork, and recognizes the late Simon Lucas as well as Adam Werle, Katie Fraser, Stanley Sam, and Sidney Sam, among others, who have helped guide and teach him with love and respect.

Website: <https://www.joshuaprescott.ca>

*ʔuuk^wačilʔiʔaat̓ t̓aaqaak, hix^waaʔiʔaat̓ ʔuutaq q^wismaḥsayiik, hitaʔapnaʔaat̓
tuxcpaanuʔaλqun tuuḥmis.*

*Always believe in yourself, always work hard for what you want to become,
for we win when we jump over our fears.*

-Joshua Prescott

MELISSA P. MCLETCHE

Prison Education Programs and Their Impact on Recidivism in Canada

Prisoners are one of the most marginalized and vulnerable populations within any society. Education programs offered by Correctional Service Canada (CSC) and the Ontario Ministry of the Solicitor General (SOLGEN) have been critiqued for not adequately preparing prisoners to return to their communities. In this article, I explore the types of education programs available to Canadian prisoners and suggest how the federal and provincial governments can support new and innovative prison education policies using examples from the United States. I also discuss the benefits of post-secondary education to prisoners and its impact on recidivism.

Keywords: Prison, prisoners, Canada, education, recidivism

On the day my partner and I picked up our friend from prison, the weather was absolutely perfect. It was the spring of 2011 and the air smelled fresh and the breeze felt like hope and possibility. It had been seven years since he'd stepped foot outside of prison walls. He was no longer a baby-faced teenage boy; he was now a man in his twenties whose eyes revealed more about what he had experienced on the inside than did his childlike smile. When we pulled up to the jail he had been transferred to for his release, my partner asked me to go in and get him, although he was his best friend. Having recently completed almost six years on the inside himself, my partner vowed never to willingly set foot inside a jail or prison again.

I sat in the waiting area for what seemed like hours for the correctional officers to bring him out. Finally, I heard some chatter and looked up to see our friend coming down the hall. He was smiling from ear to ear while telling them that he never wanted to see them again...common departing banter, I assumed. We embraced one another and he collected his meager bag of belongings. Seven years of his life fit neatly into a large zip-lock bag. Just as we were stepping out of the front door, one of the guards yelled, "See you in a couple years!" My friend shook his head with a smile; he wasn't going to let anyone ruin the day for him. He was looking forward to a better and brighter future.



Prison Education Programs and Recidivism in Canada

Reintegrating into the community proved to be extremely difficult. During the seven years that he'd given to the Canadian carceral system, he returned home with minimal education and no transferrable skills. He was back living in government housing with his mother and felt just as trapped there as he had when behind bars. Having been incarcerated since the age of 17 and struggling through high school, he lacked the literacy and educational accreditation that would make him employable. He eventually became desperate for income and stability and found comfort in his old ways. Having been released for fewer than two years, our friend recidivated and is now serving 20 years to life in a Canadian prison.

It is estimated that one in seven people in Canada has a criminal record (Pate, 2019); that's over five million people and, between April 2019 and April 2020, there were over 50% more adults (11,466) in provincial remand¹ awaiting trial than were sentenced (6,384) (Statistics Canada, 2020). The fact that such a large proportion of the Canadian population is or has experienced imprisonment reinforces why it's important to critically examine the services and programs offered in carceral spaces to determine how our current methods need improving. Through my personal experiences with the Canadian justice system and those of the people around me, I use a critical sociological lens to explore carceral education programs in Canada and their impact on recidivism by exploring the following questions:

1. What types of education programs are available to prisoners in Canada?
2. What are some of the critiques of these programs?
3. What can we learn from the education policies and programs available to prisoners in the United States?

EDUCATION PROGRAMS FOR CANADIAN PRISONERS

In Canada, the Ministry of the Solicitor General (SOLGEN) in each province is responsible for the supervision and rehabilitation² of prisoners over the age of 18 who are on remand or for those sentenced to less than two years.³ Within these institutions, individuals are offered basic education and literacy courses. In Ontario jails, there are three main education programs: adult basic literacy, secondary education, and self-study. Some jails also offer various specialized language programs (Ministry of the Solicitor General, 2020).

¹ In 2018/19 the majority of individuals in custody in every province except three (Newfoundland and Labrador, Québec, and Prince Edward Island) had not been convicted of any crime and were awaiting trial (Malakieh, 2020, p. 9).

² Many advocates of criminal justice reform consider the Canadian carceral system to be more retributive than rehabilitative.

³ Provincial corrections are concerned only with offenders who have been sentenced for two years less a day, or less. Federal corrections are concerned with offenders who have been sentenced for two years or more (Frequently Asked Questions, 2019).

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At the federal level, Correctional Service Canada (CSC) offers five education programs to individuals sentenced to more than two years: Adult Basic Education (ABE), Adapted Adult Basic Education, General Education Development (GED), Post-Secondary Prerequisite, and post-secondary education. According to CSC, the goal of these programs is to “address offenders’ educational needs; increase offenders’ basic literacy, social cognition, and problem solving skills; and prepare offenders for participation in correctional programs” (Correctional Service Canada, 2019). ABE is CSC’s priority program and is available at all institutions “on a 12-month continuous intake basis” (Correctional Service Canada, 2017). Both the Adult Basic Education program and the GED certification are fully funded by the federal government, whereas prisoners are responsible for covering the costs of post-secondary education programs that would allow them to learn a trade or profession or to update their trade qualifications.

Post-secondary education is understandably more significant to federal prisoners than to provincial prisoners because federal prisoners serve longer sentences. However, prisoners at both levels could benefit from post-secondary education programs, given their vulnerable circumstances and the well-researched correlation between poverty and criminal activity (see Alexander, 2012; Hinton, 2016; Maynard, 2017; Owusu-Bempah & Wortley, 2014). Naturally, many people are completely opposed to the idea of providing free or subsidized post-secondary education to prisoners, especially since many in the general population struggle to pay for college and/or university themselves. The common sentiment that prisoners are undeserving of such “privileges” because they have broken the law is rooted unrealistically in meritocratic values which contend that all people have access to equal opportunities and would reap their due rewards, if only they tried harder (Johnston, Cairns, & Baumann, 2017, p. 63). The ideology of meritocracy ignores systemic factors that unbalance the scales of democratic ideals and stand in the way of practical solutions that truly reflect rehabilitative programming.

The argument that post-secondary education is a perk for offenders is an outdated concept that needs to be seriously challenged by both the federal and provincial governments. Subsidized, if not free, post-secondary education for all prisoners is more in line with democratic principles and directly connected to CSC and SOLGEN objectives to provide these individuals with the skills needed to maintain employment and reside lawfully in their communities upon their release. Recognizing the connection between education and socio-economic stability, three community-based organizations in Ontario, Canada work hard to dismantle the barriers to post-secondary education for prisoners. These three groups—Walls to Bridges, Amadeusz, and Literal Change—acknowledge the benefits of education to both prisoners and the community and exemplify what it truly means to rehabilitate offenders and prepare them to succeed after their release.

I. Walls to Bridges

Founded in 2011 as a partnership between the Grand Valley Institute for Women and the Faculty of Social Work at Wilfred Laurier University, the Walls to Bridges (W2B) program is an innovative approach to post-secondary education that unites prisoners and college/university students in collaborative learning environments. Courses range in discipline from gender and women's studies, geography, Native studies, criminology, social work, theatre studies, sociology, justice and emergency services, and English.

The W2B program is unique because of its pedagogical approach to the learning environment centred upon the *circle of trust* principle where students share an egalitarian peer partnership rather than a mentor/mentee relationship. Within the circle of trust, both imprisoned and community students are encouraged to speak their "own truth, while listening receptively to the truth of others, using simple personal testimony without affirming or negating other speakers" (Fayter, 2016; Palmer, 2008). W2B has the potential to transform not only the lives of prisoners, but also the perceptions of members of the general public by challenging existing stereotypes of who prisoners are.

II. Amadeusz

This program works with prisoners aged 18–35 who are incarcerated at the Toronto South Detention Centre, the Toronto East Detention Centre, or the Vanier Centre for Women. The program provides prisoners with equitable access to education and mentorship programs, with an eye to positively changing their lives. The Amadeusz education program (formally known as the Look at My Life Project) gives these young people the opportunity to complete their high school education and attend post-secondary schooling inside the jail (Amadeusz, 2019, p.3). Participants can work toward obtaining an Ontario Secondary School Diploma (OSSD) or a General Education Development certificate (GED). In 2019, the OSSD program operated out of two provincial institutions and had 50 participants enrolled, 14 of whom had completed a course, while three had earned a diploma (Amadeusz, 2019, pp. 8–9). The GED program saw similar success in the same year, with 40 prisoners across three institutions writing the GED exam, 25 of whom passed all five sections of the exam and obtained diplomas (Amadeusz, 2019, pp. 8–9).

III. Literal Change

Founded in 2016 by two women educators from Ontario who saw the need for greater literacy skills for imprisoned populations, Literal Change volunteers provide one-on-one literacy intervention at the Toronto East Detention Centre (10 teachers) and the Toronto South Detention Centre (15 teachers). In 2019, the program received 160 admission requests and worked with 100 students for 1100 contact hours (Literal Change, 2019). Past program participants attest to how their confidence improved

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and how joyful they felt in being able to communicate effectively through letters and poetry to their loved ones on the outside. According to the program website, 79% of people entering Canadian prisons do not have a high school diploma, 65% of people entering prison have less than a grade 8 education or literacy skills, and a 30% reduction in recidivism can be achieved through programming, depending on the level of literacy the student achieved (Literal Change, 2020).

Correctional facilities in Canada offer prisoners education and vocation/work programs, but these institutions tend to function independently of one another instead of collaboratively to equip prisoners with the literacy, credentials, training, and transferable skills necessary to successfully transition into life beyond prison walls. To people, including myself, who are familiar with the policies around correctional programs and the practices within the institutions, it is clear that the Canadian government does not adequately meet the needs of either prisoners or the public, and the counter-productive (in)action of CSC and the MOTSG only serves to demonstrate that they are not truly committed to rehabilitation or community safety.

BEHIND THE TIMES

The current carceral system in Canada has been critiqued for decades by the families of the imprisoned and by academics, community advocates, independent researchers, the Correctional Investigator, and prisoners themselves. Both CSC and the MOTSG have been accused of failing to uphold their commitments to prisoners and the community by implementing and enforcing outdated and culturally irrelevant programs and practices. In 2020, the Office of the Correctional Investigator (OCI) has recommended that the policies in federal institutions need to be updated as they do not fully support the acquisition of marketable employment skills or innovative computer skills; the 2015 CSC report still refers to “floppy diskettes” as a viable means for prisoners to save their documents—a medium that would not serve them practically out in the community (Zinger, 2020, p. 73).

I recall that my partner, who was also incarcerated, was extremely reluctant to engage with computer technology after his release in 2009, a limitation that significantly diminished his confidence in applying for and attending college. He felt that so much had changed and that he was not in a position to adapt to and keep up with the online platforms that were required for assignment submissions and classroom interactions. Similarly, in provincial institutions, post-secondary education programs are lacking or non-existent. Because sentences in these facilities are less than two years, provincial prison officials do not see the value of supporting a post-secondary education for this population. However, due to hearing delays, more than half of the provincial prison population is awaiting pre-trial sentencing and some individuals could remain in provincial facilities for much longer than two years.

Although Correctional Service Canada prides itself on its ability to prepare prisoners for community re-entry, the education programs offered in Canadian

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correctional facilities completely contradict this directive. While Canadian society is typically recognized for its liberal and inclusive practices, when it comes to prisoners and their needs, supporters of tough-on-crime policies often argue for a more conservative and punitive approach. For example, the Ontario SOLGEN recently announced the Eastern Regions Strategy, an attempt to strengthen justice services and community safety. The new initiative will see an investment of \$500 million over five years to “modernize correctional facilities and support frontline corrections officers across the province” (Office of the Premier, 2020) by constructing a new Greater Ottawa Correctional Complex, replacing the Brockville jail with a new facility, expanding the St. Lawrence Valley Correctional and Treatment Centre and the Quinte Detention Centre, and renovating the Ottawa-Carlton Detention Centre. It seems that the Ontario government is more concerned with stimulating the economy by building more jails and expanding the prison industrial complex than with improving everyday conditions within existing facilities. According to MPP Steve Clark, “these critical investments demonstrate our government's ongoing commitment to our incredible frontline corrections workers, while also providing an important boost to our local economy” (Office of the Premier, 2020). The question is, at whose expense?

The Canadian government and correctional institutions need to recognize the importance of education (especially at the post-secondary level) and cease adhering to neo-liberal ideologies that support the warehousing of individuals as a way to maintain public safety. If the objective of imprisonment is truly to reform socially unacceptable behaviour and protect the public, then proposed and existing policies and programs need to align with community employment sector requirements. Policies that support post-secondary attainment for all prisoners would make these individuals more marketable in the workforce upon their release and consequently reduce the likelihood that they would resort to crime as a means of supporting themselves and their families. The American prison industrial complex is often criticized for exploiting prisoners for capital gain and upholding draconian laws that disproportionately impact Black and Brown individuals (which it certainly does). However, there is much that Canada can learn from American prison education policies and practices.

EDUCATION AND RECIDIVISM

In a report entitled *The Right to Education of Persons in Detention*, presented to the U.N. Human Rights Committee in June 2009, Special Rapporteur on the Rights to Education Vernor Muñoz asserts that educational opportunities for all prisoners should be a common practice within institutions and should not simply be “an add-on should resources ‘allow’ it” (Muñoz, 2009, p. 165). Education opportunities in Canadian jails and prisons already provide basic literacy and high school education through either institutional or community-based programs; however, this is just not

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enough. True rehabilitation can be achieved through effective education programs aimed at the “full development of the whole person requiring, amongst others, prisoner access to formal and informal education, to literacy programmes, basic education, vocational training, creative, religious and cultural activities, physical education and sport, social education, higher education and library facilities” (Muñoz, 2009, p. 165). A one-size-fits-all approach to rehabilitation cannot prepare individual prisoners to return to their respective lives and communities.

Prisoners who are released into the community unskilled and undereducated are highly likely to return to prison—simply attending school in prison reduces the likelihood of reincarceration by 29% (Karpowitz & Kenner, 2003, p. 2; Rice, 2018, p.94). In a 2015 evaluation of CSC’s education programs and services, it was determined that “high risk non-Aboriginal offenders who had at least one education level completion presented a 62% higher rate of obtaining community employment compared to high risk offenders who were not assigned to an education program” (Richer, McLean-McKay, Bradley & Horne, 2015, p. 23). The authors recommend providing educational programs that are based on offenders’ career objectives and aligning these options with Canadian labour market standards, which increasingly require a post-secondary education for most occupations—a recommendation that continues to be ignored (Richer et al., 2015, pp. 29–30).

Studies have shown that individuals who obtain higher education accreditation in prison are much less likely to reoffend (Huckleberry, 2004), since their labour market credentials open up considerable opportunities for social mobility (Scott, 2016, p. 156). In a recent study from the U.S. exploring the experiences of African-American men who attained a bachelor’s or graduate degree, or who acquired formal career training or certification while imprisoned, participants explicitly stated:

Upon release the void of criminal activity must be replaced with something else. Minus, a means to support themselves or their families upon release the data indicates its [*sic*] likely former prisoners will resort to the methods that served them prior to incarceration and eventually land themselves back in prison in an effort to survive (Rice, 2018, p. 91)

—a sentiment reinforced by my friend’s post-release experience.

POST-SECONDARY PROGRAMS IN THE UNITED STATES

The Bard Prison Initiative (BPI)⁴ is arguably the most elaborate and successful prison education program in the U.S. The program extends Bard College liberal arts courses to individuals at six New York State prisons (aka campuses), which count toward associate and bachelor degrees. The students undergo a stringent admission process,

⁴ There is a documentary about the Bard Prison Initiative called *College Behind Bars* available on Netflix and Amazon.

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enroll full-time in the same courses that they would take on Bard's main campus, and are held to the same high standards as all Bard College students (Bard Prison Initiative, 2021). Since its inception in 2001, BPI has conferred 550 degrees on prisoners at their campuses. BPI students also participate in debate competitions with other colleges and universities such as West Point, Brown, and the University of Vermont and, in 2015, a BPI debate team defeated a Harvard team. Many Americans released from prison with post-secondary degrees have gone on to obtain doctorates and teach in academe. Formally known as "convict criminologists," these ex-prisoners, now academic faculty, use their lived experience and higher education training to "make critiques of existing literature, policies, and practices, and contribute a new perspective on criminology, criminal justice, corrections, and community corrections" (Richards & Ross, 2001, pp. 180, 184).

Post-Secondary Funding for U.S. Prisoners

In the United States, the federal government awards Pell Grants to full- and part-time post-secondary students who face significant financial hardship and are unable to afford college. Until 1994, prisoners in the U.S. were eligible to apply for these grants to subsidize the costs of their education. At the time, social and political dismay over prisoners being the recipients of \$200 million⁵ for a free college education led to the grant's being rescinded after 30 years, resulting in the closure of half of the prison college classrooms across the country and the reduction of opportunities in most of the surviving programs (Scott, 2016, p. 156; Wright, 2001, p. 14). In 2015, the Obama administration announced an experimental initiative called "Second Chance Pell," which allowed 67 colleges and universities to enroll incarcerated students with Pell grants on a trial basis (Cantora, 2020). The program was deemed a success, with over 17,000 students participating in 28 states and, during the first three years of Second Chance Pell, about 4,450 credentials were awarded (Cantora, 2020). In December 2020, after many years of advocacy calling for greater rehabilitation and more humanitarian practices and programs within carceral spaces, the U.S. Congress reinstated needs-based Pell Grant eligibility for prisoners. Although the United States is widely critiqued for its mass-incarceration problem, there is still much that Canada can learn from the academic opportunities made available to prisoners.

Education programs are beneficial not only to prisoners, but also to society as a whole. Individuals who participate in prison education programs describe their experience as transformative. "They become positive role models in prison and return to their communities with new perspectives and goals—and with new opportunities open to them" (Livingston & Miller, quoted in Delaney & Montagnet, 2020, p. 1). Ironically, while Canada has been branded as one of the most

⁵ Only between 0.82 percent and 1.2 percent of all Pell Grants went to prisoners in the early 1990s (Mallory, 2015, p. 1).

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humanitarian and liberal countries in the world, when it comes to the human rights of and state responsibility to prisoners, our policies are inhumane, unconstitutional, and extremely conservative. As Nelson Mandela once famously observed, “it is said that no one truly knows a nation until one has been inside its jails. A nation should not be judged by how it treats its highest citizens, but its lowest ones.”

CONCLUSION

Post-secondary education should be a priority in every Canadian prisoner’s correctional plan. It is completely counterproductive for the Canadian government to place the responsibility for post-secondary education solely on prisoners. A tuition subsidy initiative similar to the Pell Grants offered in the U.S. could help to reduce the number of individuals who reoffend after their release from Canadian jails and prisons. In addition to being cost-effective, a policy that supports free post-secondary education for prisoners would also fit with democratic and rehabilitative ideals. I do not in any way suggest that access to post-secondary education and funding would prevent all prisoners from reoffending. However, when individuals are able to use their incarceration time to pursue higher education, they are less likely to engage in disturbances and can be released from these institutions with new-found confidence and hope for the future.

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TAYLOR WHITEHEAD, VICTORIA HARDIN, ROSHAWNAH FORDE,
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Are Angry Babies Boys and Happy Babies Girls?

A paired–associate learning experiment

Expressions of happiness and affection have stereotypically been associated with women, and those of aggression and anger, with men. In this study, we ask if this association affects memory. Eleven women and 11 men had to learn the names of 24 babies by viewing their faces: 12 faces expressed happiness and 12, anger. All baby faces appeared gender neutral (in reality, half of them were girls and half, boys). Half of the happy babies were assigned a girl name and half, a boy name, and likewise with the angry babies. After trying to learn all the emotion expression and gendered name pairings of the babies, the participants were given a multiple-choice recognition test, where the face of each baby was shown and four possible names were provided (the correct one and three incorrect ones—among which, two boys' and two girls' names). As expected, there were more correct answers when learning occurred with the congruent emotion-gender pairs (happy-girls, angry-boys) than with the incongruent ones (angry-girls, happy-boys). Moreover, the incorrect names attributed to the baby faces were more often congruent with the emotion expressed: angry babies were attributed an incorrect boy name and happy girls, an incorrect girl name. Our results confirm that stereotyped associations still influence associative memory. Remembering the names of happy baby girls and angry baby boys is easier, and babies expressing happiness and anger may be easier to associate with femininity and masculinity, respectively. This research suggests that gender stereotypes are still prevalent and continue to influence our cognitive processes.

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Keywords: Gender, emotion expression, stereotypes, memory, paired-associate learning



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Our perception of what we see is often subject to implicit, or unconscious, attitudes which manifest as judgments outside of an individual's awareness (Greenwald, & Banaji, 1995). Past evidence has shown that generalized associations between various emotions and gender groups exist; for example, happiness and fear have been more frequently associated with women, and anger and contempt with men (Brody & Hall, 1993; Plant et al., 2000). Similarly, women have been believed to be more likely to smile, and men to openly express anger (Briton & Hall, 1995; Brody & Hall, 1993; Dember et al., 1993; Fabes & Martin, 1991).

Evidence supporting these stereotypes pairing women with happiness and benevolence, and men with anger and aggression was only recently discovered. For instance, in 2016, Harris and colleagues showed a series of male and female photographs expressing emotion along a continuum—anger is clearly depicted at one end of the continuum, happiness at the other end, and neutral expressions in between. Along this continuum, participants had to choose the face that depicted a neutral emotional expression for female and male faces separately. Neutral male faces were attributed to angrier expressions, and neutral female faces to happier ones. In 2009, Hess and colleagues showed an androgynous face that expressed fear, anger, and happiness to varying degrees of intensity, and asked whether the face looked feminine or masculine. Their results confirm that the happier the face, the more feminine it was perceived to be, and conversely, the angrier, the more masculine. In the second study of that same paper, Hess and colleagues (2009) used male and female faces expressing fear, happiness, anger, and sadness, and found that participants were faster at judging a female face when it was happy and slower when it was angry. In line with these findings, Hofmann and colleagues (2006) showed that individuals are faster at naming happy females and angry males compared to angry females and happy males, and Becker and colleagues (2007) found that we are faster at detecting happy expressions on female faces and angry expressions on male faces. In sum, results are unequivocal: stereotyped associations between masculinity-anger and femininity-happiness exist and, consciously or not, they influence the ways we process information about gender, including memory.

Indeed, it is well established that stereotypes sway our memory: we tend to correctly recall and falsely fabricate information congruent with our stereotypes. For example, we recall happy-female and angry-male faces (i.e., stereotype congruent pairs) better than angry-female and happy-male faces (i.e., stereotype incongruent pairs; Harris et al., 2016). Similarly, it is easier to learn the names of males and females when they are angry or happy, respectively (Hofmann et al., 2006). Accordingly, we tend to falsely recognize items that are consistent with our gender stereotypes. Lenton and colleagues (2001) had participants learn words related to men or women, and when asked to recognize which words they had learned, not only did they falsely recognize words consistent with the stereotypically associated gender, but they also were most confident about those choices, even if wrong.

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However, a recent longitudinal analysis demonstrated that biases linking men and women to different roles (such as science/career, and arts/family, respectively) have weakened over the last 10 years (Charlesworth & Banaji, 2021). Since there is a downward trend in biases linking gender and specific roles, we hope this would similarly be reflected in decreased biases surrounding emotions as either more feminine or masculine. In the current study, we evaluated whether memory would still be affected by stereotyped associations between gender (boys and girls) and emotion (anger and happiness, respectively) when judging real baby faces.

A paired-associate learning task was used where participants were asked to learn the names of each baby. Photographs of real babies were chosen because they appear gender-neutral (e.g., Condry & Condry, 1976), and their faces are realistic (as opposed to computer-generated faces). Given the multicultural context where this study took place, a variety of baby pictures were selected to represent diverse racial and ethnic backgrounds. It was predicted that it would be easier to recognize the names of happy babies when assigned female names, and those of angry babies when assigned male names (than the reverse). Moreover, it was predicted that when wrongly recognized, happy babies would be more often given an incorrect girl name and angry babies, an incorrect boy name.

METHOD

Participants

Twenty-two students from York University's Glendon College participated in the experiment: 11 women ($M_{age}=20.00$, $SD=2.19$) and 11 men ($M_{age}=20.18$, $SD=1.99$). All participants provided informed consent. The study was approved by the Delegated Research Ethics Review Committee of the Psychology Department at Glendon College.

Materials and Procedure

Photographs of baby faces expressing anger and happiness were selected from online databases of public and private domain (A3pfamily, 2021; Gelpi, 2021; Paul Hakimata Photography, 2021; Valentsova, n.d.).¹ For each baby face selected, 60 students (who were the same age and education level as the study participants) were asked to identify what emotion each baby expressed. Faces that were identified as expressing anger or happiness by at least 90% of the students were used in the experiment, totalling 24 faces. While in reality 12 babies were girls and 12, boys, pictures were standardized to appear gender neutral. They were rendered in black and white, cropped so that the hairline was not apparent, and all gender cues such as hair bows, and earrings were removed (see examples of baby faces in figure 1). The pictures selected were racially and ethnically diverse, including babies of

¹ References to all photographs shown in this paper are provided. References for all other images used in the experiment are available upon request.

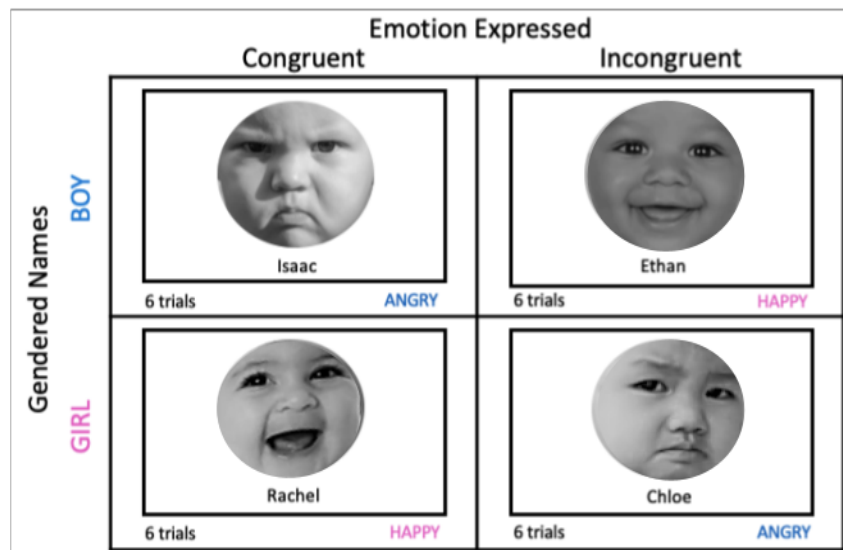
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Caucasian, Black, Asian, and Latin descent, to match the multicultural context of Toronto, where data were collected.

Twenty-four boy and girl names were paired with each picture. The names were selected from a list of the top 100 most popular first names in the U.S. to fit the following criteria: all names had two syllables and each started with a different letter (BabyCenter, 2021). Most important of all, the chosen boy and girl names had to unambiguously represent one gender or the other, and the names had to be equally common for their respective genders.

Each baby face was paired with a name (resulting in a total of 24 pairs). Of the 24 babies, 12 expressed happiness (six paired with a girl name and six paired with a boy name), and 12 expressed anger (six paired with a girl name and six paired with a boy name). This led to four emotion and gendered name pairing conditions (illustrated in figure 1): two congruent with the stereotype (happy-girl name and angry-boy name), and two incongruent with the stereotype (angry-girl name and happy-boy name). To counterbalance the emotion and gendered name pairings across participants, four different sequences of the 24 pairings were created, and one of four versions was presented at random to a quarter of all participants.

Figure 1. Examples of Emotion Expression and Gendered Name Pairing Conditions²



Note. Figure 1 presents four examples of baby faces expressing emotion paired with boy and girl names: two angry faces (one named Isaac, one named Chloe) and two

² The images used in figure 1 replace original images used in the experiment. To respect copyright regulations, the original images could not be used in this publication as the necessary permissions were not provided.

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happy faces (one named Ethan, one named Rachel). The pairing of gendered names and emotion expressed led to four conditions—two stereotype-congruent: angry-boy (here, named Isaac) and happy-girl (here, named Rachel); and two stereotype-incongruent: happy-boy (here, named Ethan), and angry-girl (here, named Chloe).

Using the PowerPoint application, a paired-associate learning task, with a learning phase and a testing phase, was designed using these expressive baby faces—each, associated with a gendered name. In the learning phase, each participant was shown 24 pairs of baby faces along with their names, one baby at a time, for five seconds (using animation in PowerPoint). Participants were asked to learn the name of each baby. The testing phase followed the learning phase. In the testing phase, participants were shown each baby in a random order and given a choice of four names (two boy names and two girl names, one correct and three incorrect).³ To the best of their abilities, participants had to choose the baby's correct name, learned previously. One baby was presented per PowerPoint slide and, at their own pace, participants wrote their choice on a piece of paper. Once their choice was made, they moved on to the next slide and could not look back at previous baby faces. An example of a baby and its name choices is shown in figure 2.

Figure 2. Example of PowerPoint Slide in Testing Phase



³ The choices of names were strategically organized so that each would belong to one of the four different pairing conditions of gendered names and emotion expression. Specifically, if the baby face shown on the slide and its correct name were from one condition (e.g., stereotype-congruent), one of the incorrect choices offered was from the same condition, and two from the opposite condition. For example, in figure 2, imagine that the correct name of this angry baby is David (stereotype-congruent pair). One of the incorrect name choices offered is another boy name (stereotype-congruent; here, Caleb) and two are girl names (stereotype-incongruent; here, Lily and Jasmine).

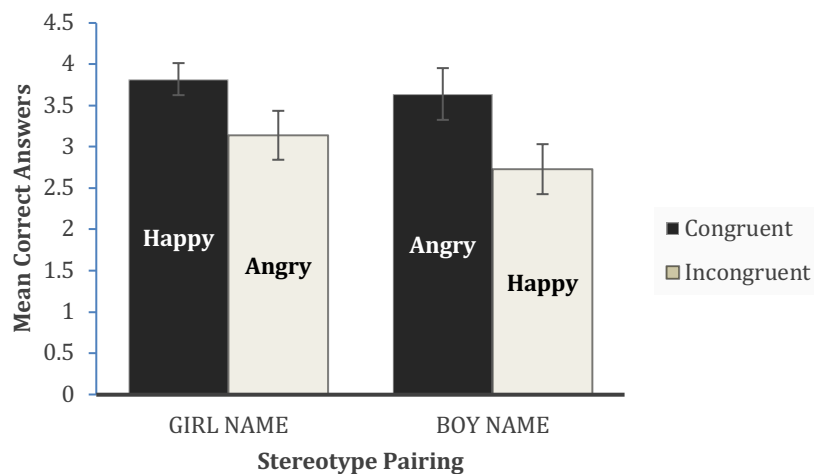
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Note. Figure 2 presents an example of one baby face with its name choices offered during the testing phase. The name choices included two male and two female names; one is correct and three are incorrect. Here, an angry baby face is presented with four name options (Caleb, Lily, David, and Jasmine).

RESULTS

For each condition, the number of correctly chosen names was calculated (see figure 3). The results show that there are more correct answers for stereotype congruent (happy-girl/angry-boy) than incongruent pairs (angry-girl/happy-boy).

Figure 3. Correct Answers for Emotion Expression and Gendered Name Pairing



Note. Figure 3 presents a bar graph for correct answers (with associated error bars) for baby faces expressing different emotions and given boy and girl names, for a total of four conditions—two stereotype-congruent: angry-boys and happy-girls; and two stereotype-incongruent: happy-boys and angry-girls. In this graph, the bars show participants had more correct answers in stereotype-congruent conditions than in stereotype-incongruent conditions.

A 2x2 statistical analysis (target gender by stereotype pairing) was conducted on participants' correct answers with the independent variables: stereotype pairing (congruent and incongruent) and gendered names (girl name and boy name). As expected, more correct answers were provided in the stereotype-congruent conditions (angry-boys and happy-girls) than the stereotype-incongruent conditions (happy-boys and angry-girls). This means that participants were more likely to remember face-name pairs that were congruent with the gender stereotypes.⁴

⁴ A 2 (target gender) x 2 (stereotype pairing) within-subjects analysis of variance (ANOVA) was conducted on the correct answers with the independent variables. As expected, the main effect

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Additionally, the number of incorrectly chosen names within the stereotype-congruent condition were calculated (i.e., when an incorrect boy name is chosen for an angry baby and an incorrect girl name is chosen for a happy baby). As predicted, there were more incorrect answers chosen to create a stereotype-congruent pair⁵ than to create a stereotype-incorrect pair.⁶ This means that participants were more likely to falsely indicate a gendered name that is congruent with the stereotype.⁷

DISCUSSION

The goal of the current study is to evaluate whether memory is affected by stereotyped associations between gender (boys and girls) and emotion (anger and happiness) when learning the names of real baby faces. Results suggest that we better recognize names of baby boys when they appear angry and names of baby girls when they appear happy. Moreover, results show that when we attribute an incorrect name to a baby, it is more often congruent with the stereotype: a happy baby is wrongly attributed a girl name and an angry one a boy name.

Our findings confirm that a stereotyped association between emotion expression and gender still exists and influences our cognitive processing. Findings are consistent with results showing that we process stimuli faster when the emotion depicted corresponds to its stereotyped associated gender (e.g., Becker et al., 2007; Harris et al., 2016; Hess et al., 2009; Hofmann et al., 2006). More directly, they confirm that we better recall stimuli pairing happiness with females and anger with males (e.g., Harris et al., 2016; Hofmann et al., 2006).

While our results are expected, they are important and innovative as the data were collected using realistic baby faces, and findings demonstrate that the stereotyped association between emotion expression and gender is persistent. It is crucial to realize that, while most of us would not explicitly acknowledge or report a different attitude towards males and females who express different emotions, our cognitive processing is still influenced by these stereotyped associations. Our results show that this influence can impact how we learn baby names. While not assessed here, it may even impact how we view a child—more feminine or more masculine—based on the emotions they frequently express.

Some limitations regarding our study should be noted. All participants were undergraduate students from York University's Glendon College (Toronto, Canada); therefore, generalizing the results to populations of different ages, education levels, and cultural backgrounds should be avoided. Individuals of different age groups may

of stereotype pairing was significant, $F(1, 21)=10.90, p=.003$. The main effect of gendered names, $F(1, 21)=1.69, p=.207$, and the interaction gendered names X stereotype pairing, $F(1, 21)=0.23, p=.633$, were not significant.

⁵ $M=6.59, SD=1.36$

⁶ $M=4.09, SD=0.93$

⁷ A paired t test: $t(21)=3.55, p=.0009$ indicated a statistically significant difference.

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hold different associations or associations of varying degrees between gender and emotion expression (Siyanova-Chanturia et al., 2015). Future research should be conducted on a larger sample for more meaningful replication of these results. It would also be interesting to examine whether stereotyped associations between gender and emotion exist across participants of different age groups such as older adults and/or children. Likewise, future studies could gather racial and ethnic demographic information on participants to explore how associations between emotional expression and gender may vary across cultures (Gong et al., 2018).

Despite these limitations, it is likely that our projection of these ideals of how boys and girls are supposed to express themselves impacts the way they are treated and, as a result, strengthens the cyclical process that perpetuates these stereotypes over generations. As mentioned earlier, the stereotyped associations between men-science/career and women-arts/family have been decreasing over the last 10 years (Charlesworth & Banaji, 2021). We can hope that the stereotypes about gender groups and expression of emotions as well as their impacts on memory will eventually recede.

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ALAINA THOMAS, NICOLE MAINA, STACY CHIU,
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The Power of Education

Comparing implicit stigma toward mental health care in Psychology and non-Psychology students

Fewer than a third of people living with mental health problems reach out for professional help, which could be due, in part, to negative stigma toward mental health issues. Typically, stigmatization toward any issue decreases as individuals gain more familiarity and knowledge about them. In this study, we measured whether students studying psychology have less implicit negative bias toward seeking psychological care. We adapted the Implicit Association Test (IAT) to evaluate how psychology and non-psychology students react to stereotypes against seeking out psychological care. Specifically, we measured and compared how easily these students classify words related to personality traits and to activities within stereotyped categories (i.e., care-seeking activities coupled with negative traits such as counselling-antisocial) and within non-stereotyped categories (i.e., care-seeking activities coupled with positive traits such as counselling-sociable). As expected, all students were faster at classifying items within the stereotype-congruent category. However, psychology students were not as affected by the stereotype non-congruent category: pairing positive attributes to care-seeking activities did not slow psychology students as much. These results suggest that exposure to psychology courses contributes to reducing implicit biases against mental health care. It is hoped that the 2020 Covid-19 pandemic will promote awareness about mental health issues, which in turn will decrease negative stigma toward mental health care.

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Keywords: Stigma, mental health care, stereotypes, implicit attitudes, Implicit Associations Test



Comparing Implicit Stigma Toward Mental Health Care

Global mental health concerns have risen over 13% in the last decade, with depression being the most common form of disability, and suicide, the second leading cause of death among 15- to 29-year-olds (World Health Organization, 2020); however, these concerns have reached new heights during the worldwide Covid-19 pandemic as people struggle with added financial, social, and health burdens (Douglas, 2020; “Pandemic impacting young people in Ontario,” 2020). Access to psychological support is needed now more than ever; unfortunately, barriers such as stigma deter individuals from seeking out mental health care (Corrigan, 2014). As the prevalence of mental illness increases, strategies to combat stigma are crucial (World Health Organization, 2020). Exposure, in the form of contact and education, has been shown to reduce negative stereotypes and biases such as stigma (O’Brien et al., 2010; Rudman et al., 2001). The goal of the current study is to determine whether a degree in psychology influences students’ implicit attitudes toward treatment seeking.

Despite evidence showing that counselling and other forms of psychotherapy help manage psychological issues, fewer than one third of people with mental illness seek treatment (Corrigan, 2014; Maranzan, 2016). Factors that have been identified as barriers to obtaining help include a lack of access to services, high cost, cultural and language differences, and stigma (Moroz et al., 2020). Stigma is defined as a negative social attitude or stereotype applied to an individual, based on a perceivable social, mental, or physical deficiency (APA Dictionary of Psychology, n.d). It is one of the most common deterrents to psychological treatment (Clement et al., 2015). Specifically, amongst men, ethnic minorities, military personnel, and health professionals, stigma is ranked as one of the top five barriers to seeking help (Corrigan, 2014). There are both private and public experiences of stigma. The private experience of stigma is expressed through stereotypes and prejudice. Stereotypes are beliefs acquired in our upbringing; for example, one may believe that, say, individuals with schizophrenia are aggressive. Prejudice is the act of agreeing with a stereotype. It provokes an evaluative and emotional response, such as being concerned about one’s safety when around someone with schizophrenia. Discrimination is the public manifestation of stigma that results from stereotypes and prejudice. For example, invitations to social gatherings may not be sent as often to individuals with schizophrenia (Corrigan, 2014).

Private and public stigma both impact individuals’ personal attitudes toward seeking out mental health care. Public stigma against mental health leads to label avoidance and/or internalizing (self-stigma). Label avoidance occurs when an individual perceives public discrimination against those with mental illness and avoids treatment for fear of being labelled. Self-stigma results in lowered self-esteem and self-efficacy. Accordingly, public stigma elicits a “why try effect”: a person avoids seeking treatment because they believe they lack the skills or worthiness to participate (Corrigan, 2014). Although most individuals do not explicitly notice the

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influence of stigma on their behaviours and judgments, their conduct may still be implicitly biased. This “implicit stigma” phenomenon is well researched and documented by Banaji and colleagues (see the Project Implicit website or Banaji and Greenwald’s 2016 book for a summary). For example, a 2018 study by Chiu et al. found that university students implicitly associate care-seeking activities (e.g., therapy) with negative personal attributes (e.g., lazy).

Greenwald, Banaji, and colleagues’ well-researched studies of how stigma influences implicit (rather than explicit) attitudes is instrumental. Explicit attitudes are deliberately believed or talked about, while an implicit attitude occurs outside conscious awareness and is non-deliberate (Stull et al., 2013). For example, a person may say, and truly believe, that depression is like any other physical illness (explicit attitude), but their openness toward treating depression may differ from how they would treat a physical ailment (implicit attitude). Detecting associations that individuals would not openly endorse or express is crucial to fully understand stigma.

Exposure, in the form of contact and education, reduces stigma and negative biases (O’Brien et al., 2010; Rudman et al., 2001). In one study, Rudman et al. (2001) examined the influence of education on non-Black college students’ perceptions of African-Americans. Students from diverse ethnicities were asked to participate in a 14-week seminar on prejudice and conflict taught by a Black professor. It was found that teachings on anti-Black racism by an educated person of colour reduced non-Black students’ implicit and explicit stigma toward African-Americans. These findings have been replicated in other areas of research, including research on anti-obesity prejudice (O’Brien et al., 2010).

Thus, familiarity with psychological issues and treatment may reduce individuals’ associated stigma. Mental health literacy, which represents one’s knowledge of mental health conditions and where to seek professional help, is correlated with positive attitudes toward help seeking (Cheng et al., 2018). University psychology courses promote mental health literacy through knowledge and exposure-based strategies (Maranzan, 2016). Given this evidence, psychology students who are educated on the realities of mental illnesses and treatment should have less negative stigma toward care seeking than other students who were not exposed to these concepts. While it makes sense that psychology students should have less *explicit* bias toward mental health-related topics, it is currently unknown whether they have a less *implicit* bias. The current study, described below, may be the first to empirically address this question. Specifically, this study aims to determine whether education in psychology reduces negative implicit attitudes toward care seeking. The implicit association between psychological care activities and personal attributes was measured and compared between psychology and non-psychology students. The Implicit Associations Test (IAT; first designed by Greenwald, McGhee and Schwartz [1998], and well established by Banaji, Greenwald, and colleagues) was used to measure the time that it takes to classify negative and positive personal attributes, as

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well as care seeking and daily living activities into *stereotype-congruent* and *stereotype-incongruent* categories. The stereotype-congruent category refers to pairings of items that are in alignment with stigma; in this case, negative attributes are paired with mental health care. The stereotype-incongruent category refers to pairings of items that are not in alignment with stigma; positive attributes are thus paired with mental health care. Typically, when using the IAT, participants are faster at classifying words into the categories that fit our stigma. As such, psychology and non-psychology students' reaction time (RT) at classifying words within the stigma-congruent and incongruent categories was compared.

METHODS

Participants

Twenty-nine psychology students and 29 age- and gender-matched non-psychology students participated in the study. All students were from York University in Toronto, Canada. Psychology students needed to have at least 18 university credits in psychology to participate (equivalent to a full year of psychology education); 25 women and four men (mean age=20.35, SD=1.47) volunteered.¹ The non-psychology students were matched to those in psychology; they had at least 18 university credits (but none in the field of psychology) and the same gender distribution (25 women and four men), and were of similar age (mean age=20.41, SD=1.50). All participants provided informed consent. The study was approved by the Delegated Research Ethics Review Committee of the Psychology Department at York University's Glendon College.

Procedure and Materials

The website TELLab (a free, online platform for designing empirical behavioural studies; Nakayama et al., 2015) was used to modify the Implicit Association Test (IAT). The IAT measures how fast (reaction time in msec) participants classify words into categories congruent with stigma (i.e., negative attributes paired with mental health care). Furthermore, the IAT compares how fast participants classify words into categories incongruent with stigma (i.e., positive attributes paired with mental health care). The IAT was accessed via the TELLab open-access website here: <http://lab.tellab.org/show/paradigm/iat/5bbbcc4a71a894c407e1c756>. After giving their informed consent, participants completed the test in a quiet space on campus,

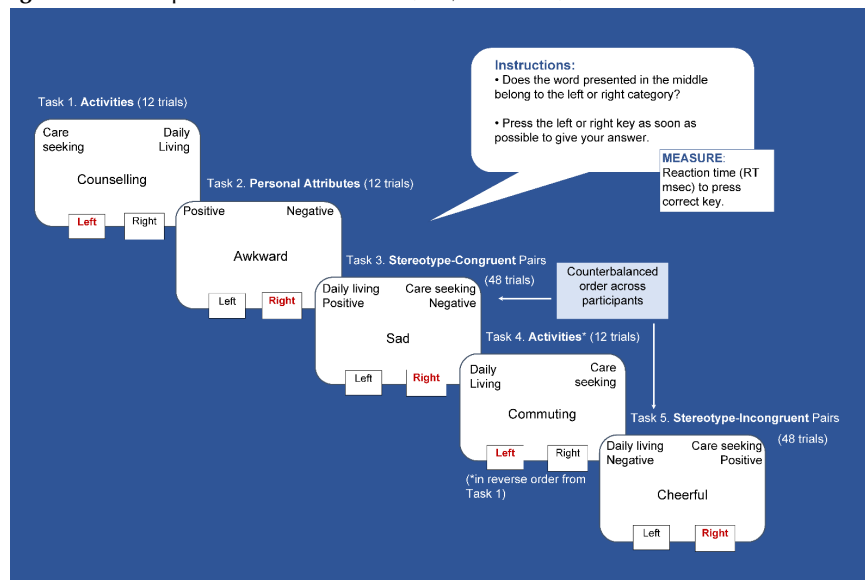
¹ The number of women is larger than that of men in our sample; this imbalance represents the psychology student population in North America. To this day, more women choose to take psychology courses than men (Trusz, 2020). To ensure that the only difference between the psychology and non-psychology students was their field of study (not gender or age difference), the group representing the non-psychology students had to be matched in age and gender distribution. This issue is addressed in the discussion section.

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accompanied by the researcher so that questions or concerns could be addressed and TELLab used without difficulty.

The IAT was constructed using words representing the categories for mental health care, daily-living activities, and positive and negative personality attributes. These terms were chosen based on the literature on stigma against psychological care and on the results of a pre-test in which four authors associated each word with one category. Only words that were unanimously paired with the same category were chosen. The terms chosen to represent health care-seeking activities were: counselling, talk therapy, psychotherapy, psychiatric help, support groups, and psychological advice. The words chosen for daily living activities were: shopping, socializing, commuting, entertaining, grooming, and cooking. Words signifying positive attributes were: confident, trustworthy, sociable, cheerful, competent, and friendly. The words chosen to represent negative attributes were: nervous, undependable, antisocial, sad, powerless, and awkward. These 24 words were used to construct the IAT (see Figure 1).

Figure 1. The Implicit Association Task (IAT, Modified)



Note. Figure 1 is a schematic illustration of the modified IAT. Tasks 3 and 5 included a total of 48 trials: each word in all categories was presented twice (six words related to negative attributes and six to positive attributes, as well as six words related to care-seeking activities and six to daily-living activities).

The IAT includes five tasks in total—three tasks ensure that each word chosen is easily classified as either a negative or positive attribute, or as either a daily-living or a mental health care activity (tasks 1, 2, and 4 in Figure 1), while two tasks (tasks 3

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and 5 in Figure 1) are the crucial tasks in which words are classified into the stereotype-congruent or incongruent categories. The instructions and measures are the same for each task: participants must choose whether a word presented in the centre of the display belongs to the category depicted on the top left or right. They must press the designated left or right computer key as fast and as accurately as possible. The time it takes to classify each word is recorded (reaction time [RT] in msec).

Tasks 1, 2, and 4 ensure that the chosen words are easily paired with their related category. In task 1, participants must classify words representing activities as belonging to the category of care seeking or daily living (12 words in total) by pressing the left or right computer key (for example, in Figure 1, task 1, the word “counselling” is paired with “care seeking” so participants would press “left”). In task 2, participants must sort attributes into negative or positive categories (12 words in total) by pressing the left or right computer key (for example, in Figure 1, task 2, the word “awkward” is paired with “negative” so participants would press “right”). The purpose of task 4 was to reinforce classifying words related to the care-seeking and daily living activities (while reversing their left-right position from task 1).

Tasks 3 and 5 are crucial conditions in which reaction time (RT) was compared between the categories congruent and incongruent with stigma. In task 3, participants must classify words (related to either activities or to attributes) in a way that is congruent with stigma—care seeking is paired with negative, and daily living, with positive (labelled *stereotype-congruent pairs* in Figure 1). In task 3, the word “sad” is paired with “care seeking/negative,” and so participants would click on the right arrow key). In task 5, participants must classify the chosen words (related to either activities or to attributes) in a way that is incongruent with the stigma—care seeking paired with positive, and daily living, with negative (labelled *stereotype-incongruent pairs* in Figure 1). In task 5, the word “cheerful” is paired with “care seeking/positive” and so participants would click on the right arrow key. The order of tasks 3 and 5 is counterbalanced across participants. It was expected that participants would be faster (and make fewer errors) when categorizing words in categories congruent with stigma (i.e., task 3 illustrating the stereotype-congruent pairs).

RESULTS

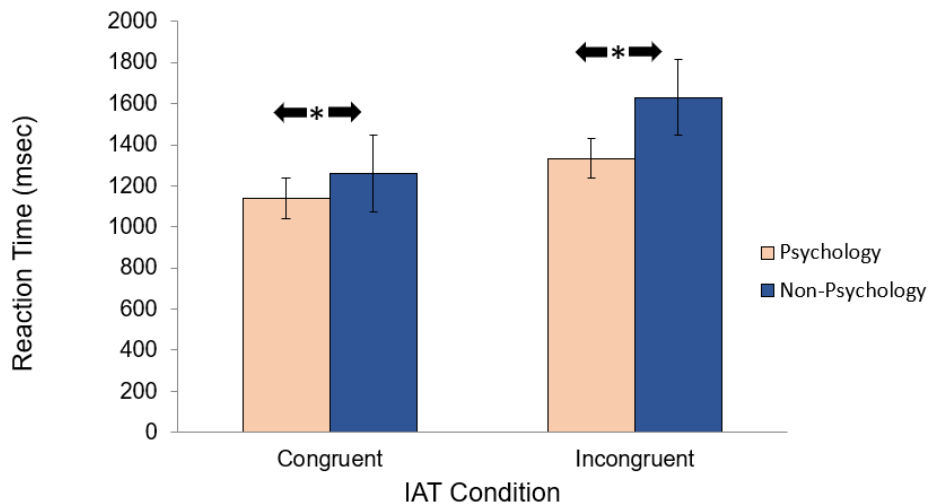
Reaction times (in msec) and the number of errors made in the IAT’s congruent and incongruent pairs (tasks 3 and 5) were measured and compared between psychology and non-psychology students separately.

The average RTs are illustrated in Figure 2. These data were statistically analysed as it is essential to compare means and draw conclusions which have a good probability of being reliable and replicable. All differences reported here are

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statistically significant and thus are deemed replicable (details about the analysis can be found in footnotes²).

Figure 2. Psychology and Non-Psychology Students' Reaction Times in Congruent and Incongruent Pairs



Note. Psychology and non-psychology students' mean reaction times (msec; one error bar represents one standard deviation) in the stereotype-congruent and incongruent pairs. The asterisk signifies statistical significance.

As expected, *all* participants were faster at classifying words into categories representing stigma toward care seeking; the average RT of psychology and non-

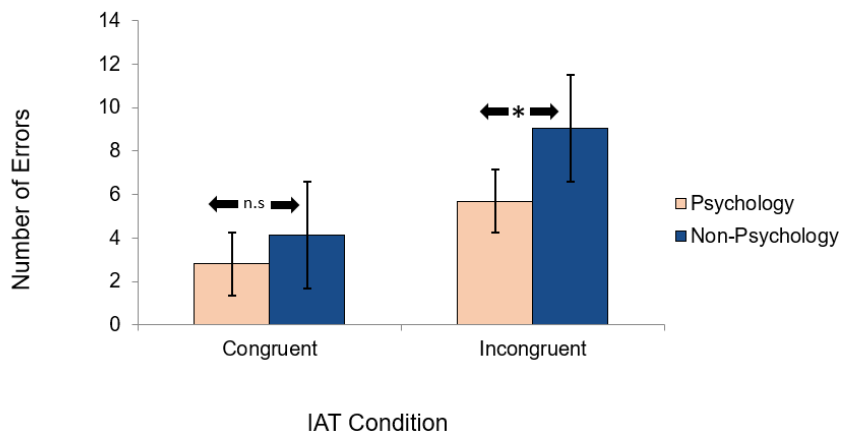
² The analysis was conducted on data from 55 participants (three participants were outliers: they obtained a reaction time [RT] z-score greater than 2.5 standard deviations from the mean). A 2x2 mixed analysis of variance was conducted on the RT (msec) with Areas of Study (levels: psychology & non-psychology students) as the between-subject variable, and with Pairings (levels: congruent & incongruent) as the within-subject variable. The main effect Areas of Study was significant [$F(1, 53)=12.22, p=0.001; \eta^2=.19; \text{Power}=.93$]: RT mean was longer for the non-psychology ($M=1444.11, SD=324.48$) than for the psychology ($M=1235.28, SD=260.96$) students. The main effect of Pairings was significant [$F(1, 53)=66.84, p < .000; \eta^2=.56; \text{Power}=1.00$]. For both psychology and non-psychology students, the mean RT was longer in the stereotype-incongruent ($M=484.15, SD=317.04$) than in the stereotype-congruent pairs ($M=1199.04, SD=233.16$). There was a significant interaction between Areas of Study and Pairings [$F(1, 53)=6.37, p=.015; \eta^2=.11; \text{Power}=.70$]. Non-psychology students were slowest in the incongruent [$t(53)=3.91, p=.0001$] and congruent pairs [$t(53)=1.98, p=.03$; smaller difference].

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psychology students was shorter in the stereotype-congruent ($M=1199.04$, $SD=233.16$) than in the stereotype-incongruent ($M=1484.15$, $SD=317.04$) pairs; however, psychology students were comparatively faster when dealing with stereotype-congruent pairs. Psychology students were also faster at categorizing words into the stereotype-incongruent pairs ($M=1258.59$, $SD=215.42$) than non-psychology students ($M=1629.64$, $SD=310.94$). (As mentioned, this difference was also true for the stereotype-congruent pairs, but to a lesser extent.) These results show that psychology students were less slowed down by the stereotype-incongruent pairs.

Not only were psychology students' RT less affected by the stereotype pairing, but their errors were as well. In the stereotype-incongruent pairs, psychology students made fewer errors ($M=5.7$, $SD=4.1$) than did non-psychology students ($M=8.8$, $SD=4.8$).³ See Figure 3.

Figure 3. Psychology and Non-Psychology Students' Errors in Congruent and Incongruent Pairs



Note. Figure 3 shows the mean number of errors made over 48 trials (one error bar represents one standard deviation) for the psychology and non-psychology students in the stereotype-congruent and incongruent pairs. The asterisk signifies statistical significance.

In sum, the results show that psychology students are less affected by the negative stigma associated with seeking mental health care. The results also show that, like non-psychology students, psychology students were faster at categorizing items in stereotype-congruent pairs. In addition, psychology students were faster in the stereotype-incongruent pairs and made fewer errors than non-psychology students.

³ There was a statistically significant difference in the number of errors made in the incongruent condition, with psychology students making fewer errors [$t(53)=2.74$, $p=0.0084$].

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These findings confirm that implicit biases against mental health care still exist among university students, but to a lesser degree in those studying psychology.

DISCUSSION

The results confirm that university students still hold negative implicit attitudes toward mental health care (as found by Chiu et al. in 2018). Importantly, our findings show that studying psychology potentially reduces the effect of this implicit bias. To our knowledge, this is the first time that a direct link between studying psychology and reduced stigma toward help seeking has been measured and documented.

Previous studies have shown that learning about psychology (psychoeducation) improves mental health literacy (e.g., Maranzan et al., 2016), which in turn reduces overt stigma toward mental health care and promotes positive attitudes toward help seeking (Cheng et al., 2018). Our findings show that education may help reduce the implicit negative biases that students have toward psychological care. As more people are educated about mental health issues, more individuals should feel free to express their concerns and seek out help. These results give hope that mental health literacy can be improved through other means than taking psychology courses.

Specifically, it is hoped that the 2020 Covid-19 pandemic has raised awareness about the importance of taking care of our mental health, which, in turn, will contribute to reducing its associated stigma. Given that the Covid-19 pandemic is worldwide and long-lasting, it may have a broad and durable impact which reaches a much larger population than just those who are enrolled in university psychology courses. Stigma against mental health care affects diverse demographic groups; it is a problem for different ages, civilizations, and ethnicities. It is known that it specifically impacts help-seeking behaviours amongst men, ethnic minorities, military personnel, and health professionals (Corrigan, 2014). Education that reaches far and wide is crucial; hopefully the worldwide Covid-19 pandemic will contribute to improving attitudes toward mental health care. Indeed, our results show that implicit attitudes, such as negative stereotypes toward health care, are malleable and can be reduced.

Such reduction has been reported within other areas in recent studies by Banaji and colleagues. For example, Charlesworth and Banaji (2019) published evidence showing that implicit attitudes about sexual orientation and race have become more neutral over the past decade, and that this trend appears to hold across different demographic groups.

When combined with accessible mental health services, psychological education may help combat stigma toward mental health care. In Canada, many mental health services were able to transition online during the Covid-19 pandemic, making them more attainable for the general public. However, online interventions may have also hindered individuals' ability to seek help; many students were confined to their homes and lacked the privacy necessary for psychological support (Jurcik et al.,

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2020). Combatting stigma toward mental health care will hopefully encourage individuals to feel more comfortable speaking about their mental health in personal settings.

Limitations

The present study has a limited number of participants and includes more women than men enrolled in York University's bilingual Glendon College. Evidently, whether the results can be replicated with other samples remains an open question. The gender imbalance within the current sample is due to Canadian student demographics—there are more women than men enrolled in undergraduate psychology, health, and related programs within post-secondary institutions in Canada (Trusz, 2020; Varrella, 2021). This remains the case in the Psychology Departments of York University and explains our sample limitations. Accordingly, the study results can only be generalized to a population with a similar gender imbalance.

While study results cannot be generalized to the greater population (i.e., external validity), it is important to appreciate that, to isolate the effect of studying psychology (or not), comparing a group of actual students in psychology to an equivalent control group (of matched age and gender) was essential for isolating the area of study (i.e., for strong internal validity).

Finally, it is important to acknowledge that students who have fewer stereotyped beliefs toward mental health issues may be more interested in studying psychology. It is possible that having an interest in psychology is related to having less stigma toward the field itself. Nevertheless, the current results show that an individual's sensitivity to psychological issues may be further transformed through their educational background in psychology. Further questions remain, but a conclusion is clear: talking about mental health is crucial for reducing its associated negative stigma. Let's talk about it!

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Understanding the Social Determinants of Female Genital Mutilation

The contested practice of female genital mutilation (FGM) is rooted in several social and cultural norms and prevalent in more than 30 countries across the world. This article aims to illustrate FGM's geographical and historical prevalence, root causes, and clinical, social, and economic implications. Despite a higher prevalence in countries in Africa, the Middle East, and Asia, FGM is also practiced in the U.S., U.K., Australia, and Canada. With substantial regional variability in prevalence, a girl's or woman's place of residence, education level, and wealth status significantly shape their personal FGM experiences. In applying a human rights lens to FGM, there is a strong case for eradicating its practice. Progress towards a world free of FGM will require tailored and data-centred policy solutions, contextualized to each FGM-practicing community.

Keywords: Female genital mutilation, social determinants of health, policy, human rights

The interconnectedness of the 21st century allows us to remain informed of the global events, circumstances, and decisions shaping our world. As human rights violations—including genocides, torture, and arbitrary arrests—are publicly reported, we can collectively mobilize against these injustices. One contested practice is female genital mutilation (FGM). A social determinants of health lens allows us to understand FGM in its wider social, economic, and cultural conditions—extending beyond the mere biomedical and symptomatic presentation. Despite efforts from international organizations and governments to abolish its practice, FGM continues to persist today. Factors such as a girl's (or her parents') socioeconomic status, level of education, and access to quality health care inextricably affect the FGM experience. I argue that, when examining FGM in its social, environmental, and cultural context, it becomes clear that this global health issue requires holistic and empowering solutions in order to improve health equity for girls and women.

This article has two main sections. The first section applies a multidisciplinary lens to FGM, illustrating its geographical and historical prevalence, root causes, and



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clinical, social, and economic implications. It also highlights the course in which a girl's or woman's place of residence, education level, and wealth status situate their personal FGM experiences. The second section examines FGM as a human rights issue and features select policy and community-based interventions around the world.

UNDERSTANDING FEMALE GENITAL MUTILATION

Mapping the Prevalence of FGM

Over 200 million women today have undergone some form of FGM (Unicef, 2020). The practice appears to be concentrated in western, eastern, and north-eastern regions of Africa and in some countries of the Middle East and Asia (see figure 1). According to Unicef, the countries of Djibouti, Guinea, and Somalia report some of the highest rates of girls and women 15–49 years of age having undergone FGM (94%, 95%, and 98%, respectively).¹ However, it is important to emphasize that FGM is practiced globally and not only limited to regions in Africa and/or Asia.

Outside of Africa and Asia, cases of FGM are reappearing in North America and Europe. Until the 1950s, *clitoridectomies* (a form of FGM where the clitoris is surgically removed or reduced) were performed medically, both in the United States and in Europe. Take, for example, Victorian England, where these procedures were used to “cure” middle-class girls and women of so-called non-feminine behaviour in the mid-20th century (Green, 2005). Fast forward to the mid 1900s, when clitoridectomies were used until the 21st century to “treat” intersex infants and children with “ambiguous genitalia” (Green, 2005). Today, FGM prevalence in North America, Europe, and Australia is driven in large by migrant populations who practice or have undergone the procedures themselves. Although the exact prevalence of FGM remains unknown due to the lack of routine data collection, recent estimates suggest that 137,000 women and girls have undergone FGM in the U.K., while 507,000 others are at risk in the U.S. (Goldberg et al., 2016; Macfarlane & Dorkenoo, 2015). Monitoring the global incidence and prevalence of FGM cases is crucial to understanding the trends shaping its uptake and prioritizing populations that may benefit from targeted interventions.

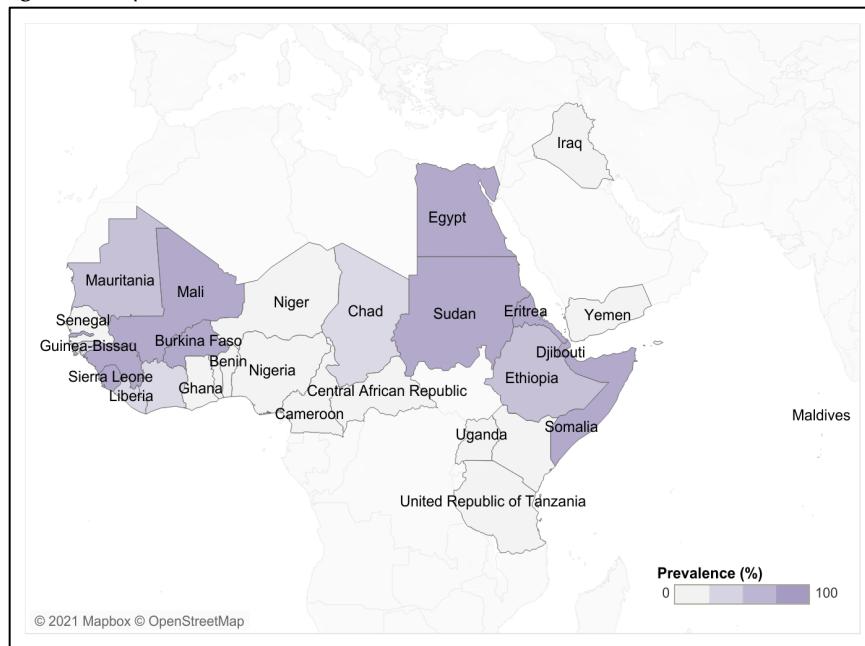
Despite considerable improvements in survey design and statistical analysis, data analysis tools are only as good as the quality of data collected; eradicating FGM is hindered by poor quality and inconsistent data collection. In low- and middle-income countries, there are limited resources for governments and health systems to routinely collect data and conduct sound epidemiological surveillance. On the contrary, high-income countries with the resources and infrastructure to securely collect medical data may rank FGM lower on the public health agenda (given lower estimated prevalence of FGM as compared to other diseases). Additionally, the definitions for what constitutes FGM vary across the globe, thus making it difficult to

¹ Available data for Somalia was updated in 2006.

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compare and to track detailed progress. But, in all cases for girls and women, reporting FGM is sensitive and progress may be undermined by substantial under-reporting (Reisel & Creighton, 2015). Victims of FGM may believe that parents who subjected them to the procedure have done it out of love and care, irrespective of how harmful the procedure may be. Ensuring FGM-practising communities are well-resourced and well-positioned to collect high-quality data will help us untap the potential of data-centred decision-making.

Figure 1. Map of FGM Prevalence



Note. Prevalence captures the percentage of girls and women 15–49 who have undergone FGM in countries for which data is available. Figure generated by author with open-access data provided by Unicef.

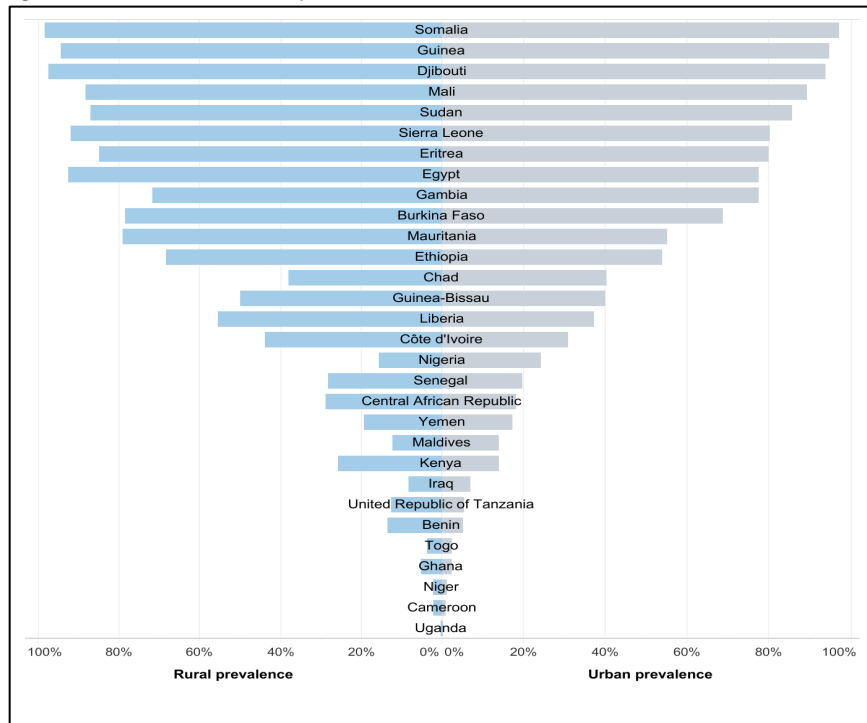
Factors Shaping the FGM Experience for Girls and Women

Place of residence is one of many factors that play a critical role in shaping the FGM experience for girls and women. By way of illustration, Unicef data indicates that rural areas in Africa, the Middle East, and Asia often have higher prevalence rates of FGM. Nineteen out of the 30 countries for which data was reported saw a higher prevalence of girls and women 15–49 who have undergone FGM in rural areas, as compared to urban areas (see figure 2). For example, in Ethiopia, the FGM prevalence is 14% higher in rural areas than in urban areas. One study found that women in rural Ethiopia were more likely to favour continuing FGM than those residing in urban areas (Masho & Matthews, 2009). The higher rural prevalence could be

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attributed to the isolation of communities in rural settings, with limited exposure to the non-traditional practices and values found in urban centres (Masho & Matthews, 2009). In contrast, some countries do show the opposite trend in regional prevalence, where the prevalence of FGM is lower in rural areas than in urban. For example, Nigeria’s urban prevalence is 18% higher than its rural prevalence. However, there are reports that, in recent years, this appears to be changing, and more than 20% of daughters aged 14 and under living in urban areas have experienced FGM, compared to 29% of those living in rural areas (*28 Too Many*, n.d.). The rural and urban migration patterns in sub-Saharan Africa provide insight into the variation in regional FGM prevalence (Ahinkorah et al., 2020; Temin et al., 2013). In particular, rural to urban migration is high in many countries. Yet not all women who migrate to urban regions remain there; some return to their rural communities with potentially “unfilled expectations and aspirations” (Ahinkorah et al., 2020). These short moves to urban regions may expose women to a more diverse range of ideas and opinions about harmful practices, often different from traditional perceptions in their rural homes (Mackie, 1996; Shell-Duncan & Hernlund, 2001). For meaningful impact on eradicating FGM, a woman’s place of residence, along with other determinants, can help us design solutions that address the root determinants.

Figure 2. FGM Prevalence, by Rural and Urban Areas

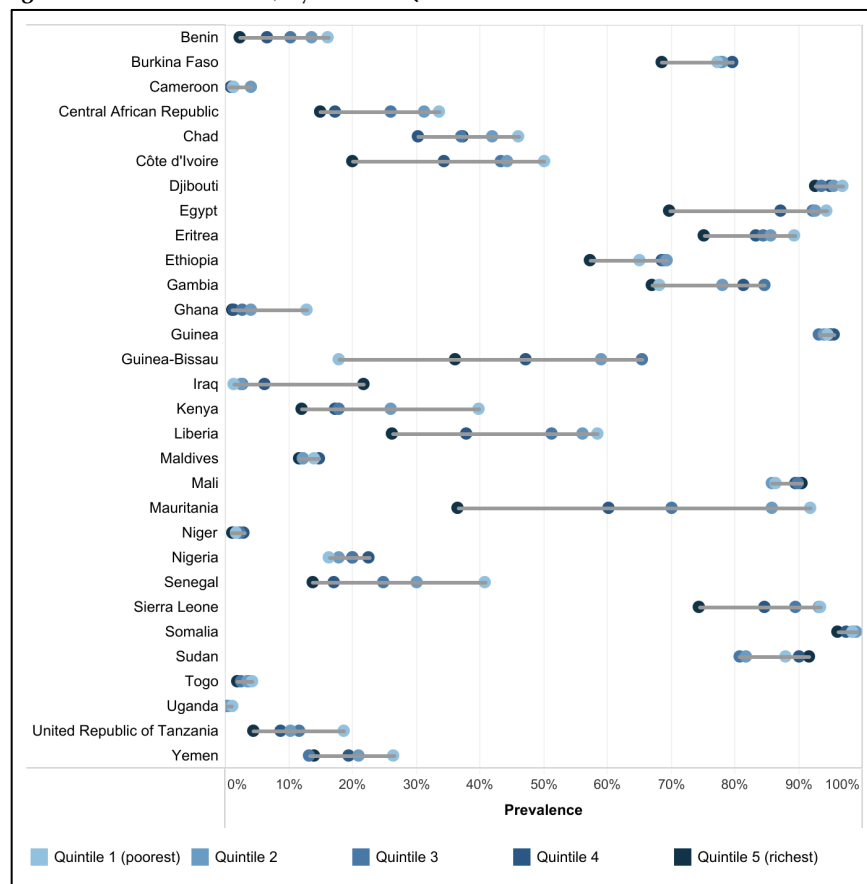


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Note. Prevalence captures the percentage of girls and women 15–49 who have undergone female genital mutilation in countries for which data is available. Figure generated by author with open-access data provided by Unicef.

Together with a girl’s or woman’s place of residence, wealth, and education level are two additional influences on the FGM experience. Twenty-four out of the 30 countries represented in the Unicef database showed a higher prevalence of girls and women 15–49 who have undergone FGM in the wealthiest 20% of the population as compared to the poorest (see figure 3).

Figure 3. FGM Prevalence, by Wealth Quintiles



Note. Prevalence captures the percentage of girls and women 15–49 who have undergone female genital mutilation in countries for which data is available. Figure generated by author with open-access data provided by Unicef.

In sub-Saharan Africa, women in the richest wealth quintile and their daughters are less likely to undergo FGM compared to those in the poorest wealth quintile

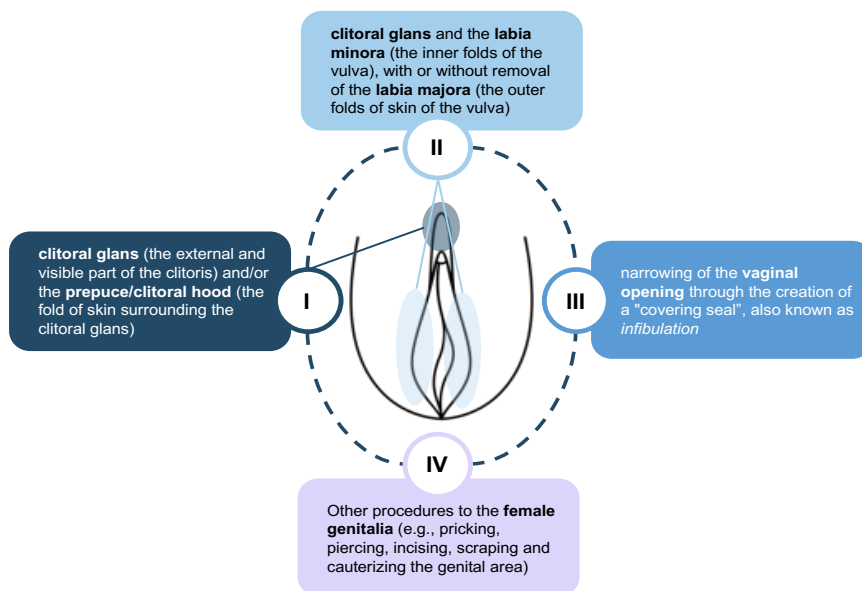
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(Ahinkorah et al., 2020). Women in wealthier households have strong decision-making power, particularly on practices such as FGM (Setegn et al., 2016). The odds of women and their daughters undergoing FGM decrease with increasing levels of education and wealth—two significant protective factors (Ahinkorah et al., 2020). Moreover, fathers also influence the likelihood of their daughters' undergoing FGM. A study of FGM practices in Egypt found that a father's education and area of residence appear to be the most significant factors influencing FGM (Dandash et al., 2001). The same study showed that paternal illiteracy and rural residence were the factors most responsible for the continuation of FGM in Egypt (Dandash et al., 2001). Place of residence, wealth, and education are three of the many social determinants affecting the FGM experience for girls and women—echoing the need for multi-faceted and data-driven policy solutions.

Clinical, Social, and Economic Impacts of a Medically Unnecessary Procedure

There are myriad clinical, social, and economic consequences stemming from the practice of FGM, effectively building the case for its abolishment. Clinically, FGM is any procedure that “involves partial or total removal of the external female genitalia, or other injury to the female genital organs for non-medical reasons” (World Health Organization, n.d.). There are four different types of FGM procedures, loosely categorized based on the specific area of the female genitalia that is cut (see figure 4). The global medical community unanimously agrees that FGM provides no health benefits for the girls and women undergoing it, and results only in immediate, medium-term, and long-term harm (see table 1).

Figure 4. Four Types of Female Genital Mutilation Procedures



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Note. Four types of procedures include Type I (mutilation of the clitoral glans), Type II (mutilation of the clitoral glans and labia minora), Type III (narrowing of vaginal opening), and Type VI (other procedures to the genitalia). Figure designed by author with data provided by WHO (n.d.) and open-source image.

Table 1. Complications from FGM/Cutting

	PHYSICAL	PSYCHOLOGICAL
Immediate complications	<ul style="list-style-type: none"> • Severe pain • Excessive bleeding (hemorrhage) • Fever • Wound healing problems, swelling, and infections e.g., tetanus • Urinary problems • Injury to surrounding genital tissue • Death • Shock 	<ul style="list-style-type: none"> • Depression • Anxiety • Post-traumatic stress disorder • Low self-esteem • Societal stigma • Sexual problems (e.g., decreased satisfaction)
Long-term complications	<ul style="list-style-type: none"> • Urinary problems (e.g., painful urination, urinary tract infections) • Vaginal problems (e.g., discharge, itching) • Menstrual problems (e.g., painful menstruations, difficulty in passing menstrual blood, etc.) • Sexual problems (e.g., pain during intercourse) 	

Note. Table designed by author with data provided by the World Health Organization (n.d.).

Generally, more invasive mutilations present a higher risk of serious complications. According to a systematic review of 22,052 patients in African countries, a majority had undergone a Type II procedure. The highest number of infections was identified among those who underwent a Type III procedure and included urinary tract infections, genitourinary tract infections, abscess formation, septicemia, and HIV (Iavazzo et al., 2013). Despite the slow but steady decline of FGM in some regions, the high rate of a Type III procedure is worrisome as these cases result in more complications than other types. One econometric study, which

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included 22 sub-Saharan African and Middle Eastern countries, estimates the prevalence of all types of FGM fell significantly between 1965 and 2000 (Koski & Heymann, 2017). However, the prevalence of all women who report that their genitals were sewn (infibulation, Type III) has increased in Mali (from 6% to 15%) and in Sierra Leone (from 6% to 8%) (Koski & Heymann, 2017). The different types of FGM procedures and the range in severity of subsequent complications on individual girls and women point to the breadth and specialization of supports victims may require for a lifetime.

The clinical complications experienced by individual girls and women amount to a significant economic burden. The economic cost is not limited to the FGM procedure alone, but includes the treatment of all resulting medical complications. One estimate suggests that the total cost of complications could reach as much as 1% annually of total government expenditures for women of reproductive age (Adam et al., 2010). The World Health Organization (WHO) estimates that treating the health complications from FGM procedures in the 27 countries of Africa, Middle East, and Asia where data were available amounted to \$1.4 billion in 2018. Given that governments in resource-constrained countries have many competing priorities, targeting FGM practices could relieve the pressures placed on public health care systems and on the economy.

The Role of the Wider Community

The decision-making process varies from region to region and generally involves members of the immediate and/or extended family (Alradie-Mohamed et al., 2020). When there is conflict, each family member has a different degree of power and influence over the final decision (Alradie-Mohamed et al., 2020). Fathers, mothers, and grandmothers are the main decision-makers and open dialogue regarding FGM between both genders may free mothers from the social pressure and responsibility of maintaining tradition (Alradie-Mohamed et al., 2020). For example, in the Somali and Harari societies of Eastern Ethiopia, mothers are the main decision-makers, followed by grandmothers, and, to a lesser extent, fathers (Bogale et al., 2014). The same study in Ethiopia also reported that 5% of the girls in the sample made the decision to undergo FGM themselves (Bogale et al., 2014).

The wider community—including traditional community leaders and medical professionals—directly enables FGM through their respective roles. In many communities, FGM is performed by older women at the homes of the girls and women undergoing the procedure. These “traditional cutters” in the home setting may make use of blades, unsterilized kitchen knives, scissors, glass, sharpened rocks, or even fingernails (Odukogbe et al., 2017). In some cases, barbers are solicited for their precise blade-handling skills. Those who perform the ceremonial cut may accept compensation through money or gifts, while others see it as public service to the community. The community conditions where FGM is performed are generally

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unhygienic, and there is limited use of anesthesia to numb the pain. For example, a 2007 report published in *The Lancet* relates that the same unsterilized cutting instrument was used on up to 30 females (Wakabi, 2007). In some regions, health-care professionals also perform FGM, motivated by the fact that the medical setting will prove to be safer for patients; however, health-care professionals could also be enticed by the remuneration they receive from the girls' families (Serour, 2013). This "medicalization" of FGM is widely controversial, with some arguing that medicalization normalizes the behaviour and others, that it prevents the pain and complications from what would otherwise be unhygienic procedures in the community. Given the role that the broader community plays in perpetuating FGM, solutions for changing attitudes must be geared to the entire community, and not only to individual girls and women.

Social, Cultural, and Religious Reasons Behind FGM

As a practice, FGM is the product of several deeply rooted cultural, religious, and social beliefs, with cutting being only one aspect of a girl's socialization. Sociocultural influences continue to vary and evolve regionally. In some regions, FGM is associated with cultural ideals of modesty and femininity (Gruenbaum, 2005). It is common for these societies to preserve unequal gender relationships, believing that the sexuality of women must be controlled. With the desire to exert control over women's sexuality, FGM is seen as necessary to dull libidos and ensure extramarital sex is circumvented (Gruenbaum, 2005). Infibulation (i.e., sewing the genitals shut), in particular, is defended in this context and serves as proof of virginity. In other regions, FGM is held to be essential in raising a girl and preparing her for adulthood and marriage (World Health Organization, n.d.). In these societies, a girl's social acceptance and survival depends on successful marriage and childbearing. Although FGM can cause severe medical complications, forgoing the practice could exclude girls from participating meaningfully in their societies. Many of the social and cultural beliefs promoting FGM are based on myth or misinformation, as the intended results are rarely achieved. For example, in investigating the relationship between FGM and women's sexual behaviour, a study of 23,628 women across Kenya and Nigeria found no correlation between FGM and any particular sexual behaviour outcome (Mpofu et al., 2017). Specifically, female circumcision was not significantly related to the age at which women first engaged in sexual activity or to the number of their lifetime sexual partners (Mpofu et al., 2017). The contentious nature of FGM—where, on one hand, the procedure is medically harmful but, on the other, it is an important rite of passage—requires solutions rooted in cultural sensitivity, empathy, and understanding.

FGM has existed in almost all known civilisations throughout history and is not confined to any one culture or religion; its origins predate Christianity and Islam (Serour, 2013). It is practiced by people from various religions, including Christianity,

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Islam, and a minority group of Ethiopian Jews (El-Damanhoury, 2013). Within Islam, the opinions of religious scholars are divided about the practice. For example, the use of the Islamic term *Sunna circumcision* is described by some Islamic scholars as a form of deceit, in that it gives the misguided impression that FGM is one of the common Islamic practices like profession of faith, prayer, fasting, and pilgrimage (MET, n.d.; Serour, 2013). Furthermore, it is important to note that FGM is not mentioned in the Jewish Torah or in the Christian Gospels (El-Damanhoury, 2013). Given the role that religion has in shaping the attitudes and beliefs surrounding FGM, solutions should involve a diverse range of religious leaders.

For all the social and religious influences in the community that perpetuate FGM, there are equally protective community factors that discourage the practice as well. For example, when FGM's dangerous health consequences are promoted as undesirable or when religious leaders address the misconceptions of FGM as a religious requirement, girls and women may be less pressured into or even dissuaded from engaging in the practice. Nigeria has achieved mixed results in addressing these socio-cultural norms, and therefore that country's persistently high prevalence rates account for 10% of the global prevalence rate (*28 Too Many*, n.d.). The mixed nature of the results makes it explicit that interventions cannot thrive without involving community-leaders, medical practitioners, and religious leaders.

FGM as a Human Rights Issue: A Spotlight on Policy Solutions

Because the procedures can be a torturous experience resulting in severe health complications or death, FGM violates several articles of the United Nations' Declaration of Human Rights (Universal Declaration of Human Rights, 1948). There is a clear violation of Articles 03, 05, and 25—the right to life; the right to freedom from torture, cruel, inhuman, and degrading treatment or punishment; and the right to the highest attainable standard of health. Progress on addressing FGM in the global community is structured around policy interventions, which could be in the form of targeted programs, large-scale initiatives, and legislation.

Policy and Community-Based Interventions

Policy interventions for FGM can target a change in knowledge, attitudes, and beliefs, and be directed towards different actors—girls and women, caregivers and parents, healthcare professionals, and community leaders. Interventions may include training health personnel, educating female students, conducting multi-faceted community activities, and village empowerment. For example, one community-based, village-empowerment intervention provided education to community members in Senegal on hygiene, problem-solving, women's health, and human rights (Diop & Askew, 2009). The prevalence of FGM amongst the daughters of the women who participated decreased in the villages where this intervention was

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implemented, but not in neighbouring villages. This decrease provides a clear indication of the positive effect of the community-based initiative.

In North America and Europe, preventative activities include legislative action, health persuasion, fostering engagement with the local community through outreach and the involvement of community champions, and training health-care professionals (Njue et al., 2019). In the U.K., Europe, and Canada, interventions seek primarily to increase individual, professional, and community awareness and understanding of FGM as a human rights issue, as well as the negative impact of FGM on health outcomes (Njue et al., 2019). In Winnipeg, Canada, one successful initiative involved a targeted awareness campaign whereby migrant women from select communities were given translated information pamphlets and community service providers were trained through specialized workshops (Daniel et al., 2013). Community-level programs and initiatives are essential to strategically tailor solutions to different contexts.

In addition to community-based interventions and programs, legislation shows some potential benefit in addressing FGM. Because FGM fosters inequality between genders and promotes discrimination against women, its continued practice violates several global commitments. In adapting a rights-based approach to this contested issue, many states around the world have banned the practice through national or regional legislation. Of the 29 African countries with a high prevalence of FGM, 25 have laws prohibiting the practice (Center for Reproductive Rights, 2008). Among those, practitioners and parents procuring services could face penalties that range from monetary fines to life in prison (Center for Reproductive Rights, 2008). However, enforcing legislation is a great challenge because of the sensitive position in which FGM victims are placed—reporting the crime would mean implicating their own parents.

FGM has been illegal in the U.K. since 1985, since 1996 in the U.S., and since 1997 in Canada, but court hearings shed light on how FGM can take place when girls or women travel abroad or in physicians' offices in their home countries (Packer et al., 2015). For example, the U.K. used its FGM law in 2015 to review the case of a doctor who was accused of performing the procedure on a woman in the U.K., at the request of her husband, after she had given birth (BBC News, 2015). Similarly, in 2009, a Danish case resulted in a two-year sentence for a mother who allowed her daughters to be subjected to FGM during a stay in Sudan (Packer et al., 2015). Well-designed and enforced legislation and grass-roots community-level programs and initiatives are part of the solution to combat FGM.

CONCLUSION

FGM is a human rights issue with intricately linked social determinants that shape its continued practice. Embedding the practice in the wider social determinants serves a useful purpose in designing and delivering tailored and targeted policy

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interventions. There is seldom a one-size-fits-all approach, but interventions will benefit from data-centred approaches. Rooting policy solutions in social and religious factors and engaging community leaders, religious leaders, and medical practitioners will enable progress on the path to eradicating FGM.

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TARA SCHELL

Performing Home

Theatre, performance, and the experiences of Finnish–Canadian settlers

“Performing Home” explores theatre in the Finnish settlements of the Thunder Bay region between 1880 and 1914. It begins with an overview of Finnish immigration to Canada, and moves into an analysis of the role of theatre in Finland, where it was used as a political and social tool by the working class to preserve language and identity under Russian rule. The fundamental role of identity in Finnish theatre made it well suited for Finnish communities in the isolated Thunder Bay region, as settlers “performed home” by mobilizing folk arts as a community building tool. This allowed for a greater sense of cultural identity, and helped Finnish immigrants maintain a connection to their language and national identity, while building a unique Finnish-Canadian artistry within their communities. The political tensions between socialist and conservative groups is explored through the use of theatre among workers’ unions, and temperance societies. Further, the article argues that the role of theatre was essential in the establishment of settlements in the north in necessitating greater need for community spaces, such as town halls, which ultimately led to the growth of Finnish settlements in the region. Finally, the article aims to show how the theatre of early Finnish settlements evolved as a tool to preserve cultural identity and give voice to an isolated community with a unique language.

Keywords: Finnish-Canadian theatre, folk movement, immigration, community theatre, Thunder Bay, Ontario

DEDICATION

At the time of publication of this article, the Finnish Labour Temple is in the process of rebuilding following a devastating fire in December of 2021. The Labour Temple has served Thunder Bay’s Finnish community for over a century, and played a significant role in the history discussed in this article. While it is not yet known whether much of the archives survived the fire, it is certain that the Finnish community of Thunder Bay will save what is left of the structure, and rebuild the Temple. While the impact of the fire was severe, the community remains strong in the wake of this loss.



INTRODUCTION

Patrick’s gift, the arrow into the past, shows Nicholas the wealth in himself, how he has been sewn into history. Now he will begin to tell stories.

—Michael Ondaatje, *In the Skin of a Lion*

In the face of change, our connection to home and identity grounds us. From the people with whom we surround ourselves, to the traditions we keep, home is for many an idea more so than a place; and though ideas are fluid, there are key tenets of home that make up the foundation of the stories we tell about who we are. This is perhaps most true for those who have left their country behind in search of a new life in a new part of the world. For those who have made this difficult journey, the task of preserving a sense of home and identity can be fraught. Our cultural connection to who we are can be cultivated in many ways, but perhaps one of the most powerful tools in shaping these narratives is the arts. Theatre, music, and dance, among other artistic forms, have a particular way of connecting us to that aspect of home which is not at all physical, but some untouchable part of ourselves that forms our identity. Perhaps this is why we often see the arts as a tool used within immigrant communities who must necessarily create and recreate a connection to home in the face of change.

In Canada’s own history, a group of settlers who demonstrated particularly well the value of the arts in connecting communities to their heritage were the Finnish immigrants who came to the Thunder Bay region of Ontario in the late nineteenth and early twentieth centuries. During the period of focus for this study—between roughly 1880 and 1914—Finland itself was in the midst of a cultural revival, where a struggle for identity through folk arts and language was taking hold (Singleton, 1989, p. 72). While this would eventually lead to a civil war between socialist “Red Finns” and more conservative “White Finns,” the factions along political lines could already be seen in Finnish art and theatre, with each party employing the arts to help cultivate the Finnish identity that would best reflect their vision of what an independent Finland might be (Singleton, 1989, p. 1).

In the midst of this uncertainty, those who chose to leave Finland behind to come to Canada brought much of these political movements with them, and it is perhaps because of this unique struggle—that Finland itself was emerging from a period of intense political turmoil, and reforming its own national identity—that Finnish-Canadians were so well positioned to build and reflect upon their communal lives through the arts. Indeed, for many of those first Finnish settlers in Canada, the arts were a central part of their daily lives, and a vital link between new and old identities. Through this essay, I explore what life might have been like for Finnish settlers in the Thunder Bay region between 1880 and 1914 and, specifically, discuss the role of theatre and the arts in the daily lives of settlers; and how, in many ways, theatre and

other art forms were essential in their creation of a new home, and in the formation of a unique Finnish-Canadian identity.

NATIONS ON THE BRINK: CANADA AND FINLAND 1880–1914

Before speaking to the experience of Finnish settlers in Canada during this time, it is necessary to understand that the Canada in which they arrived would have been far different from the country we know today. In many ways, the time surrounding Canada's confederation in 1867 was defined by factions: French and English, Protestant and Catholic, Indigenous and settler, and the east and the west, all represented key groups in Canada, each of which had very different needs and desires. At the same time, the influence of the United States and Britain was heavy, and in many ways, these two countries shaped the development of Canada as a nation. When one considers, then, that many Finnish settlers were leaving their home country to avoid political factions and the oppressive influence of larger world powers, it seems incongruous that Canada—a country divided in its own right—was where they landed.

Yet, while Canada was certainly a nation that had not yet found its footing, Finland too was confronting its own fault lines. As the nineteenth century drew to a close, Finland saw a long history of Swedish and Russian rule in the nation finally come to a head. As early as 1809, Finland had been under the control of Tsarist Russia, though de facto governed by Sweden (Singleton, 1989, p. 1). During this time, one obstacle that seemed to underscore diverse challenges faced by Finns was the fracturing of language practices between social classes. Governance in Swedish meant a clear, almost insurmountable gap between working-class Finnish-speakers and upper-class Finns who were fluent in Swedish. This division within the country furthered an already unstable sense of Finnish identity; which in turn, made any movement toward independence nearly impossible (Singleton, 1989, p. 76). The implication, then, was that Finns emigrating to Canada, as well as those who stayed in the country, faced the momentous task of establishing who they were free from outside powers. As such, the task of any art form aiming to connect Finns to a sense of heritage and history faced an uncommonly large challenge in reaching past the walls of Russian and Swedish culture which had been carefully crafted around an autonomous Finnish identity. In some ways, this was not dissimilar to the task Canada was then facing, insofar as both nations were working towards establishing who they would be on the world stage as the nineteenth century came to an end.

As both Canada and Finland worked to form their national identities in the face of myriad challenges, Canada also faced a more practical challenge: filling the land with enough people to establish a country strong enough to stand on its own. To facilitate this, a number of immigration campaigns began in the late nineteenth century with a focus on attracting settlers from Great Britain, Norway, Sweden, and Germany (Ranta & Burkowski, 1976, p. 15). However, by 1898, at least one program had shifted its focus to Finland. Finnish settlers were promised a better life, in a world

where they could *vuolla puuveitsellä kultaa*, that is, “carve gold with a wooden knife” (Ranta & Burkowski, 1976, p. 15). One could well argue that Finnish immigrants were recruited because they were, generally, fair-haired and Protestant, which would have been considered “ideal” traits by many Anglo-Saxon Canadians (Lindstrom-Best, 1985, p. 8); however, Dominion of Canada Sessional Papers from 1898 state that Finns were recruited because they were “sturdy, honest, hardworking, God-fearing folk, used to hardship and toil, obliged to battle in order to live” (Ranta & Burkowski, 1976, p. 15). By 1890, Finnish settlements in Canada were on the rise in British Columbia, the Prairies, and more than anywhere else, Northern Ontario (Lindstrom-Best, 1985, p. 6). It is difficult, however, to get concrete information on just how many truly Finnish settlers were in Canada at this time. Similarly to how most eastern Europeans were referred to as “Galicians” during the 1800s (Herstein, 1970, p. 289), Finnish settlers were often recorded as Russian or Swedish by immigration officials, while many Estonian settlers were marked as Finnish (Lindstrom-Best, 1985, p. 7). Because of this conflation, even our best numbers are rough estimates.

Though it was incredibly difficult to convince people to come to Ontario’s north, once they did, it would seem they came in relatively large numbers. In 1884, Port Arthur – the settlement that would later become Thunder Bay – began building “immigrant sheds” to house newcomers (Ranta & Burkowski, 1976, p. 16), and while these conditions were certainly not ideal, they did serve as a first stop for new settlers—many of them Finnish—who were beginning the journey of making Thunder Bay their home. Indeed, by 1911 roughly half of Finnish Canadians living in Ontario were settled in the Thunder Bay region (Lindstrom-Best, 1985, p. 9). It was in this context of remote communities connected through a shared heritage and immigration experience that we begin to see Finnish theatre as a tool for settlement.

A FINNISH-CANADIAN IDENTITY: FOLK ART, THEATRE, AND THE POLITICAL

Many scholars have argued that there was not actually a “Finnish Theatre” until the second half of the nineteenth century (Singleton, 1989, p. 75). This was largely due to the fact that, prior to this time, most dramatic works were written and performed in either Swedish or Russian, in keeping with the language of the upper class and imperial rule. Beyond this, the majority of theatre in Finland was not created by Finnish theatre companies, but from touring groups (Binham, 1980, p. 58). All this began to change with the ringing of revolution, and the search for a truly Finnish identity that began in the mid-1800s. Around this time, scholars began encouraging Finns to find a sense of their own national identity through the folk art of the peasantry (Singleton, 1989, p. 72). Because Finland had been under Swedish and Russian rule for so long, by the late 1800s, many Finns no longer associated themselves with being “Finnish.” Because of this crisis of identity, separation from imperial Russia was near impossible, making the “folk revolution” of the nineteenth century essential (Singleton, 1989, p. 75).

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Finnish actor and author Philip Binham succinctly stated that “the Finnish-language theatre began as a protest, originating as a weapon of the Finnish nationalist movement in the mid-nineteenth century against Russian rule and Swedish culture” (Binham, 1980, p. 58). And indeed, unlike the theatre of other European countries which served primarily as entertainment, Finnish theatre was used, from its very beginning “by the workers’ movement to educate members and bring them together in amateur performances” (Binham, 1980, p. 58). This practical, politicized form led to a very distinctively Finnish theatre: one which is nearly always realist in nature, and which prizes content over form (Binham, 1980, p. 58). Fittingly, much of the theatre we see developing in the late nineteenth century was rooted in the very folk art that was re-emerging in an effort to connect Finns to a cultural legacy that was uniquely theirs.

Perhaps the best example of a re-surfacing of folk art from this time came in the form of Elias Lönnrot’s compilation of the *Kalevala*. The *Kalevala* is an ancient epic poem of purely Finnish origin that weaves together a number of key myths from the country’s oral tradition and looks back to Finland’s pre-reformation paganism (Pentikäinen, 1999, p. 41). The re-surfacing of this epic inspired a myriad of new works, from musical compositions, to paintings, to plays. One young playwright in particular made his mark with a *Kalevala* story: at twenty-six, Aleksis Kivi won the Finnish Literary Society’s drama competition with his play, *Kullervo*. *Kullervo* is, interestingly, the only tragedy found in the entirety of the *Kalevala*. It carries strong Greek tones and is reminiscent of the Oedipus story; the crux of the plot occurs when Kullervo unknowingly seduces his sister, after which she commits suicide, driving Kullervo to eventually do the same (Pentikäinen, 1999, p. 40). The play has had great impact on Finnish culture, with some arguing that the character Kullervo has become a sort of role model for Finnish men, embodying stoicism, and the necessity of striving tirelessly towards your fate, even if that fate is a tragic one (Pentikäinen, 1999, p. 42).

While *Kullervo* was certainly defined by tragedy, that is not to say that all of Kivi’s works followed a similar pattern. His play *Seitsemän veljestä* [Seven brothers] provides an interesting contrast, and perhaps greater insight into the Finnish folk movement. Though the play was initially poorly received, it was at one time the second most widely circulated book in Finland, with only the Bible ahead of it (Matson, 1962, p. 5). It is the story of seven brothers who, rather than man their family’s homestead, choose to forge a life for themselves in a nearby forest. It is interesting that, in many ways, this theme of returning to nature and foregoing modern society is not dissimilar to the romantic sentiments around the natural world which were beginning to gain popularity in Ontario around the same time. As southern Ontario began to urbanize with the approach of the 20th century, more and more the idea of “the forest” began to be idealized in the arts; cultural attitudes around the simplicity and appeal of the pastoral, contrasted with the wild of the forest, began to shift (Smith, 1990, p. 75). It would seem that on both sides of the Atlantic, the natural world was beginning to be seen as an essential part of human identity.

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Not long after Kivi's time, Finland broke free from Russian rule. But the tensions that formed among Finns during this period of uncertainty manifested in a Finnish civil war in 1918, less than a year after the nation gained independence. With so much political strife in such a short time, it is unsurprising that a large portion of Finnish theatre revolved around political ideologies, most markedly defined by the socialist "Red Finns," and more conservative "White Finns."

One playwright who would have fallen decisively into the "Red Finn" camp is Minna Canth. Canth was born in 1844 and made her work necessarily political by writing only in Finnish at a time when the language was regarded as second-class, and its use in literature at times even radical (Launis, 2011). That is not to say, though, that the language of Canth's works was the only thing that made them political. Her 1888 play *Kovan Onnen Lapsia* [Children of misfortune] dealt with the abject poverty often faced by the working class, and the devastating effects it could have. The piece was performed only once and was then banned by the theatre community for fear that the work would cause the state to repeal its theatre grants (Launis, 2011). This certainly speaks to the delicate balancing act which Finnish artists were forced to maintain.

While many playwrights, Canth among them, would have seen it as their duty to use their art to address the injustices of the state, the possible repercussions were not to be taken lightly. It is particularly interesting, then, to discuss how the Finnish theatre was applied and created by Finns who were no longer managing the constraints of their home country, but trying to forge a home in a new one.

THEATRE AND THE ARTS AS A TOOL FOR SETTLEMENT: FINNISH COMMUNITIES IN RURAL THUNDER BAY

As Finnish theatre evolved against a Canadian backdrop, its political underpinnings remained. The growth of industry in Ontario's north also meant the growth of organized labour, and in 1872, Canada legally recognized labour unions (Herstein, 1970, p. 300). As employees in many of the large industries that would have been affected by this change, many Finns were vocal about the rights of workers. And indeed, this centring of the working class in the Finnish community was not unique; many other immigrant communities had strong workers' theatres. Notably, the Ukrainian community in Winnipeg was renowned for employing theatre and other arts to raise awareness around social issues (Filewod, 2011, p. 66). Indeed, it would appear that, while working to fill Canada with as many European settlers as possible, the Canadian government overlooked the eventuality that many of those working-class "men in sheepskin coats" (Herstein, 1970, p. 288) would not readily trade their ideologies for a passage to the new world and a plot of land; and moreover, that many had been fighting for workers' rights in their own countries against incredibly high stakes. A majority of Finnish immigrants brought with them socialist ideologies, and what would have been seen as radical ideals. This is evidenced in data collected in the Finnish settlement of Intola, just outside of the Thunder Bay region. In 1914, there

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were about 60 Finns living in Intola, and while only 14 were registered Canadian citizens, 37 were members of the settlement's Socialist Society (Ranta & Burkowski, 1976, p. 74). With such strong ideologies, the community tensions between political groups which were so prevalent in Finland would not have disappeared.

While it is true that a number of the performances we are aware of in these settlements were of published, relatively non-controversial plays, socialist theatre certainly played a role in these communities. A number of community halls with stages that would have been used by theatre groups served double-duty as socialist halls. Because of this, the relationship between Finnish theatre and socialism is indeed a close one. An excellent example of this can be found in the Kivikoski settlement's Finnish Labour Temple. Built in 1910, the temple served as a key gathering place for members of the Finnish community. Indeed, the Finnish Socialist Organization of Canada held its first delegates meeting in this space, and a photograph of the delegates was on display in the hall's archives.

It can be said with some certainty that the cornerstone of the Finnish theatre community was the working class. One particularly interesting performance at the Finnish Labour Temple captured this notion in its production of *Spartacus*. As a mythologized Roman slave who led a revolt, for generations the character of Spartacus has been interpreted as symbolic of the rights of the working class. How fitting then, that it should be remembered as one of the earliest plays performed at the Finnish Labour Temple.

While it has been noted that Finnish theatre was often bent towards a political left, spearheaded by those "Red Finns" who would have been firmly rooted in progressive ideologies at home, it must also be noted that "White Finns" who did make their way to Canada wielded theatre as a tool in their own right. Notably, the very first records of theatrical activity in Finnish settlements was the work of temperance societies (Sporn, 1995, p. 96). These often religious groups used theatre as a way to spread a "social gospel" to a population that was largely anti-religion. This must have been particularly taxing, as many Finnish settlers saw emigration to Canada as a way of breaking from the Lutheran church (Reeves, 2017). For those Finns who were more conservative, though, temperance societies must have offered a welcome place to find theatre that was not overtly socialist. That is not to say that those who were religious were always on the political right, while those who weren't were on the left; occasionally, combinations of ideologies led to rifts in theatre groups, leading to some very interesting hybrid socialist-temperance movements that must have found great difficulty in reaching either side in a meaningful way (Sporn, 1995, p. 97).

While plays were sometimes performed outdoors, or as home entertainment once the turn of the century hit, more and more community halls with stages were being built, providing more variety of space for staging. At the Tarmola Hall, there is a record of the play *Rymättylän Häät* [a wedding in Rymättylä] having been performed,

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a Finnish work that would have brought a bit of home to Thunder Bay (Ranta & Burkowski, 1976, p. 35). Beyond this, the Lakehead Archives provide evidence of a number of staged performances from Finnish settlers at this time. This habit of performing published, well-established Finnish plays must have been key in helping settlers stay connected with the country they had left behind. Through these works, they would have been able to, quite literally, “perform home” by focusing on Finnish narratives and characters in their own language.

The records of plays, both professional and amateur, seem to reach an impressive level of prominence in the community. In Kivikoski, a professional director was brought in to lead the drama program (Halonen, 2016), just one example of the seriousness with which Finnish settlers engaged in theatre. Another interesting example can be seen in the Tarmola Hall, though this venue’s existence slightly post-dates the stated scope of this study. Built in 1917, the Tarmola Hall opened with real velvet curtains at its stage, a commodity that would have been exceptionally difficult to acquire in Thunder Bay at this time (Ranta & Burkowski, 1976, p. 34). But then, it makes sense that these communities would have been willing to put so much of their limited resources into theatre spaces. Quite often, theatre groups literally “built” communities by necessitating the need for greater space, resulting in the building of town halls and other buildings that could serve as a meeting place (Ranta & Burkowski, 1976, p. 75). And with this, we reach the core of just why theatre in Finnish settlements would have been so important. While giving settlers a link to their home, it also offered them a bridge forward. Through the creation of new works and new spaces, a new identity began to form within these communities; one that was not purely Finnish or purely Canadian, but a combination of the two. And indeed, it could be said that this was the theatre’s ultimate purpose for these settlers, and perhaps for many artists today: to hold a mirror up to where we are now, while reflecting on the past that brought us here, and projecting the future that might be built.

LOOKING BACK, MOVING FORWARD

The theatre of Canada’s past, and particularly that of communities outside the official Anglophone and Francophone traditions, remains largely unexplored; but these stories have played no small role in making Canada the nation it is today. The ways in which theatre was used by Finnish settlers to help those first arrivals create a home in a new world exemplifies how the arts provide us with the tools to honour our past while building our future. Ultimately, the connection between the political, the arts, and the ways in which we continually create and recreate identity is a common thread linking diverse communities: just as theatre was used in Finland as a tether to the country’s unique heritage in the face of Swedish and Russian rule, so too did it connect Finns in Canada to a sense of home and identity.

The power of theatre in community is its ability to allow us to envision more for ourselves, bridging the past, present, and future through an imagining of worlds that

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might be. When brought to the stage, the narratives found in Finnish folk art, or indeed, the stories that any community might tell about who they are, allow players to step into roles that capture a part of themselves that is intangible—a connection to identity, home, and culture that lies at the root of who we are and who we might become. And through this, we see that the strength of theatre in community building extends far beyond socialist halls or imported curtains. Instead, it empowers communities to forge their own unique identities, ultimately finding a way to *vuolla puuveitsellä kultaa* after all.

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TYLER ABBATE

How to Erase Shakespeare

The troubling history of *Pericles*

Why do we know Shakespeare plays like Romeo and Juliet, but not Pericles? This article explores the reasons why the popular Shakespeare play Pericles was targeted and erased by editors throughout the 17th and 18th centuries. From marketing strategies to concern for Shakespeare's reputation, I contend that the play was intentionally discarded by those who owned the copyright. This paper focuses on the tough and competitive printing market after Shakespeare's death in 1616. I explore how Shakespeare's business partners, Henry Condell and John Heminge, attempted to find literary success in 1623 by erasing what they thought was Shakespeare's failure: Pericles.

Keywords: Shakespeare, *Pericles*, English Renaissance, English literature

I've questioned the purpose of Shakespeare countless times. I asked myself *why* we read Shakespeare, but I never considered *how* these plays survived through generations. *How* were the most important Shakespeare plays chosen for the masses to study? Who decides which plays are essential? Why does a play like *Romeo and Juliet* prosper, but other plays such as *Pericles* remain neglected? As *Pericles* was co-authored by George Wilkins and not written solely by Shakespeare, I initially believed that collaboration might be the reason; however, *Henry VIII*, co-written by John Fletcher, has not been ignored in the same way *Pericles* was—*Pericles* was consistently discarded from key Shakespeare collections. Yet *Pericles* was not forgotten; it was intentionally erased. If *Romeo and Juliet* survived in glamour, *Pericles* was a blemish to be removed. Eighteenth-century editors, and even fellow business partners of Shakespeare, tried to scrub away the play like a stain.

Pericles was actually a popular play during Shakespeare's life (Parr, 2004), so why would it have been targeted for erasure? There were two potential reasons: marketing and Shakespeare's reputation. Yet there may have been a human motivation beyond business, such as publishers (and even Shakespeare's business partners) wanting to protect the playwright's reputation. Alternatively, could concern over Shakespeare's



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legacy be interpreted as just business? If negatively affecting Shakespeare's legacy could hurt sales, at which point does love of the Bard become blurred?

The tough publishing market around the time of Shakespeare's death suggests that a main motivation for side-lining *Pericles* was due to marketing strategies. Henry Condell and John Heminge (who were fellow members of Shakespeare's company, The King's Men) wanted to print a collection of Shakespeare's work in a larger folio format. This folio was "expensive and risky" (Jowett, 2007, p. 74) for two reasons. First, many cheaper versions of Shakespeare plays (published in the smaller quarto format) had been printed before 1621. The market was already filled with cheap, single-edition Shakespeare plays. It would be hard for Condell and Heminge to justify selling a more expensive, multi-play collection. Second, large play collections of a dramatic nature did not have much of a precedent before Condell and Heminge's 1623 publication of Shakespeare's works. Very few folios had been published in England (Connor, 2012, p. 2), and the fact that history plays were the top sellers before Shakespeare's first folio suggested further uncertainties in the market (Lyons, 2012, p. 8). The only precedent for printing more serious dramatic works in this format was Ben Jonson's 1616 folio. Recognizing that an already expensive venture would be even riskier, Condell and Heminge needed a marketing strategy to ensure that the folio would stand out and sell.

What was the marketing strategy Condell and Heminge decided upon? They were aiming to create the appearance of a premium, textually legitimate product by achieving two principles: 1) they excluded the less-literary *Pericles* as an attempt to make the first folio seem more legitimate than the single-edition plays that flooded the market; 2) they included Edward Blount as a publisher. Blount was a notable publisher of literary texts that lent the project a sense of upmarket legitimacy (Jowett, 2007, p. 73). He had published authors such as Christopher Marlowe and Ben Jonson, who were established and legitimate writers in the print market. Massai (2013) notes that Blount also included aesthetic choices to make his products seem more premium. For example, Blount's books would include lavish decorations to highlight powerful patrons, whose names he also flaunted to boost his own literary reputation, a testimony to his skill for transforming book products for upmarket consumption (pp. 133, 136). He had specific and painstaking strategies of patronage that elevated his worth in the business.

Blount's influence is important, as he held the rights for *Pericles* and ultimately had to make the choice (perhaps along with Condell) as to whether to include the play. In the case of *Romeo and Juliet*, Blount had to convince copyright holder John Smethwicke to give permission to publish the play, but Blount did not need to seek permission to publish *Pericles* if he had truly wanted to. Why exclude such a popular play? As I see it, the answer lies in Blount's background: he was educated and well read, and recommended the books he published to his readers based on their literary value (Massai, 2013, p. 133). But from a monetary standpoint, not including the

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popular *Pericles* is puzzling. The play had enough renown to be performed before high-profile guests, such as the French and Venetian ambassadors who are recorded as having attended a performance of it in London in 1608 (Graves, 1916, p. 546). Including the play might have secured more purchases and eased the initial risk of production. This suggests that Blount's primary commercial strategy was achieving a legitimate product, rather than preserving every play that Shakespeare wrote regardless of literary value.

The other strategy Heminge and Condell used was to delegitimize their competition. The only other Shakespeare collection that was going to be on the market was Thomas Pavier's quartos, which did contain *Pericles*. This collection would have been unprecedented and a possible source of serious competition. Thus, Heminge and Condell sought to portray Pavier, and the inclusion of *Pericles*, as illegitimate: while the order was not explicitly aimed at Pavier, Shakespeare's theatrical company (or potentially just Heminge [Jowett, 2007, p. 71]) presented a modern-day equivalent of a cease-and-desist letter that banned unauthorized printing of their plays. Condell remarked on this in the preface to fellow readers of their finished collection, writing "you were abused with diverse stolen and surreptitious copies, maimed and deformed by the frauds and stealths of injurious imposters" (as cited in Jowett, 2007, p. 88). Claiming that their competition was composed of criminals that stained Shakespeare's reputation, Condell made works such as *Pericles* seem illegitimate.

However, Pavier was a mostly reputable publisher who got mislabelled as a fraud due to the successful marketing and business approach of Condell and Heminge. According to Andrew Murphy (2003), Pavier served as Assistant Warden for the Stationer's Company and was a legitimate member of the publishing trade (p. 40)—he was hardly an injurious imposter, as Condell would claim. As Jowett suggests, Pavier may have had to go underground halfway through the edition's printing, thus needing to rearrange dates to finish off the remaining plays. If this theory is to be believed, Pavier may have wanted to recoup his losses and continue on. Either way, Pavier held the rights to most of the plays printed, or in the case of *Pericles*, the ownership had probably expired (Jowett, 2007, p. 71). In order for the King's Men to market their collection as the legitimate Shakespeare text, Heminge and Condell slandered Pavier to clear a spot in the market.

If *Pericles* was a success on stage, then why not print the play? Blount probably thought the play would lower the literary quality of their collection. *Pericles* suffers from an opening act that does not employ the same rhyme schemes as the rest of Shakespeare's oeuvre. It is possible that Blount may have felt that George Wilkins's contributions to the play—Acts One and Two—undermined Blount's marketing strategy. Not only are there many more rhymes in Wilkins's section, there are rhyme schemes that don't occur anywhere else in the Shakespeare canon (Jackson, 1993, p. 141)—and these differences do not lend distinction to Wilkins's sections. Every

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line in the first chorus of *Pericles* is rhymed immediately with a subsequent couplet. The more complex rhyme scheme structure of a Shakespearean sonnet is absent, and in its place one finds a scheme that has a sing-song quality. Jackson also points out that rhymes like “consist and resist” (p. 242) appear nowhere else in Shakespeare’s works, and judges that Acts One and Two of *Pericles* have a generally amateur quality to them in comparison with the rest of Shakespeare’s oeuvre. Jackson counted the occurrences of these non-Shakespearean rhymes in Acts 1 and 2 compared with Wilkins’s other play, *The Miseries of Enforced Marriage*. Jackson found that simple three- and four-letter rhymes such as “ill/will” and “life/wife” had double the occurrences in *The Miseries of Enforced Marriage* than in any Shakespearean work (p. 245). Act 3 of *Pericles* has no rhymes such as that cited above (“consist”/“resist”) where the same root serves as the rhyming element between two words. Blount attended the Merchant Taylor’s School with a natural talent for reading (Taylor, 2004) and could tell what stood up to Shakespeare’s name and what did not. He likely excluded *Pericles* due to his own literary taste and to the fact that the play did not befit the highbrow status that Condell and Heminge were aiming to achieve.

Another motivation for excluding *Pericles* was the play’s critical reception from Ben Jonson, Shakespeare’s contemporary. Jonson panned the play’s quality and disparaged the common folk who made the play popular. He seethed: “No doubt some mouldy tale, Like *Pericles*; and stale As the Shrieves crusts, and nasty as his fish-scrap out every dish, Throwne forth, and rak’t into the common tub, May keepe up the *Play-club*” (1631, penultimate unnumbered page). If an acclaimed writer such as Ben Jonson dubbed *Pericles* a “mouldy tale” to be served to the masses, Blount might possibly have had a similar opinion. Jonson wasn’t just another critic, but a fellow playwright; he carved a path of success in a tough literary market. Given that Jonson’s folio was the first precedent for dramatic works printed in that format, Blount, Condell, and Heminge likely wanted to emulate Jonson’s acclaimed reputation in the market by selecting the plays that they considered as literarily important, not crowd pleasers. While there is no hard proof that Blount ever read Jonson’s comments, he was well read, educated, and had published Jonson’s works. Blount had a talent for predicting classics (Taylor, 2004), and would only want to include plays that had the best literary reputation. Furthermore, Blount had been apprenticed to William Ponsonby, who had pioneered commercial strategies for contemporary literature (Taylor, 2004), a model that Blount was in all likelihood inclined to emulate. *Pericles* was possibly ignored due to its “stale” critical contemporary reception and would have damaged Heminge and Condell’s upscale marketing strategies.

Marketing and money were not the only motivation for trying to erase *Pericles*. In fact, excluding *Pericles* could be interpreted as an act of compassion, an attempt to save Shakespeare’s image after his passing. As Heminge and Condell were instructed in Shakespeare’s will to purchase rings in his memory (Edmond, 2004), it is probable

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that there was legitimate care for the Bard beyond economics. George Wilkins, Shakespeare's co-author of *Pericles*, did not enjoy a great reputation, for he found himself frequently before courts of law from 1602 until the end of his life (Parr, 2004). As Condell and Heminge were employees in Shakespeare's theatrical company, and were potentially friends with him, they would have wanted to present their late friend in the best possible light. To show Shakespeare in the most flattering way after death, as well as to ensure folio profitability, it is probable that Condell and Heminge intended to scrub away Shakespeare's association with a co-author with multiple felonies.

The impact of Condell, Heminge, and Blount's exclusion of *Pericles* in their folio collection would have significant consequences for the play's long-term reception. Although the play was eventually accepted as partially Shakespeare's in the 18th century (Jowett, 2007, p. 91), the exclusion of *Pericles* from the folio resulted in a long history of purposely burying the play. Protecting Shakespeare's reputation was also a motivation for Alexander Pope, who in addition to being 18-century England's most prolific poet, also edited a lavish collection of Shakespeare's works. Pope also excluded *Pericles* from his published edition of Shakespeare on the principle of enhancing Shakespeare's reputation (Kirwan, 2012, p. 12).

Pope held elitist views that were very similar to the principles of other editors of the time. As Harriman-Smith (2014) suggests, many 18th-century editors aimed to restore the texts as Shakespeare intended (p. 48). Pope thought he was editing to bring out Shakespeare's true authorial intent. While this sounds noble, Pope was still appealing to a wealthy audience for an expensive edition (Novak, 2014, p. 134). His selling point was to maintain authorial intent, but the long-term consequence was to tarnish the legitimacy of what had come before, just as Condell and Heminge had done to their competitors. Pope (1725) judged Condell's 1623 collection "far worse than the Quarto's" (p. xvi), undercutting the authority that Blount had tried to achieve for it. Whether it was salesmanship, a marketing fraud, or just arrogance, Pope employed the same marketing tactic against Condell that the 17th-century publisher had used against Pavier!

As for Blount, a primary motivation for Pope to erase *Pericles* was to project the best image of Shakespeare. Many other parts of his preface exhibit the same highbrow bias Blount had been guilty of. For example, Pope over-praises Shakespeare as an author who never borrowed ideas, even to the point of criticizing Ben Jonson. Pope writes, "If any Author deserved the name of an *Original*, it was *Shakespeare*" (p. 1), and, "Because *Shakespeare* borrowed nothing, it was said *Ben Jonson* borrowed every thing" (p. 6). However, Pope is wrong—many Shakespeare plays are based on other works. *Pericles*, for example, is based heavily on John Gower's *Confessio Amantis*, to the extent that Gower is immortalized as a character in the play. Excluding *Pericles* helped Pope to engineer Shakespeare's reputation as

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original. The greater the status that Pope fashioned for Shakespeare, the more copies of his expensive and risky collection he would sell.

Pope's reasons for erasing *Pericles* ran deep. As Harriman-Smith indicates, Pope had an anti-theatrical bias that may have informed his editorial and business decisions. Pope thought that the audiences of Shakespeare's time could not have appreciated fine art; any play that had appealed to these audiences was considered by Pope as a lower form of art. Pope opines, "the Audience was generally composed of the meaner sort of people... buffoonery would always please" (p. 3). Pope would not consider a popular crowd pleaser like *Pericles* to contain enough literary value. He continues, "the common Audience had no notion of the rules of writing" (p. 3), and claims that it was not until Ben Jonson that these under-educated masses learned the art of critical thinking. This not only severely undercuts the theatrical achievement of *Pericles* and the tastes of those who enjoyed it at the time, but also claims that the orality of the stage was worth less than Pope's written edition. This elitist view is embodied by Pope using the term "stage-poetry," which he employed to imply that the stage was a limit to Shakespeare's genius (Harriman-Smith, 2014, p. 51).

Pope congratulated Condell and Heminge for throwing away *Pericles* and other co-authored plays. He writes that they "did Shakespear [sic] the justice to reject those eight plays in their edition" (p. xx), exhibiting concern about Shakespeare's reputation above everything else. From Pope's perspective, theatrical popularity was damning to Shakespeare, for he did not care that these plays had once been thought to be Shakespeare's, or how important *Pericles* had been to Shakespeare's life; they were, in Pope's mind, a disservice to Shakespeare's reputation.

To be fair, Pope cannot be blamed entirely for declining interest in *Pericles* during the 18th and 19th centuries. Giddens (2009) suggests that, despite a 1780 edition by Edmund Malone, the play's lack of live performances might be attributed to the aversion to sexual content during the 19th century. As the play contains incest and prostitution, the few appearances of *Pericles* in that century were heavily altered. In *Charles and Mary Lamb's Tales from Shakespeare* (1807), a book for children, Marina was sold into slavery instead of prostitution, and Antiochus's incest is only referred to as a shocking deed. Samuel Phelps put on an altered production in 1854, as the play had not been staged for almost a century at that point. Once again, the incest was removed, but Giddens also noted that a reviewer took note of the (lack of) prostitution scenes. That reviewer said the prostitution was "too gross for representation, save in a most attenuated form" (Giddens, 2009). Although Pope did harm to *Pericles's* canonical reputation, the preferences of generations also helped to erase the play.

In addition to morality, *Pericles's* decline could be linked to Shakespeare's figure as a source of national pride in the 19th century (Schoch, 2005, p. 112). Multiple Victorian essayists such as Thomas Carlyle wrote that "Shakespeare is ours... we are

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of one blood and kind with him" (1840, p. 139). Carlyle went beyond feeling a national pride for Shakespeare, and felt a connection and physical bond for the Bard. The fact that the play featured prostitution and had been co-authored by a criminal would certainly diminish such an idolization. Victorians also generally believed that Shakespeare's works were like a biography, and so gave greater insight as to who the Bard was (Williams, 2010, p. 502). Would *Pericles* show a side of Shakespeare that could damage his figure-head status? The lower-quality rhyme schemes unique to *Pericles* could affect the worthiness of studying Shakespeare in the mind of Victorian critics.

Legal protections on theatre and Shakespeare's plays in the 18th and 19th centuries also led to *Pericles*'s decline. The Licensing Act of 1737 restricted unauthorized productions of Shakespeare plays, forcing smaller theatres to disguise Shakespearean productions by using fake titles (Schoch, 2005, p. 108). The result of these laws was a financial monopoly by the few elite theatres in England. When Parliament attempted to reform this law in 1832, the arguments against change were based on a sense of legitimacy. Charles Kemble argued that smaller theatres' productions of Shakespeare would be inferior to those of larger companies (Schoch, p. 107). This suggests that Shakespeare was an icon to be protected, as Kemble thought that inferior productions from smaller theatres should not be deemed legally acceptable. The Earl of Glengall defended these protections on Shakespeare, as "it would be impossible to give proper scenic effect to Shakespeare in a small theater" (Schoch, p. 115). Those in favour of keeping licensing restrictions felt any performance that could not capture Shakespeare in full glory would be damaging to his legacy to the point of being illegal. *Pericles*, having been cast aside as illegitimate by Pope, would not have been a play choice for a legitimate theatre before 1832. Laws that determined the legitimacy of Shakespeare indirectly contributed to the play's absence from the stage for almost a century, until 1854. The laws established in 1737 that intended to protect Shakespeare's works led to the withering of *Pericles*. Yet laws and morals could not fully fade the work.

While I've scrutinized decisions taken by 17th- and 18th-century editors over their concern for Shakespeare's legacy and for their own profits, plays must be reimagined and cared for in every era to survive the erosion of time. In my view, editors not only have the responsibility of keeping these flowers of art alive, but also have the burden of removing the invasive species that can threaten the ecosystem as a whole. Even if an editor made their decisions for economic reasons, would they not have had even a little compassion for the product? Heminge and Condell may have brought on Blount for marketing purposes, but I do not believe that invalidates the compassion they had for Shakespeare and the care that they showed for his oeuvre. One could even interpret Heminge and Condell's desire to succeed as a tribute to Shakespeare; the duo could reach an audience of book readers that was not possible in Shakespeare's lifetime, even if it meant discarding *Pericles*. Condell and Heminge's

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editorial actions succeeded in keeping Shakespeare's art alive through the transition from the stage to the printed word. A parallel could be made to syndicated television shows, which see select controversial episodes removed in transition to streaming platforms. While one could view the decision as a sole concern for reputation and profitability, show creators have to remove the warts in their creations to survive past the traditional television era; editors had to decide if *Pericles* was a blemish that could ruin their product, but also affect the ability for Shakespeare to survive another generation. *Pericles* did contain warts and deformities, yet the beauty of art should not be about perfection. Knowing that artistic blunders are possible from even the greatest of writers should enhance our appreciation of their accomplishments. It is possible that publishers thought *Pericles* could erase Shakespeare himself; that the stain of one play would destroy the rest of Shakespeare's accomplishments. Good intentions have the power to preserve history, but can eradicate the past we promised to conserve.

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XX Cygni: Fourier Analysis

High amplitude delta Scuti (HADS) stars are short period pulsating variable stars, with a pulsation of several hours. They typically pulsate in radial modes, with most of their energy being distributed into the main pulsation. Fourier spectra was completed for star XX Cygni (XX Cyg) for the purpose of deducing the dominant frequencies of pulsation for XX Cyg. For the years 2010 to 2017, data reduction was completed to produce light curves displaying the time of maximum light for XX Cyg at the Allan I. Carswell Observatory located at York University in Toronto, Canada. With over 100 new data points coming from the Allan I. Carswell Observatory, the total observed times of maximum light is 12,895 data points. Frequency analysis of the light curve has shown the energy is being distributed primarily into the main pulsation, with a fundamental frequency of 7.3 cycles/day.

Acknowledgements: Thank you to the staff and volunteers at the Allan I. Carswell Observatory for collecting data on XX Cyg during many observing nights. A special thank you to Sunna Withers for assisting with the data reduction process and to Professor Paul Delaney for editing this paper.

Keywords: High amplitude delta Scuti (HADS) stars, Fourier analysis, fundamental frequency

INTRODUCTION

High Amplitude δ (delta) Scuti (HADS) stars are short period pulsating variable stars, with pulsation periods of several hours. Pulsation in this context means that the star expands and contracts its outer atmospheric gas layers causing it to enlarge during expansion and shrink during contraction. This results in changes to the star's brightness (and temperature). During pulsation, HADS will have most of their energy distributed into the main or fundamental pulsation period (or frequency), but other pulsation periods can and do occur simultaneously.

In this research, a Fourier spectrum was generated for the star XX Cygni (XX Cyg) for the purpose of identifying the dominant frequencies of pulsation for this star. Frequency refers to how many times the star goes through an expansion-and-contraction cycle (pulsation) during a specific period of time. For comparison, when



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a musical instrument produces sound, it is rarely a pure tone but rather a mix of many different frequencies, with each frequency having a certain strength (or energy). Similarly, pulsating stars do not “breathe” with simply one frequency. A Fourier analysis is conducted on data collected from a star to allow the determination of the frequencies involved in the star’s pulsation, and this in turn enables stellar properties like age and evolution (energy generating processes) to be better understood.

Observational data for XX Cyg were collected at York University’s Allan I. Carswell Observatory (AICO) in Toronto, Canada, for the years 2010 to 2017. Data reduction was completed to produce light curves displaying the star’s brightness as a function of observing time, thus revealing the time of maximum light that occurred during a pulsation. With over 100 new times of maximum light coming from the new AICO data, the total observed number of data points available for the Fourier analysis was 12,895. Frequency analysis of the light curve data was completed using Period04 (Lenz & Breger, 2005) and VStar (Benn, 2012) software packages, and has shown the energy during pulsation was distributed primarily into the main pulsation, with a fundamental frequency of 7.3 cycles/day.

HADS STARS AND XX CYGNI

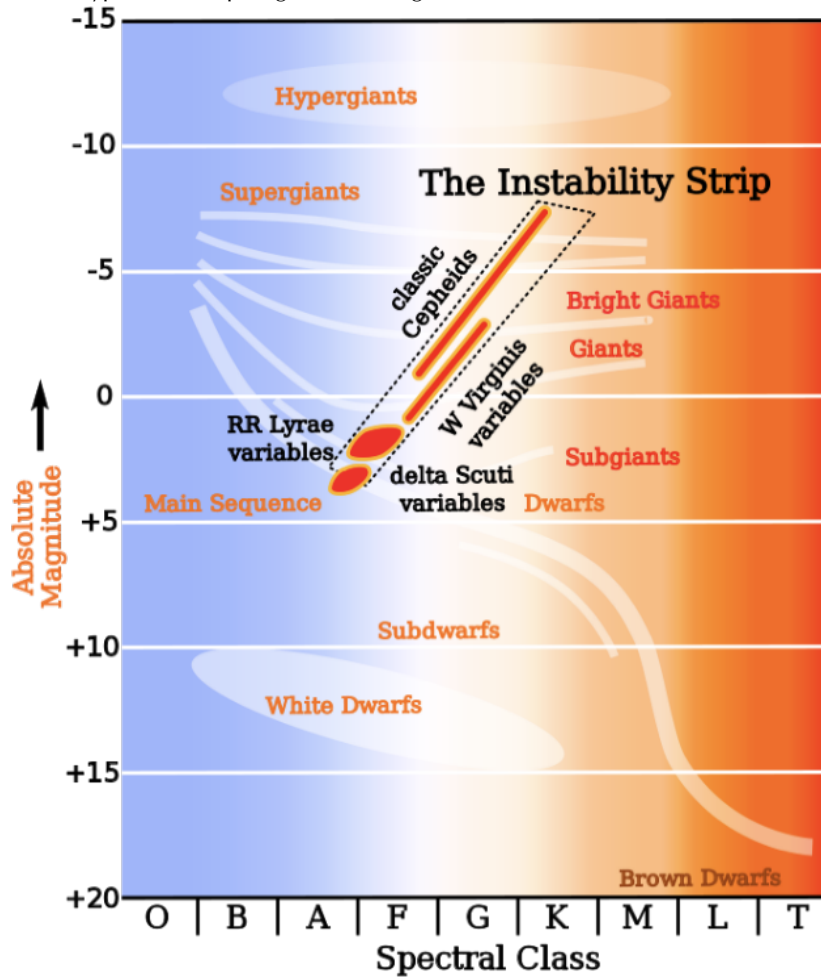
HADS stars are stars in which thermonuclear fusion in their cores has stopped, moving the star off the main sequence of the Hertzsprung-Russell diagram (HRD) and onto the instability strip. Thermonuclear fusion for most stars (and for most of a star’s life) is when they are actively converting hydrogen into helium in their cores. Figure 1 shows a typical HRD with the instability strip outlined in black. A HRD plots Spectral Class (essentially temperature) versus Absolute Magnitude (essentially brightness or energy output). For example, “O” type stars are the hottest and brightest stars and are located towards the upper left of the diagram. Our Sun is a “G” star and can be found on the Main Sequence at this stage of its evolution (near the very center of the diagram). All stars can be placed onto an HRD revealing evolutionary patterns.

HADS that are of Population II (meaning they are metal poor with elements heavier than hydrogen and helium significantly depleted in the star) are called SX Phoenicis stars (SX Phe) and these Population II stars are more evolved than their Population I (metal rich) counterparts (Conidis, 2011; Pigulski et al., 2006). Population II HADS stars are usually discovered in globular clusters (old star clusters that typically contain tens of thousands of stars), with about 150 HADS stars located in the Galactic Field. Out of these 150 HADS stars, only 13 of them are known SX Phe stars (Rodríguez & López-González, 2000; Clement et al., 2001; Yang et al., 2012).

The star discussed in this paper is the metal-poor, Population II SX Phe star, XX Cyg. XX Cyg has a mean visual magnitude of $V=11.7$ and has a velocity (speed) through space of -108 km/second, with a radial velocity amplitude of 37 km/seconds (Conidis, 2011; Jonev, 1982). Descriptive information specific to XX Cyg is summarized in Table 1. XX Cyg has a mass of $1.7 M_{sun}$ and a spectral class of A5-F5

(Yang et al., 2012). The Right Ascension (RA) is the location of an object in the sky according to its east-west coordinates. It essentially represents the celestial longitude of a star. The Declination (Dec) is where the object is located in the sky according to its north-south coordinates, essentially the celestial latitude. Effective temperature is the temperature a Black Body (an object that would absorb all electromagnetic [light] radiation) would be if it was the same size of the star. Metallicity is the ratio between the elements iron and hydrogen in the star.

Figure 1. A typical Hertzsprung-Russell Diagram (HRD)



Note. The x-axis (spectral class) represents the types of stars based on temperature (hottest to coolest from left to right), and the y-axis (absolute magnitude) represents the brightness of the star (brightest to dimmest from top to bottom). The Instability Strip represents the area of stars where thermonuclear fusion in their cores has stopped. The HADS stars can be located on the bottom-left location of the Instability Strip.

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Table 1. Summary Descriptive Information on XX Cyg

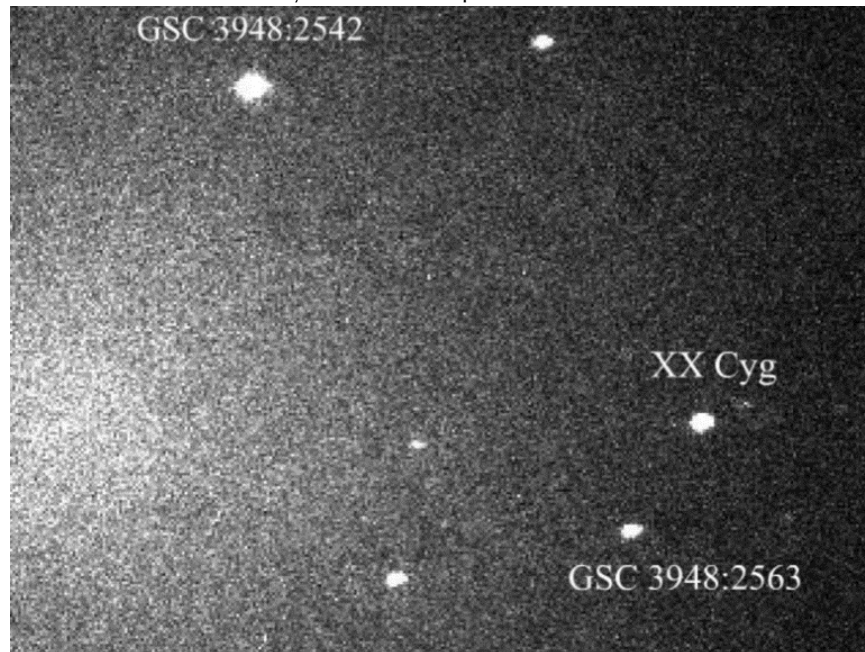
Descriptor	Value
Spectral Type	A5-F5
RA	20h 3m 15.6s
Dec	+58 57' 16.5''
Effective Temperature (Teff)	7530 K
Metallicity (Fe/H)	-0.49

Note. RA = Right Assentation, Dec = Declination.

NEW OBSERVATIONS AND FOURIER ANALYSIS

At the AICO, XX Cyg data were collected using a Charged Coupled Device (CCD), essentially an electronic camera containing thousands of light sensitive picture elements, or pixels, that was attached to the 60 cm telescope. The light (photons) striking these pixels creates a pattern of electric charge that can be read by a computer system and then analyzed.

Figure 2. Field of View for XX Cyg on the Charged Coupled Device Attached to the Allan I. Carswell Observatory 60 cm Telescope



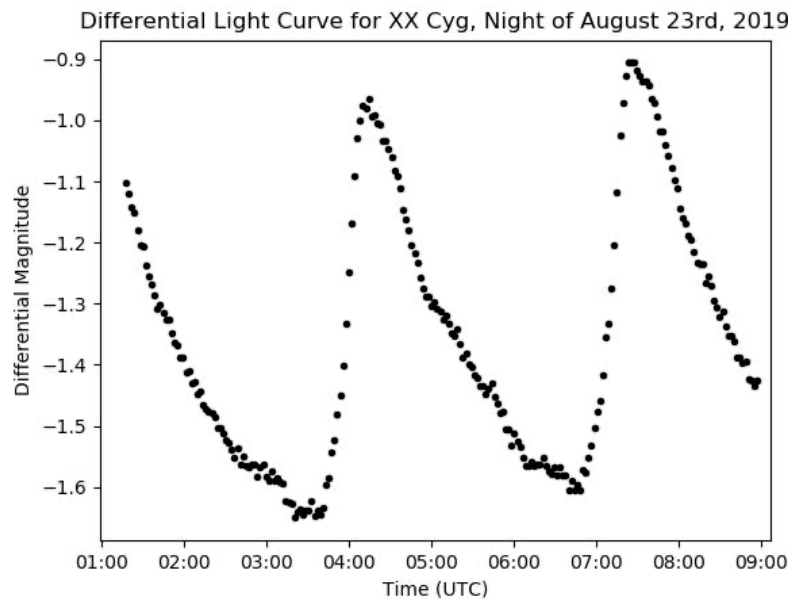
For this research, hundreds of images of XX Cyg were taken nightly, so the time of maximum light could be determined from an analysis of the brightness variation of the star measured over time. An example of the field of view for XX Cyg is depicted in Figure 2. Light curves are then used to understand the pulsating nature of the

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variable star. When light curves are constructed, they form a non-sinusoidal curve as evident in Figure 3, where the x-axis represents the time in Coordinated Universal Time (UTC) while the y-axis marks the differential magnitude. UTC is the world's time standard in which an Atomic Clock and Universal Time are used to get the basis for civil time. The differential magnitude is the difference between the comparison star's (instrumental) magnitude and the variable star's (instrumental) magnitude. The light curves show the maximum time of light, defined by the peak in brightness.

Fourier analysis is a fundamental tool in helping to understand the different frequencies present in a periodic signal (Fiacconi & Tinelli, 2009; Yang et al., 2012). Period04 is a computer program that takes a periodic signal and determines the contributions (strengths) from the different frequencies detected within the signal.

Figure 3. Typical Light Curve for XX Cyg Observed at the AICO for a Time Frame of Approximately Eight Hours

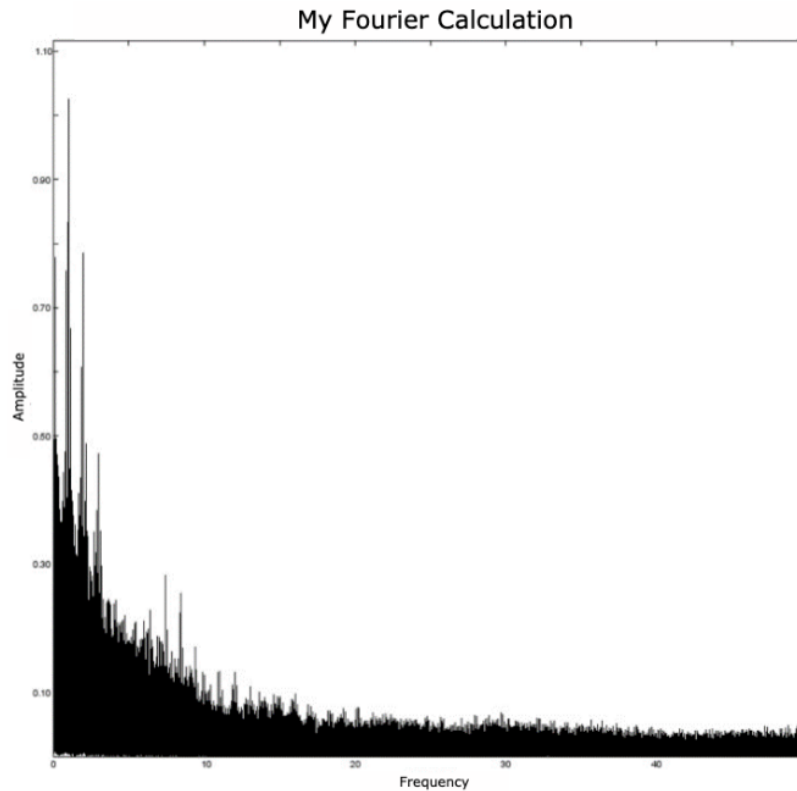


Between the years 2010–2017, 12,895 data points were obtained for XX Cyg at the AICO. The 60 cm telescope was used to collect the raw data for this research and the principal analysis program used to create the nightly light curves was Image Reduction and Analysis Facility (Tody, 1993), along with custom python codes in Linux. To obtain the Fourier spectrum, the Heliocentric Julian Date (HJD) and magnitudes were strung together to form one single time string for input into Period04. The HJD is the number of days since January 1, 4713 BCE, and corrected for Earth's position with respect to the center of the Sun. Period04 produced a Fourier spectrum that showed all the detected frequencies of pulsation for XX Cyg (Figure 4).

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The larger (more intense) peaks that are evident in the spectrum represent the main frequencies of pulsation for XX Cyg. Once the spectrum was obtained, the research data was input to VStar, a similar program to Period04 that allows the generation of more quantitative information relating to the Fourier spectrum. With this program, fundamental frequencies were explicitly extracted from the time string inputted.

Figure 4. Fourier Spectrum of XX Cyg from Period04



Note. The x-axis is the frequency and ranges from 0–50 cycles per day. The y-axis shows the amplitude (energy or strength of pulsation) and ranges from 0–1.10 units.

FINDINGS

The five frequencies with the most energy were extracted from VStar and are shown in Table 2. A fundamental frequency of 7.3 cycles/day was successfully detected, in keeping with previous research results. The fundamental frequency is receiving the majority of the energy while at least four non-radial modes at other frequencies were present. Non-radial means that as some parts of the star are expanding, some areas are shrinking at the same time, while radial means the whole star is either contracting or expanding. Again, using a music analogy, a drum membrane when struck will have some portions moving “up” while other parts of the membrane are moving

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“down.” Thus, the results from VStar confirm that XX Cyg is a radial mode pulsating star, but there is evidence showing energy is being distributed into non-radial pulsations modes.

Table 2. Pulsation Frequencies Detected from VStar for XX Cyg

Frequency (cycles/day)
7.3 (Fundamental Frequency)
15.07
22.84
29.5
37.27

Harmonics were also searched for with VStar. Harmonics are integer (1, 2, 3, etc.) multiples of the fundamental frequency. Looking at the top five frequencies primarily, there is no evidence of exact integer multiples being present. Examining the top 10 frequencies detected (based upon the energy available to these frequencies) revealed 58.4 cycles/day, 94.9 cycles/day and 109.5 cycles/day which are integer multiples of the fundamental pulsation frequency and therefore are harmonics.

CONCLUSION

XX Cyg is shown to have a fundamental pulsation frequency of 7.3 cycles/day with additional non-radial modes present in the star. With research data from the years 2010 to 2017, it is evident that XX Cyg is distributing most of its energy into the fundamental pulsation with other frequencies having smaller amounts of energy deployed to them. When examining the top 10 pulsation frequencies detected, harmonics were evident.

The determination of the principal pulsation frequencies helps to constrain the theoretical models for the energy regeneration processes occurring within the star as it traverses the Instability Strip of the HRD. Applying the Fourier analysis to the broader category of δ Scuti stars will further improve our understanding of these stars as they transition from hydrogen fusion energy generation (on the main sequence) into their later stages of stellar evolution.

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Contribution of Chemotherapy Treatment Factors to Cognitive Outcomes in Survivors of Childhood Leukemia

Long-term cognitive deficits are frequently observed in survivors of childhood acute lymphoblastic leukemia (ALL). Studies conducted in mice have identified chemotherapy agents methotrexate (MTX), dexamethasone (DEX), and prednisone (PRED) as having a significantly adverse impact on brain development. However, few studies have examined the relationship between variations in childhood exposure to these agents and cognitive abilities among ALL survivors. We hypothesized that survivors who had received higher doses of MTX would exhibit significantly greater cognitive impairments than survivors who received lower doses. Further, we hypothesized that survivors treated with both PRED and DEX would have greater cognitive deficits than those treated with DEX only. The sample included 59 ALL survivors (35 males, 24 females) between the ages of 8 and 18 years old. Compared to normed means, male ALL survivors exhibited significantly lower scores on working memory and processing speed, $t_{(34)}=-3.912$, $p<0.001$ and $t_{(34)}=-5.077$, $p<0.001$, respectively; female ALL survivors exhibited significantly lower scores on working memory, $t_{(23)}=-3.035$, $p<0.01$. Variations in exposure to MTX, DEX, and PRED were not correlated with variations in cognitive outcomes. Further research is needed to determine what factors explain different cognitive outcomes after chemotherapy treatment for childhood ALL.

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Keywords: Chemotherapy, acute lymphoblastic leukemia, late effects, cognitive outcomes



Contribution of Chemotherapy to Cognitive Outcomes

1. BACKGROUND

Acute Lymphoblastic Leukemia (ALL) is a cancer of the white blood cells. It involves an overproduction of lymphocytes—immature white blood cells—in the bone marrow. The accumulation of these cancerous cells inhibits the production of normal cells in the bone marrow.

ALL is the most prevalent pediatric cancer, accounting for approximately 26% of all cases of childhood cancer (Essig et al., 2013; Jacola et al., 2016). Additionally, ALL most frequently occurs in childhood with 60% of ALL cases occurring before the age of 20 (Bassan & Hoelzer, 2011; Hunger et al., 2012; Pui et al., 2008). Childhood ALL is typically diagnosed between the ages of two and five years (Pui et al., 2008), coinciding with a period of major developmental changes in the brain.

1.1 Cranial Radiation Therapy, Chemotherapy, and Late Effects

The past few decades have seen a tremendous increase in the survival rates of childhood ALL patients. The five-year survival rate was approximately 5% in 1960 (Edelmann et al., 2013). Today, the survival rate exceeds 90% (Pépin et al., 2016).

Cranial Radiation Therapy (CRT) introduced in the 1960s, was accredited with early increases in survival by targeting central nervous system sites of relapse. However, CRT use in cancer treatment has been associated with a high incidence of neurotoxicity (Montour-Proulx et al., 2005) and therefore, is now used sparingly. As a result, treatment with chemotherapy alone, consisting of the administration of a cocktail of drugs over several treatment phases lasting as long as three years, is the preferred approach to treating ALL patients.

The term “late effects” is used broadly to describe observed deficits associated with cancer treatment. Late effects emerge months or even years after the completion of treatment and persist across the lifespan. Studies show that long-term survivors of ALL experience significant deficits—believed to be associated with their treatment—including premature mortality, neoplasms, congestive heart failure, stroke, obesity, osteonecrosis, and neurocognitive dysfunction (Kadan-Lottick et al., 2009; Mody et al., 2008). Neurocognitive dysfunction is particularly impactful on quality of life.

Despite the efforts to reduce the observed intellectual impairments and attention dysfunction, they continue to be reported in survivors (Buizer et al., 2005; Cheung & Krull, 2015; Montour-Proulx et al., 2005). Studies have shown that survivors are at an increased risk of neurocognitive deficits in attention, processing efficacy, and executive function (Cheung & Krull, 2015). Understanding how childhood ALL or its treatment leads to intellectual impairments is a high priority for research.

1.2 Chemotherapy Protocols

Chemotherapy treatment is administered according to predetermined protocols that outline which chemotherapy agents should be administered, in what amounts, and how often. At diagnosis, patients are stratified into standard-risk (SR) or high-risk (HR)

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categories based on likelihood of relapse. Individuals stratified as HR receive a more intense chemotherapy treatment than those considered SR. It is important to note that the exact doses of chemotherapy agents delivered vary between individuals based on risk-stratification, protocol type, and adjustments made to accommodate individual tolerances.

1.3 Chemotherapy Agents and Late Effects

It is widely believed that chemotherapy agents might have adverse effects on cognitive function. The agents most commonly suspected to play a large role in the emergence of late effects include intravenous methotrexate and prednisone (Montour-Proulx et al., 2005). Many studies investigating the impact of chemotherapy treatment have been conducted and a broad range of chemotherapy agents and factors have been attributed to causing the observed deficits (Duffner et al., 2014; Edelmann et al., 2013; Kingma et al., 2001; Waber et al., 2013).

Past research has linked glucocorticoids (i.e. prednisone and dexamethasone) to the cognitive outcomes observed in survivors of childhood ALL. Prednisone was the preferred glucocorticoid administered in the past to cancer patients. However, due to its better penetration into the central nervous system (Labar et al., 2010), dexamethasone is now frequently used instead. High levels of dexamethasone have been reported to have both short-term and long-term adverse effects on declarative memory, possibly through impacts on the hippocampus (Kingma et al., 2001). Greater academic problems and memory deficits have been reported in survivors treated with dexamethasone compared to those treated with prednisone (Waber et al., 2013). Glucocorticoid receptors are actively involved in memory storage and consolidation, consistent with the observation that dexamethasone-treated survivors were found to perform significantly worse on tests of vocabulary, academic learning, and verbal memory in comparison to normed means, while survivors treated without dexamethasone performed at or above normed means (Edelmann et al., 2013).

Intravenous methotrexate has been speculated to have adverse cognitive effects. A study investigating the contribution of methotrexate exposure to cognitive deficits found that individuals treated with an intense central nervous system directed therapy scored below average on more outcome measures than individuals who received fewer central nervous system directed treatments (Duffner et al., 2014).

Long-term neuropsychological effects of central nervous system directed chemotherapy treatment remain largely unknown (Buizer et al., 2005). A younger age at diagnosis and female sex have been associated with increased risk of late effects (von der Weid et al., 2003). Further, it has been reported that high-risk individuals experience a greater overall decline than standard-risk individuals (Mulhern et al., 2005).

While a detailed understanding of the mechanisms involved is lacking, sufficient research has been conducted to implicate exposure to chemotherapy agents in the

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adverse behavioral and cognitive outcomes observed in survivors of childhood ALL (e.g. Edelmann et al., 2013; Kingma et al., 2001; Waber et al., 2013). The severity of deficits varies considerably between survivors, as does the intensity of chemotherapy treatments delivered to patients (e.g., between risk-stratification categories and between different contemporary ALL treatment protocols). Differences in cognitive outcomes between standard-risk and high-risk groups suggest that cumulative doses of chemotherapy agents may contribute to the magnitude of the observed deficits. However, few studies have systematically and comprehensively evaluated the relationship between cumulative chemotherapy drug exposure and cognitive outcomes in survivors (e.g. Essig et al., 2013).

1.4 Present Study

The present study seeks to characterize the cognitive deficits experienced by survivors of childhood ALL and determine whether there is a relationship between chemotherapy exposure and observed deficits. We hypothesized that survivors who had received higher doses of MTX and VCR would exhibit significantly greater cognitive impairments than survivors who received lower doses. Further, we hypothesized that survivors treated with both PRED and DEX would have greater cognitive deficits than those treated with DEX only.

2. METHODOLOGY

2.1 Participants

Study participants were survivors of childhood ALL, treated on contemporary chemotherapy-only protocols. The participant sample (n=59) was composed of 35 males and 24 females between the ages of eight years and 18 years at testing. Inclusion criteria for participation required participants to be at least two years post-treatment with no history of relapse, to have received chemotherapy-only treatment, and to be fluent in English. Participants were excluded if central nervous system involvement—presence of leukemia cells in the cerebrospinal fluid—was noted at diagnosis, if treatment included cranial radiation therapy or bone marrow transplant, or if a prior diagnosis of Down syndrome or brain injury was noted.

2.2 Materials & Measures

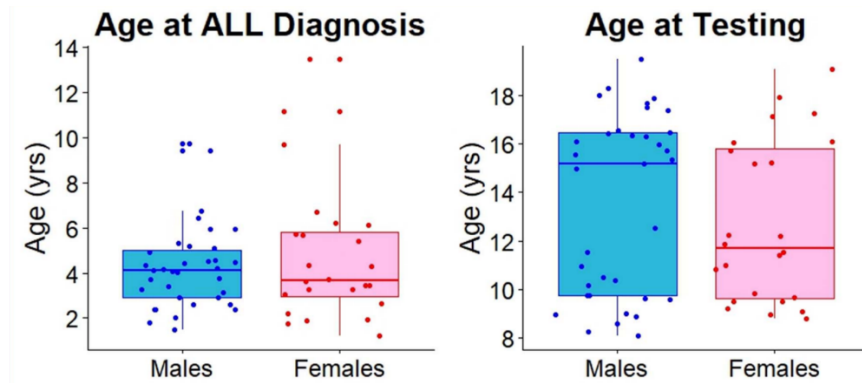
Survivors had previously been recruited as part of a multidisciplinary research program in childhood ALL; pre-existing data on cognitive outcomes was used for this study. To evaluate cognitive abilities, survivors completed the Wechsler Intelligence Scale for Children-IV (WISC-IV) and were assessed on four indices: verbal comprehension, perceptual reasoning, working memory, and processing speed.

Data on exposure to MTX (via intrathecal, intravenous, and oral delivery), PRED, and DEX was collected through retrospective review of medical files in the oncology clinic at SickKids Hospital. Information recorded in the chemotherapy protocol

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charts was entered into an electronic database and matched with outcome measures using participant IDs assigned to patients at testing.

Figure 1. Box-and-Whisker Plots Displaying Age at Diagnosis and Age at Testing of ALL Survivor Sample (35 Males, 24 Females)

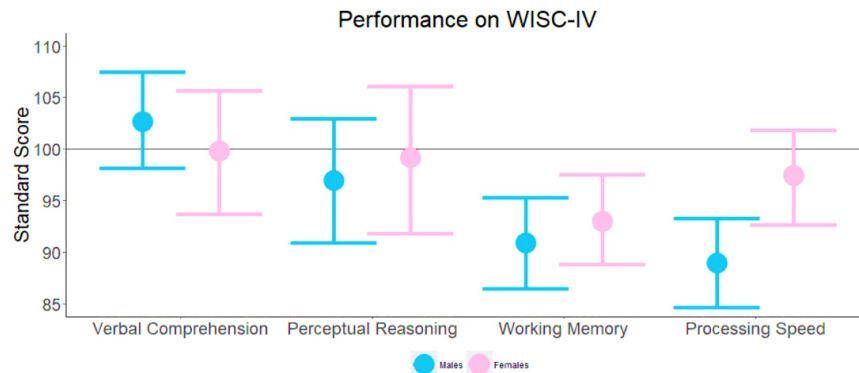


3. RESULTS

3.1 Analysis of Cognitive Outcome in ALL Survivors

Four independent-measure, one-tailed t-tests were conducted to compare ALL survivor scores on each of the four indices with normed means (Mean=100, SD=15). The scores were age and sex adjusted in accordance with WISC-IV. Survivor performance on all four indices (verbal comprehension, perceptual reasoning, working memory, and processing speed) is shown in figure 2. Lower scores indicate impairment.

Figure 2. Survivors Performance on All Four Indices of the WISC-IV



Note. Survivors performance on all four indices of the WISC-IV in comparison to the normed mean of 100, represented by the horizontal black line. Male and female average score with 95% confidence intervals are shown separately.

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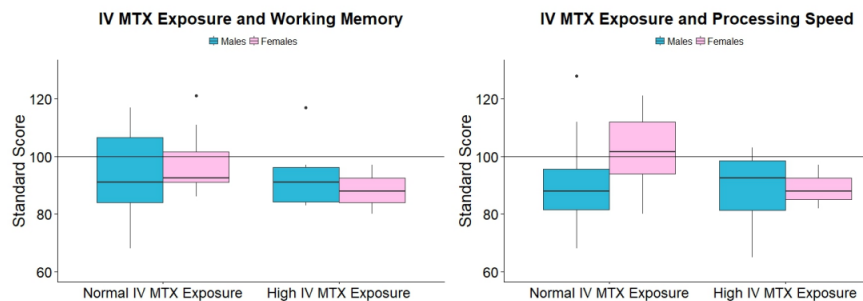
Compared to the general population (represented via normed means), male survivors exhibited significantly lower scores on working memory and processing speed, $t_{(3,4)}=-3.912$, $p<0.001$ and $t_{(3,4)}=-5.077$, $p<0.001$, respectively. Female survivors exhibited significantly lower scores on working memory, $t_{(2,3)}=-3.035$, $p<0.01$, than the general population.

No statistically significant differences were observed in verbal comprehension and perceptual reasoning between survivors and normed means. Female survivors did not differ significantly on processing speed compared to the general population.

3.2 Impacts of Chemotherapy Exposure on Cognitive Deficits in ALL Survivors

The cumulative amounts of MTX, PRED, and DEX were calculated and compared with the above observed cognitive deficits in working memory and processing speed. Once again, male and female survivors were studied separately. Analysis revealed no statistically significant correlation between the total amount of chemotherapy agent administered and the magnitude of cognitive impairment observed. Other factors, including age at diagnosis, years since diagnosis, and sex, were not associated with cognitive abilities.

Figure 3. Box-and-Whisker Plots of the Impact of Normal vs High MTX (Administered Intravenously) Exposure



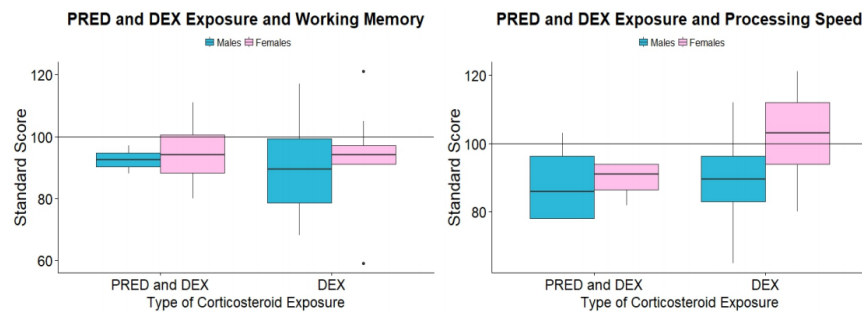
Note. Box-and-whisker plots of the impact of normal vs high MTX (administered intravenously) exposure on working memory and processing speed in male and female survivors. No statistically significant differences between performance outcomes and exposure level.

4. DISCUSSION

The investigation of cognitive performance of survivors compared to normed means revealed that male and female survivors performed significantly worse on working memory, and male survivors performed significantly worse on processing speed, in comparison to the general population. These results corroborate the conclusions of previous studies which found statistically significant cognitive deficits in survivors compared to controls or population norms.

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Figure 4. Box-and-Whisker Plots of the Impact of PRED and DEX vs DEX-Only Exposure



Note. Box-and-whisker plots of the impact of PRED and DEX vs DEX-only exposure on working memory and processing speed in male and female survivors. No statistically significant differences between performance outcomes and exposure type were obtained.

The above findings do not support our hypothesis that survivors who received a higher cumulative dose of MTX would exhibit greater cognitive impairments than survivors who received a lower MTX dose. Nor do the findings support our hypothesis that survivors who received both PRED and DEX would have greater cognitive deficits than those treated with DEX only. The severity of the cognitive deficits observed appear to not be directly correlated with the cumulative amount of exposure to MTX, PRED, and DEX.

4.1 Future Directions and Limitations

There were several challenges during the study that should be considered in interpreting the results. Firstly, the sample size was relatively small. Having few participants lowers the likelihood of obtaining truly representative results. Secondly, participant cognitive performance was collected only post-chemotherapy treatment. Therefore, it is impossible to know what the true changes in working memory and processing speed of the survivors are. Thirdly, conducting retrospective reviews of patient charts to calculate cumulative chemotherapy doses is a very tedious process. It is made difficult by a lack of notational consistency across different patient files, possibly impacting the accuracy of the reported cumulative doses. Further, the case-by-case nature of chemotherapy treatment could lead to discrepancies making it difficult to accurately collect and cumulate the data. Fourthly, because chemotherapy treatment is administered as a cocktail of numerous agents it is impossible to determine with certainty which drug is responsible for the adverse effects observed in survivors. Since the cumulative administered dose of different chemotherapy agents is frequently related—so that individuals receiving elevated levels of MTX similarly receive elevated amounts of VCR, for instance—it is impossible to determine explicitly whether it is a single drug, the combined effect of

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two or more of the drugs, or an interaction between the drugs that contribute most significantly to the cognitive impairments exhibited by survivors. It is unethical and thus impossible to treat children with a single chemotherapy agent to determine the contribution of each chemotherapy agent separately. This is where laboratory experimentation in small animal models is very valuable: mice treated with a single chemotherapy agent can be studied to better understand the structural and functional brain abnormalities that result from the administration of a single drug.

4.2 Significance

With high treatment success rates, long-term quality of life for ALL survivors is a key concern during and after treatment. The characterization of cognitive outcomes in survivors is key to understanding the types and magnitude of impairments experienced. Identification of the factors that determine cognitive outcomes is critical for developing better screening tools for early detection of late effects in survivors and for creating effective therapy programs for individuals facing these impairments. The findings of this study reveal that there is not a simple and direct contribution of chemotherapy exposure to cognitive outcomes in survivors. It is possible that individual responses to drugs may be dependent on other factors such as nutrition, genetics, and/or ethnicity. This introduces considerable variability, so that uncovering the influence of chemotherapy intensity (if present) will require stratification based on these additional variables. Further research should investigate these factors—genetic and environmental—in relation to chemotherapy exposure to elucidate the causes of variability in survivor cognitive outcomes.

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The Complexities of Malaria in Ghana

Malaria is a disease produced by a mosquito infected parasite which is then spread to humans through bites. Ghana is one of 15 countries in the world where malaria has a high impact. In Ghana, malaria greatly effects children under the age of 5 and pregnant women due to the fact that both populations are immunocompromised. To reduce the number of individuals affected by malaria in the country, Artemisinin-based Combination Therapy (ACT) has been recommended as the most efficient treatment modality; however, the treatment comes at a cost and is not readily available to those residing in the rural areas of Ghana. The spread of malaria is highly prevalent in Ghana because of a number of underlying issues that contribute to the burden of the disease. When it comes to examining the crisis of malaria, it is important to examine how the social determinants of health such as gender, globalization, inequities, and politics further influence the pervasiveness of malaria in Ghana.

Keywords: Ghana, burden of disease, history of malaria, biomedical burden of malaria, social burden of malaria, economic burden of malaria, political burden of malaria, globalization of malaria, treatment of malaria

INTRODUCTION

Approximately 22,000 people die each year of malaria in Ghana and of those, 20% are deaths of pregnant women and children under the age of 5 years (World Health Organization [WHO], 2015). In 2014, in Ghana, the number of confirmed cases of malaria was 3,415,912 (WHO, 2015).

Malaria largely impacts rural areas and individuals with poor socioeconomic status, especially pregnant women and children (Centers for Disease Control and Prevention [CDC], 2016a). Furthermore, malaria is difficult to treat, making it a large financial burden for governments and citizens alike (CDC, 2016a). Artemisinin-based Combination Therapy (ACT) is the number one recommended treatment for malaria as it is very effective, fast acting and reduces the likelihood of the microorganism (*Plasmodium* parasite) forming a resistance to the effects of the drug itself (Banek et al., 2014). When addressing the socioeconomic impact of malaria, it is critical to



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examine the issues of cost, access, and delivery of ACT as a combatant against the disease. In order to fight malaria, there must be an increase in case detection and treatment success rates. It is also important to pay special attention to the diagnosis and management of malaria. This paper will discuss how poor economic and social conditions, considering factors such as gender, politics, globalization, and inequity, influence the crisis of malaria in Ghana.

MAJOR BURDENS OF DISEASE IN GHANA

Global Health Issue

As recently as 2016, in Ghana, 44.1% of deaths and disability were attributable to non-communicable diseases and 48.8% of deaths and disability were due to infectious diseases (Institute for Health Metrics and Evaluation [IHME], 2017). The top five major causes of death in Ghana are: malaria, lower respiratory infections, ischemic heart disease, HIV/AIDS, and cerebrovascular disease (WHO, 2015). Although the rates of non-communicable diseases are increasing, infectious diseases are still more prevalent in Ghana due to the lack of prevention and treatment. Malaria is of global importance because it is a vector-borne, parasitic disease carried by mosquitos. As mosquitos are a migratory insect, this makes malaria both widespread and difficult to trace and control thus creating a greater burden on the global healthcare system (IHME, 2017).

Malaria has a high death and illness rate and is more prevalent in vulnerable populations. The increase in prevalence among pregnant women is because a woman's immunity is momentarily suppressed during pregnancy. Young children are also vulnerable because their immune systems are not fully matured. Due to their compromised immunity, pregnant women and young children have a high mortality rate and have the greatest risk of developing severe clinical symptoms of malaria infection (Ricci, 2012). Although adults may also become infected with malaria, it is often less severe due to their developed immune systems (Ricci, 2012).

HISTORY OF MALARIA

Malaria is one of the longest enduring diseases, originally from Africa because of the continent's warm and tropical climate (CDC, 2016b). In 1955, the WHO began its efforts to eliminate malaria worldwide starting with countries with seasonal malaria transmission and temperate climates. The WHO's eradication efforts focused on surveillance, antimalarial drug treatment, and house spraying with residual insecticides. Although successful in these countries, Ghana was not included in the eradication campaign; furthermore, the campaign was eventually abandoned due to a lack of government funding (CDC, 2016b). To date, a malaria vaccine is still not in the works, nor are adequate vector control strategies or appropriate therapies to treat the disease that would eliminate death caused by the illness and aid in the abolition of malaria. In order to gain control of malaria, the goal must be to target the spread

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of malaria to a point where it is no longer a public and global health problem (CDC, 2016b).

COMPLEX FACTORS CONTRIBUTING TO MALARIA

Biomedical Burden of Malaria

Malaria occurs after one is bitten by a mosquito carrying the *Plasmodium* parasite. Once bitten, the parasite enters the bloodstream and travels to the liver where it matures and then infects red blood cells (Crompton et al., 2014). According to Crompton et al. (2014), contracting malaria during pregnancy can lead to extensive fetal, infant, and maternal illness as the infected mother can pass the disease on to the neonate at birth. The death of children with malaria is often due to cerebral malaria which causes seizures or comas; low birth weight from infected pregnant mothers; and respiratory distress from severe metabolic anemia and acidosis. Lastly, repeated malarial disease in children can contribute to long-term consequences such as respiratory infections and diarrhea (Crompton et al., 2014).

Social Burden of Malaria

According to the WHO (n.d.), the social determinants of health (SDH) are defined as factors not related to medicine that influence the outcome of one's health. They are settings in which people are born, develop, live, work, and age with outside structures and forces that shape the surroundings of daily life. These structures and forces comprise of social norms, social policies, development agendas, economic policies and systems, and political systems (WHO, n.d.). It is important to consider how the varying SDH such as education, gender, housing, and income influence health inequities and how they impact the spread and control of malaria in Ghana.

Public health and the government of Ghana are making strides to improve malaria control interventions and education; however, individuals living in marginalized areas are often poor and lack awareness and health information due to lower levels of education and literacy. Individuals who are illiterate may not understand written information about malaria on flyers or posters put out by public health. The poor also lack access to such information where messages from public health are broadcasted over media, as most low-income households do not have televisions or radios (Ricci, 2012). Public health interventions fail to accommodate the poor especially considering that malarial transmission rates are greater for those living in marginalized areas. Public health measures such as using insecticide-treated bed nets and providing access to clinics to treat symptoms are not readily available to Ghana's rural communities. As a result, those living in marginalized areas struggle to attain access to adequate prevention measures (Ricci, 2012).

Low-income households cannot afford the interventions that would protect them from malaria because anti-malarial drugs are an out-of-pocket expense, as are insecticide spray and bed nets (Ricci, 2012). Structural dwellings may also increase

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the risk of contracting malaria because houses that are often inadequately constructed allow mosquitos to enter freely, compared to adequately built houses that have windows with screens. Overcrowding of households may also lead to an increased rate of contracting malaria because higher concentrations of carbon dioxide in crowded houses attract mosquitos (Ricci, 2012). People who are poor are often the ones living in such inadequate dwellings and thus are at higher risk of catching malaria.

Additionally, individuals residing in low-income households are often famished. Children who are underweight and malnourished are often deficient in protein and specific vitamins and minerals such as vitamin A, iodine, iron, and zinc. Having these deficiencies can lead to an underdeveloped immune system which in turn puts these children at a greater risk of contracting malaria (Ricci, 2012). Lastly, social exclusion based on gender also contributes to the disproportionate impact of malaria on women as women are more often illiterate compared to men and are frequently tasked with being mothers and homemakers with limited access to public health resources and access to education (Ricci, 2012).

Economic/Political Burden of Malaria

There is a significant financial burden of malaria in Ghana on the government and its citizens. According to the CDC (2016a), malaria causes families and individuals not only to miss work and school, but also to carry the high cost of out-of-pocket expenses for anti-malarial drugs and pesticides. In addition, sick individuals must also bear the expenses of travel to and from clinics, and burial in the case of death. When it comes to seeking care, associated costs are often either direct, such as charges for services, unintended, such as cost of travel, and economic, such as loss of income due to being off work from the illness. All of these factors work against efforts to mitigate preventable diseases such as malaria.

Governmental costs include staffing, supply, and maintenance of health facilities; public health interventions against malaria such as the distribution of insecticide-treated bed nets or insecticide spray, anti-malarial drugs, and supplies; lost chances for economic tourism; and lost days of work causing losses of income. The total annual cost of malaria prevention and treatment in Ghana, including health system treatment costs and household costs, is \$37.8 million US (Nonvignon et al., 2016). Not only does malaria have a financial burden on the government, but corporate businesses are also affected. Malaria affects employee attendance, productivity, expenses, and reduces the efficiency of businesses. According to Nonvignon et al. (2016), in Ghana, businesses lost \$6.58 million USD as a direct result of malaria costs. Although the government should be responsible for allocating resources to malaria control and prevention, in recent years the private sector has become more involved with the undertaking.

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Ghana's private and public sectors play a large role in malaria prevention. For example, Ghana's private sector is very large and vastly growing; and its engagement in malaria prevention and control over the past decade has increased. The private sector has become involved through marketing of malaria prevention products; effective malaria treatment; and other public-private partnerships and services incorporating market catalyzation for malaria control products. The public sector has become more involved through campaigns, education, and further research and development with regards to malaria control. They have invested in providing informative materials to their staff, families, and direct communities (Shretta et al., 2020).

On average, Ghana receives \$36 million USD of funding from the Global Fund, which the country is highly dependent on (Ghana Health Service [GHS], 2017). The government of Ghana, however, has recently been diverting its global funds and resources from supporting the control of malaria to sustaining the economy (GHS, 2017). In order for the government to reallocate the funds back toward malaria control, aimed interventions such as vector control to marginalized populations and high-risk areas will likely aid in extensive cost-efficiencies. By implementing structures to improve productivity through the control of malaria this can serve as a sponsorship tool to entice new and existing investors. These strategies can be made more effective by ambassadors or key influencers to ensure accountability (Shretta et al., 2020).

Lastly, the government of Ghana currently accumulates taxes on alcohol and soda, lottery funds, petroleum revenues, tobacco products, and tourism and airport levies. According to Shretta et al., (2020) these taxes collected are not allocated for health and thus create a prospective opening for increased funding for malaria control. According to the law put forth by the government of Ghana, 0.5% of new obtained funding allotted to the District Assembly Common Fund is delegated to district-level elimination efforts and control of malaria. However, it has been noted that these funds are not being utilized for the purpose of malaria control and this needs to be re-examined by the government (Shretta et al., 2020).

GLOBALIZATION AND MALARIA

The process of globalization has been linked to an increase in malaria worldwide due to human migration and deforestation. Globally, it has been reported that there were 212 million clinical cases of malaria in 2015, with 429,000 of those cases resulting in death, and most of them being children in Africa (CDC, 2016a). The principal malaria mosquito, *Anopheles gambiae*, is very common in Ghana and is very efficient at transmitting malaria (WHO, 2014). Deforestation creates conditions that are conducive to mosquito reproduction. By having new paths of open land as a result of clear cutting, rainwater and sunlight accumulate and create new habitats for mosquitos to populate. Deforestation creates highways that allow *Anopheles*

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mosquitos to migrate to unaffected regions, such as the cities of South Africa and other parts of Africa where they would otherwise have not been able to reach (WHO, 2014). The environmental impact of deforestation further contributes to the spread of malaria and is another factor that if further examined and deterred may aid in reducing the spread of the disease.

RECOMMENDATION

In 2003, the government of Ghana launched the Roll Back Malaria (RBM) initiative, which aims to decrease illness and death caused by the disease through enacting strategic projects in malaria control, developing the health sector overall, and increasing coverage of universal access to prevention and treatment, with a goal to reducing malaria-related mortality by 75% by the year 2020 (United Nations Children's Fund [Unicef], 2017).

Strategies to combat malaria include indoor residual spray, insecticide-treated mosquito nets, intermittent preventative treatment of women who are pregnant and children under the age of 5 years, and accurate diagnosis and prompt treatment with ACT (Unicef, 2017). In order to evaluate the effectiveness of ACT, a study was done in Ghana with 1,740 children who presented with a fever over a period of 12 months and were positive for the malaria parasite. Artemisinin-based Combination Therapy was the chosen therapy and there was a 71% to 87% treatment success rate (Banek et al., 2014). Drawbacks of using ACT treatment include high cost, limited public awareness of how it works, inadequate knowledge regarding its safety in pregnancy, an imbalance between supply and demand, and inadequate surveillance systems specific to malaria (Banek et al., 2014). In an effort to tackle this issue, the government of Ghana has set up the National Health Insurance Scheme allocating its resources to treating malaria and introducing a policy where children under the age of 5 years with malaria will receive ACT at a lower cost (Banek et al., 2014). Although ACT is the number one recommended treatment for malaria, as well as the easiest solution, other factors, such as mitigating the SDH, need to be taken into consideration when it comes to preventative measures.

CONCLUSION

In order to combat the issue of malaria in Ghana, it is important to examine the relationship between poor economic and social conditions, as affected by gender, politics, globalization, and inequity, and how they affect susceptibility to contracting malaria. The current RBM campaign put forward by the government of Ghana is an investment initiative that provides a "people first approach," and aims to understand how multi-level factors influence the participation of marginalized communities in Ghana in reducing the prevalence of malaria (Unicef, 2007).

Public health and its practitioners can respond, advocate, and lobby to improve knowledge about malaria by providing educational resources regarding bite-

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prevention through the use of insecticide-treated mosquito nets, indoor sprays, seeking early diagnosis if unwell, and taking antimalarial tablets prophylactically (Carter & Mukonka, 2017). Public health efforts are further supported by the Ghana RBM that establishes health services using the Global Fund which has been set aside to support the control of malaria. Ghana may also benefit from collaborating with inter- and multi-sectoral organizations such as Unicef, WHO, Department for International Development (DFID), and the US President's Malaria Initiative (USPMI), and by making prevention and treatment strategies more readily available (GHS, 2017). There are many factors that must be taken into account when fending off or decreasing malaria in poverty-stricken countries such as Ghana, and it is important for the government to take into consideration the SDH as they are necessary for reducing health inequities and improving overall health. By doing this, government sectors and civil society can then take global action when it comes to discussing and managing malaria.

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Effects of Lower Troposphere Temperature on Ice Phenology and the Pacific Walrus Population

The effects of climate change on biotic communities and their environment have been one of the leading factors of recent population declines. This study investigated how climate change affected sea ice, a key component of the Pacific Walrus's habitat, and in turn how it can affect walrus populations. Lower troposphere temperatures along with sea ice retreat data were obtained between 1979–2014 for the Arctic Ocean and Chukchi Sea region, respectively. Concurrently, Pacific Walrus population estimates were obtained from the literature. We found a significant, negative relationship between sea ice retreat and temperature such that earlier retreat of sea ice was more common with warmer temperatures. Sea ice retreat and temperature were good predictors and highly correlated with population size. These results provide a possible link between climate change and walrus population decline, and future studies should include life history and sea ice traits to solidify this linkage.

Keywords: Arctic amplification, climate warming, haulout, ice phenology, sea ice retreat

INTRODUCTION

Climate warming is at the forefront of changing sea ice phenology (Serreze et al., 2000), most notably indicating a downward trend in sea ice extent (Chapman & Walsh, 1993). There has been a notable thinning of ice since 1988, attributed to greater air temperatures over the Arctic for spring, winter, and fall; shifts in the Arctic Oscillation and Pacific Decadal Oscillation; and Arctic amplification (Lindsay & Zhang, 2005). Kim et al. (2016) proposed three mechanisms that explain the acceleration of warming in the Arctic: water vapour feedback, albedo feedback, and insulation feedback. The most widely accepted mechanism, insulation feedback, refers to the warming of the lower troposphere via turbulent heat flux released from the ocean in the winter, if the ocean is free of ice. Overland and Wang (2007) suggest that by 2050 there will be at least 40% loss in sea ice area during the summer for



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marginal seas in the Arctic basin, and for some seas, at least 40% loss in sea ice area over the winter.

Sea ice has been retreating earlier in the year and forming later in the year (Cai et al., 2021). This loss in sea ice contributes to a positive feedback loop because more open water leads to greater warming of the lower troposphere. But how does such retreat and onset affect life? Kovacs et al. (2010) notes distribution shifts, declines in production/abundance, and reduced body condition as direct effects of sea ice retreat. More specifically, earlier seasonal sea-ice melt can cause direct effects such as earlier phytoplankton blooms, which disrupts primary production among top marine mammals (Post et al., 2013).

The Chukchi Sea is a region of the Arctic basin situated adjacent to the Beaufort Sea between Alaska and Russia, and above the Bering Sea. A recent study by Taylor et al. (2017) suggests Pacific Walrus populations have undergone a multidecadal decline with juvenile survival either decreasing or stabilized, but still below a rate of increase. This decrease in Pacific Walrus populations is attributed to the declining extent of summer sea ice that increases coastal haulouts and decreases productive offshore feeding areas (Udevitz et al., 2012). We aimed to find a correlation between temperature, sea ice phenology, and walrus survival. We hypothesized that warming temperatures correspond to earlier sea ice retreat, which subsequently causes a decrease in walrus population in the Chukchi Sea. We predicted temperature to have a significant effect on sea ice phenology based on previous literature, and in turn sea ice retreat to be significantly correlated with walrus decline.

METHODS

Average lower troposphere Arctic Ocean temperature anomalies for March–May were obtained from the National Oceanic and Atmospheric Administration (NOAA) website for 1979–2014. Walrus population data were obtained from a paper by Taylor et al. (2017). They used total population size estimates from five United States and Russian aerial surveys, which took place in 1975, 1980, 1985, 1990, and 2006, to construct a likelihood function that predicts population size from 1975–2015. We extracted population size estimates from a single figure using WebPlotDigitizer (Rohatgi, v4.2), and the data included both males and females. In addition, ice phenology data were extracted from Serreze et al. (2016) using WebPlotDigitizer. Day of sea ice retreat, or the Julian day in which sea ice starts to retreat to the shelf break of the Chukchi Sea, was the variable used to portray ice phenology. IBM SPSS Statistics (v26) and Minitab (v19) Statistical Software were used to conduct simple linear regressions, multiple linear regressions, and descriptive statistics. All assumptions were met, except normality for the dependent variable. No transformations corrected this, so this should be kept in mind. No outliers were reported. An alpha value of 0.05 was used for the significance threshold. Alpha is a predefined number that determines how likely it is for one variable to affect the other.

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A p -value below 0.05 would indicate that there is at least a 95% probability that the results are not occurring by chance.

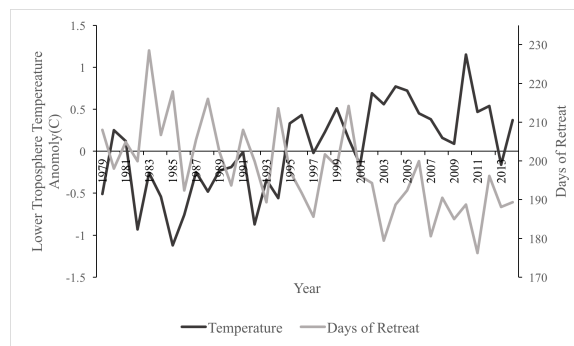
Description of Analyses

Regression analyses use test statistics such as F -value and adjusted R^2 to estimate the result of one variable based on the influence of others. As determined by the p -value, a significant F -value indicates that at least one of the explanatory variables can predict the response variable. R^2 indicates the percentage of the variance in the response variable that the predictor variables explain collectively on a scale of 0 to 1. Adjusted R^2 differs from R^2 in that adjusted R^2 considers the number of predictor variables used for predicting the response variable. R^2 does not decrease if new, possibly redundant predictor variables are added, but adjusted R^2 factors this in. For Pearson's correlation, a coefficient of 1 indicates a strong positive relationship, whereas a coefficient of -1 represents a strong negative correlation. For every increase in one variable, there is a fixed increase/decrease of fixed proportion in the other.

RESULTS

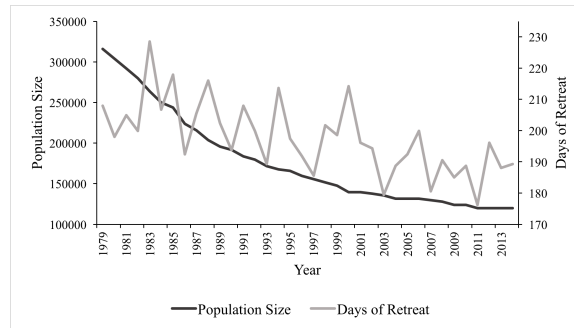
Notable downward trends were seen in walrus population and date of retreat, whereas an upward trend was seen for lower troposphere temperature (Figure 1). Furthermore, earlier sea ice retreat and warmer temperatures had a significant effect on population size (Analysis of Variance [ANOVA] of multiple regression: $F(2, 33) = 13.82$, $p < .05$) and explained a moderate amount of variation in population size as well (adjusted $R^2 = 42.3\%$). Warmer temperatures were a good predictor of date of sea ice retreat (ANOVA of simple regression: $F(1, 34) = 11.99$, $p < .05$; adjusted $R^2 = 0.26$). All three variables were significantly, highly correlated with each other (Table 1). Thus, there is sufficient evidence to conclude that all variables interact significantly with each other, along with trends in the raw data that support our hypothesis (See [Appendix](#); Table A1).

Figure 1. Time Series from 1979-2014 for (A) Lower Troposphere Temperature Anomalies and Days of Retreat and (B) Walrus Population Size and Day of Retreat
(A)



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(B)



Note. A large decrease in day of retreat and large increase in temperature is seen around 1995.

Table 1. Pearson Correlation Coefficients for Population Size, Day of Retreat, and Temperature

Variable	Population Size	Days of Retreat
Days of Retreat	0.574	-
P-value	<0.0001	-
Temperature	-0.598	-0.511
P-value	<0.0001	0.001

Note. This coefficient shows the linear relationship between two sets of data. The first cell content is the coefficient, and the second cell content is the *p*-value.

DISCUSSION

It is known that marine mammals are directly affected by climate change, however the processes by which they are affected are very complex. Here, we connect the influence of higher lower troposphere temperature to earlier days of ice retreat, and finally to declining walrus population numbers. Our findings stand in line with current literature that suggests that walrus life history traits and population demographics may be negatively influenced by climate change (Udevitz et al., 2017). We found that in the Chukchi Sea, ice phenology was influenced by lower troposphere temperatures in the Arctic, and walrus populations were negatively correlated with day of retreat and temperature.

Many studies have investigated top-down effects of the atmosphere on sea ice variability, and more recently bottom-up effects of sea ice on the atmosphere (Hopsch et al., 2012). The last 40 years of sea ice decline (retreat and thickness) is heavily attributed to Arctic amplification. Furthermore, this positive feedback mechanism leaves sea ice more vulnerable to other outside forces, such as downward longwave radiation, which is associated with climatic variability (Francis

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et al., 2005). This study simply provides more evidence for the consequential impacts of Arctic amplification on sea ice. As for walrus demographics, to date, there are no definitive answers as to why populations have been declining (MacCracken et al., 2017). Taylor and Udevitz (2014) suggest harvests are to blame for the declines of the 1980s and 1990s, but ecosystem changes which affect feeding sources may also be a factor. Nonetheless, this is not the first study to identify a link between retreating ice, temperature, and population declines (Siddon et al., 2020). Our study excelled at aligning and identifying trends in three key variables; however, the data are limited as average lower troposphere temperature data were presented as anomalies and for the entire Arctic Ocean, which is not indicative of the Chukchi Sea. Additional data such as juvenile survival rates and/or birth rates for the season of sea ice retreat would provide insights on life history traits. Furthermore, the inclusion of additional sea ice features, such as ice thickness and day of sea ice advance, would have strengthened the findings.

It is important to note that atmospheric and oceanic heat fluxes, along with advection from winds and currents, contribute to changing sea ice properties (Lu et al., 2020). In particular, the Chukchi shelf summer temperature is affected by three oceanic heat fluxes: winter water, Bering Sea water, and melt water. Oceanic heat flux in the Chukchi Sea accounts for over 70% of the heat budget allotted to melting ice along the ice edge and ice zone. While this paper was written with the intent to discuss atmospheric heat flux (that is, atmospheric heating at the surface of the ice), it should be viewed as inclusive towards both heat fluxes, as ultimately oceanic heat is affected by atmospheric temperatures, albeit indirectly.

Ice melts. Since the time this paper was written, recent research has indicated that the recent record-lows of winter and spring sea-ice cover from 2014–2018 in the Chukchi and Northern Bering seas are correlated with increased spring absorption of solar radiation, reduced springtime albedo, and elevated water column heat content (Danielson et al., 2020). By now, the topic in question is not whether sea ice retreat and a warming climate are related, and not necessarily if such sea ice retreat has ecological consequences, but rather the severity of such changes.

Management strategies for this particular field are hopeful, but not reality as of yet. Solving the global climate crisis would largely improve Arctic sea ice conditions, though this may not be practical in the short term. Two geoengineering strategies, carbon capture and sequestration (CCS) and solar radiation management (SRM), are promising technologies (Vaughan & Lenton, 2011). Further, restoring sea ice extent in the summer can be done most effectively by creating more sea ice in the winter through Arctic Ice Management (Zampieri & Goessling, 2019). This would be particularly useful in the Chukchi Sea as summer sea ice is marginal here (Desch et al., 2017). Regardless, mitigating greenhouse emissions and the climate crisis would effectively restore sea ice and the Pacific Walrus population.

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APPENDIX

Table A1. Troposphere Temperature, Population Size, and Day of Retreat 1979-2014

Year	Temperature	Population Size	Days of Retreat
1979	-0.51	315911.0169	208
1980	0.25	303898.3051	198
1981	0.12	291885.5932	204.9
1982	-0.93	279872.8814	199.9
1983	-0.26	263855.9322	228.5
1984	-0.54	249841.1017	206.7
1985	-1.12	243834.7458	217.9
1986	-0.76	223813.5593	192.4
1987	-0.25	215805.0847	205.5
1988	-0.48	203792.3729	216
1989	-0.23	195783.8983	202.4
1990	-0.19	191779.661	193.7
1991	-0.01	183771.1864	208
1992	-0.87	179766.9492	199.9
1993	-0.34	171758.4746	189.3
1994	-0.56	167754.2373	213.6
1995	0.33	165752.1186	197.4
1996	0.43	159745.7627	191.8
1997	-0.02	155741.5254	185.6
1998	0.23	151737.2881	201.7
1999	0.51	147733.0508	198.6
2000	0.15	139724.5763	214.2
2001	-0.16	139724.5763	196.1
2002	0.69	137722.4576	194.3
2003	0.56	135720.339	179.4
2004	0.77	131716.1017	188.7
2005	0.72	131716.1017	192.4
2006	0.45	131716.1017	199.9
2007	0.38	129713.9831	180.6
2008	0.16	127711.8644	190.5
2009	0.09	123707.6271	185
2010	1.15	123707.6271	188.7
2011	0.47	119703.3898	176.2
2012	0.54	119703.3898	196.1
2013	-0.16	119703.3898	188.1
2014	0.37	119703.3898	189.3

Note. Day of retreat refers to how many days into the year ice starts to retreat.

Abstracts (2018)

The following abstracts accompany posters prepared in spring 2018 for the sixth annual multidisciplinary Undergraduate Research Fair at York University (Toronto, Canada). The poster images can be viewed by clicking on the abstract titles in the “Abstracts & Posters” section on the Revue YOUR Review website:

<https://yourreview.journals.yorku.ca/index.php/yourreview/issue/view/2217>

Inside a Killer Drug Epidemic

A look at Canada's opioid crisis

“Comprehensive, collaborative, compassionate and evidence-based” are the words used to describe the Government of Canada’s approach in addressing the opioid crisis. An average of eight people die every day due to opioid overdose. This is greater than the number of Canadians lost in 1995 to the HIV epidemic. This multi-faceted crisis is far beyond the illegal drug market and the increased use of fentanyl and other illegal opioid drugs. The crisis has deeper roots that lie in high level addiction to legal opioids caused by inappropriate prescribing practices and lack of education about the risks of opioid usage.

Women's Cardiovascular Health

The heart truth

The importance of studying women's cardiovascular health lies in alarming global trends where, despite a lower prevalence of cardiovascular disease, women have higher mortality rates. The contribution of a multifactorial web to women's cardiovascular disease mortality in the face of significant medical advances is explored. This study asks: What are the biomedical and socio-environmental factors that can provide plausible explanations for the higher cardiovascular mortality trends observed in women? The underlying thread in this multifactorial web is the long-standing discrimination that continues to permeate women's lives. A trans-sector policy on gender equity in areas of biomedical research, healthcare delivery, and economics—backed by strong political will to address the research gap, wage gap, and political and policy exclusion—is discussed.

SHARMINI ATPUTHARAJ, DAVID C. CAPPADOCIA, &
J. DOUGLAS CRAWFORD

The Influence of Spatiotemporal Structure on Recall Accuracy in Memory-Guided Saccade Sequences

Saccades are a form of rapid eye movement that function to bring an item of interest onto the centre of the fovea, which is the location of highest visual acuity in the human eye. Saccades have been extensively used in neuroscience as a tool to measure underlying cognitive processes such as visual working memory. The goal of this study is to identify the effect of spatiotemporal structure on performance in memory-guided saccade sequences. In this study, participants took part in a behavioural task where they were presented with a series of sequences that differed with respect to path type, set size, and target presentation order. Results showed that having path types with structured spatial and temporal locations were most beneficial for recall accuracy and that recall was better for items presented earlier in a sequence. These results show that visual working memory capacity is improved by the presence of spatiotemporal structure.

Pharmacare

The unfinished business of Canadian Medicare

Canada has the unique distinction of being the only country with a universal national healthcare care plan not to include Pharmacare: the universal, public coverage of prescription drugs. A literature review was conducted to investigate the benefits of implementing Pharmacare. Historically, little progress has been made toward a universal drug plan. Pharmacare would ensure that all Canadians receive equitable access to safe, cost-effective, and appropriately prescribed medicines. Additionally, universal, publicly managed drug coverage ensures that prescriptions are contingent on contemporary medical evidence by integrating the management of medical and hospital care. Finally, Pharmacare would save billions of dollars, hence stimulating the federal and provincial economies and aiding Canadian businesses. Pharmacare is the only suitable option as the current fragmented patchwork of public and private drug plans become increasingly unsustainable.

Low-Cost Technologies to Teach Beginner Braille to Children

At present, there are very few interactive technologies available to help children with visual impairments to learn Braille. Teaching is typically done by trained teachers using a variety of teaching techniques and evaluation instruments. Treasure Box Braille (TBB) is an interactive device that provides an innovative approach to supporting the development of functional knowledge of Braille in children with visual impairments. The project espouses a low-cost DIY approach. TBB falls under the ENAMEL (ENAbilingMEdiafor Literacy) project. The ENAMEL project aims to make Treasure Box Braille accessible to anyone who wants to make Braille learning a better experience, and to improve the TBB user interface. The objective of this research is to investigate and test the usability of Treasure Box Braille and its associated set of teaching materials.

KAIPA BHARUCHA, HARLEIGH LINDSAY,
GIANLUCA PANICCIA, & JESSICA SHAW

Streaming and Marginalization in the Ontario Education System

A problem of practice

The public education system in Ontario, Canada is designed to stream students into either academic or applied categories, a problematic practice which can begin as early as kindergarten and continue through secondary school. Streaming can include specialty programs such as the gifted programs, vocational-led schooling models, and specialty high-skills majors. This study seeks to reveal the inequities occurring within Ontario's current streaming process. The authors investigate the history of streaming in schools, record site observations from schools in the Greater Toronto Area, and analyze material from current academic research through the lens of culturally relevant pedagogy. Based on their findings, the authors offer a list of suggestions and potential solutions for implementing de-streaming in Ontario schools, with a view to eradicating deficit-based models that disenfranchise and marginalize large populations of youth in Ontario.

Politics and Health in Iran

Isolation or liberation?

This study seeks to understand both mainstream and alternative views of the health care system in Iran. The author critically analyzes resources from Western media, international organizations, and Iranian government documents, and interviews selected Iranians working in the health care industry. A mainstream view holds that, due to sanctions and global isolation, Iran's health care system is weakened through inadequate access to pharmaceuticals and modern technology. An alternative view suggests that there are underlying advantages from having minimal imperialist ties and foreign control over Iran's economy and resources. The author suggests that the real issue is not a struggle between the Global North and the Global South, but rather one of the ruling class versus the people.

STEVEN CAMPBELL

Oscillating Between Fear and Relief

A volatility-based aggregate market return-state model

Is there a generalizable relationship between aggregate market returns and implied volatility variables that can extend the predictions made by existing volatility forecasting models? The purpose of this study is to explore any existing implied volatility in the market return relationship. I distinguish between two state variables: implied volatility level and implied volatility changes. VIX and S&P 500 daily data were obtained for the period 1990 to 2016. The relationships are examined with linear, non-linear, and quantile regressions, a cross-sectional analysis including difference of mean tests, and multiple cross-sectional event studies to investigate market behaviour around each cross-sectional observation. This study finds evidence for significant asymmetric and non-linear relationships between implied volatility variables and macro market returns. Volatility-based macro market return-states, as described by the cross-sections, are found to rigorously filter for sign and magnitude of returns, and have significantly different return expectations. Since volatility is more easily forecast than market prices, these findings hold significant value for investors and risk managers, both in managing tail risk and in making investment decisions.

TSZ CHING (EVA) CHEUNG, SHANIECE CLARKE,
ANDREA LUCIANI, & ANGIEMYR VILLAR

The Impact of York University Faculty Association community projects (YUFA-CP)

Funding for Jane & Finch community access to post-secondary education

In the past ten years, the York University Faculty Association's Community Projects initiative (YUFA-CP) has spent a significant amount of funding on community projects targeting the Jane and Finch community in Toronto, Canada. In this study, we analyzed annual reports 2009–2017 from the communities who received more than \$1,500 in funding. We also gathered data from eight interviews with community program directors and past program participants in order to gauge the effectiveness of the funding in assisting students from low-income communities to access higher education at nearby York University (Toronto, Canada). Literature reviews of academic journals and various online sources were done to support the analysis. Study results showed several positive impacts from the funding initiative; improved social support and financial assistance as well as gains in student academic achievement and self-confidence were evident from the interview results. The data suggest that the faculty association's community project funding initiative has been used effectively in the past ten years.

Progress or Profits?

The World Trade Organization's approach to pharmaceutical patents

How does a powerful institution like the World Trade Organization (WTO) influence global health? Since the 1990s, WTO-led trade agreements have included provisions related to public health and intellectual property—specifically, pharmaceutical patents. How does the WTO's approach to patent law impact the development and accessibility of pharmaceuticals worldwide? In the style of Global Health Watch, this project identified and contrasted the dominant narrative put forward by the WTO and the counter-narrative presented by outside sources. Pharmaceutical patents are justified by the WTO for two reasons: to respect an inventor's right to own and profit from their work; and to stimulate investment into new medicines. The WTO insists that patents do not negatively affect pharmaceutical research or access to medicines because of public health flexibilities included in trade agreements. Evidence from investigative journalists and alternative media sources discredit these claims. Historical and contemporary examples of trade agreements and patented pharmaceuticals show how the current patent system is flawed. Long patent terms have created monopolies and public health flexibilities have been underused. Since the 1990s, free-trade agreements have increased patent protection and made it more difficult for governments to ensure access to medicines, even when patents have expired. While the WTO has positioned itself as a global health stakeholder, this study suggests that its current approach to patents places corporate profit over public health.

Group Dynamics

An observational case study in group behaviour

Group dynamics encompass a system of complex interactions and behaviours influenced by social norms and individual motives. This study analyzes three key areas of group behaviour: formation, structure, and conflict. These areas are explored through a comparative approach, juxtaposing in-class group experiences with relevant peer-reviewed literature. The study of group behaviour, a popular topic in scholarly literature, has versatile applicability, including understanding group decision-making and facilitating teamwork. However, what remains unknown is the generalizability of research findings. This observational case study of group behaviour shows the development of structure and norms by an in-class group. The in-class group, consisting of four members, met weekly to work on a variety of academic tasks over 12 weeks for a Behaviour in Groups course at York University (Toronto, Canada). Both the psychology literature and the in-class group experiences reveal that group formation, structure, and conflict resolution are all dynamic processes, and that challenges and conflicts are inevitable. The findings of this observational study present support for previous research on social influences, group developmental stages, and the negative impact of group members' conflicting perceptions of task conflict on task performance.

Diel Changes in the Molecular Physiology of Rainbow Trout Gill

*The regulation of salt and water balance is a basic physiological challenge in vertebrates. In aquatic vertebrates, such as fishes, ionoregulation is strongly influenced by water conditions which, in turn, can be altered by diel changes and abiotic factors such as light. In this study, the effects of light and dark cycles on gene expression in the whole gill of rainbow trout (*Oncorhynchus mykiss*) was quantified using real-time quantitative PCR and western blot analysis. It was hypothesized that diel changes would be observed in core-clock genes, which drive the circadian expression of many physiological processes in vertebrates, as well as in tight junction (TJ) proteins, which regulate the movement of salt and water between epithelial cells in the gill. As suggested, it was observed that mRNA abundance of several core-clock genes had diel rhythms that peaked at the dark-to-light transition or in the middle of the light period. Similarly, changes in select TJ proteins also followed a rhythmic pattern, with some transcripts showcasing a different oscillatory period than the expected 24 hours. Although mRNA abundance was rhythmic, interestingly, the protein abundance for some TJ proteins remained constant throughout the 24-hour experiment. Together, these results suggest that, at the molecular level, factors that generally contribute to regulating osmoregulation exhibit diel changes. These results will help bridge the current gap in knowledge regarding ionoregulation in the freshwater gill within the context of light and dark cycles, which may provide clues to evolutionary adaptations of fish and whether fish can anticipate changes in their environment in order to improve their survival.*

NAEEMA HASSAN

How Bullet Proof Is the Toronto Community Housing Corporation?

This research study revolves around a silenced conversation within Toronto, Canada's Somali community living in Toronto Community Housing. The purpose of the study is to explore the reasons behind the substantial increase in gun-related violence among Somali-Canadian youth, and whether living in low-income housing provided through the Toronto Community Housing Corporation (TCHC) influences the high death rate of Somali Canadian youth. The role of TCHC resources and TCHC board representation is considered. Through the lens of the social determinants of health, this study investigates the relationship among socio-economic status, government housing, race, gender, and violence for Somali families living in TCHC-sponsored housing in Toronto neighbourhoods.

Animal/Human Relationships, Indigenous Ways of Knowing, and Species Extinction

We humans coexist within the biosphere and live among other creatures, and thus have a duty to protect and preserve the environment. The purpose of this research is to deconstruct the human/animal relationship through biocentric and biophilic perspectives, challenging the modern Western anthropocentric view of non-humans and nature as compared to the Indigenous way of life, deeply rooted in Traditional Ecological Knowledge. Through a critical analysis of scholarly books and journals, I compare and contrast Indigenous ways of living with the western human/animal relationships, assessing the impact of our coexistence in the natural and urban environments. Well-respected and renowned scientists have long warned that the current rate of resource consumption is unsustainable and will result in an inter-generational human threats as well as threats to non-human life and peril to plants. Without an immediate change in human behaviour, we are heading towards a loss of biodiversity. This research highlights the importance of decelerating species extinction by integrating Indigenous Traditional Ecological Knowledge with western science to inform governments, private interest groups, and the public.

Women, Representation, and Electoral Systems

This project assesses the gendered implications of Canada's first-past-the-post electoral system and considers alternatives (alternative voting, proportional representation, and mixed-member representation) for gender representation. Electoral systems directly impact representation in parliament by determining which votes count and by structuring the kinds of issues that are included on the political agenda. Much of the research on women's representation in government distinguishes between descriptive representation (the number of women elected to office) and substantive representation (the representation of women's interests on the political agenda). Because the links between descriptive and substantive representation are contested, and because substantive representation is a broad concept, this study argues that substantive representation of women should be conceptualized as the actualization of feminist political goals, one of which is the descriptive representation of women in parliament. The regional focus of majoritarian systems diminishes the relevance of cross-regional political goals, limiting opportunities for discussion of feminist priorities. Additionally, proportional representation consistently correlates with higher numbers of women in office. While many have argued that higher numbers of women in office will lead to improved representation of women's interests, this study suggests that descriptive and substantive representation of women should be considered as distinct feminist initiatives, and that a proportional representation system is effective for both.

Gender and Microinsurance

A study of Ethiopia

Microinsurance has been thought of as the cure for poverty in the Global South. In the Ethiopian context, the concept of microinsurance is fairly new. Due to a continuous dependence on agriculture as the main source of income and to low levels of education, most of the population rely on Edir and Equib as methods of coping with risk. This study uses data collected on Ethiopia in 2017 by the consulting firm MicroInsurance Center and focuses on coping mechanisms for agriculture and health crises for peoples in rural areas of the country. This study asks: What is the effect of gender on crop risk coping strategies? What are the perceptions of insurance in rural Ethiopia? An analysis of the data set reveals that few people in rural areas understood what microinsurance was or used it as a coping mechanism. In a crisis, men relied first on cash and savings, while women took on additional employment. Results suggest that policymakers might further the understanding of microinsurance in the country and that insurance companies design gender-sensitive microinsurance programs.

The Canadian Correctional System and Aboriginal Risk Assessment

A systemic failure

Correctional Service Canada (CSC) operates within the framework of the risk-need-responsivity model (RNR). The RNR model suggests that a reduction of recidivism is possible, if the treatment provided is proportionate to the overall risk of reoffending. This approach utilizes empirical measures, developed through data collection and a statistical analysis of outcomes. These outcomes are associated with specific predictor variables or risk factors that are known to be correlated with recidivism. In addition to risk prediction, these measures also provide a means to monitor the effectiveness of correctional interventions. However, a review of Canadian case law shows that insufficient training often results in the inappropriate application of risk assessment measures. This finding is even more disturbing when considering its impact on marginalized populations such as Indigenous offenders. CSC policy requires the inclusion of Gladue Principles, which take into consideration the unique circumstances of Indigenous history. However, correctional staff frequently fail to understand or document an offender's social history when conducting risk assessments. The undifferentiated application of what are intended to be objective risk assessment tools have serious implications. Indigenous offenders are frequently classified as higher risk and this influences eligibility for parole. In addition, an extensive literature review shows that, despite similar predictive validity across various risk assessment measures, Indigenous offenders consistently presented with higher baseline scores. These findings contradict the utility of risk assessment measures and require further research, as current approaches to risk assessment are not appropriate for use with Indigenous offenders.

Workplace Discrimination

A key contributor to mental health issues for new immigrants

Canada is a settlement country building on the efforts of new immigrant workers and investors. In Canada, one in five residents is foreign born. However, according to a study from the Ryerson Centre for Immigration and Settlement, many G8 countries that receive immigrants encounter challenges in integration. One significant barrier is workplace discrimination against visible minority immigrant workers. Workplace discrimination affects workers' emotional health and ability to succeed. In this research project, Canadian immigration policies and statistics, from the 1960s to the present, were analyzed and a literature review was conducted. Social surveys reveal the health impact of decreased job satisfaction and lowered motivation and organizational citizenship. Despite public policy supporting cultural differences, many employers have not valued cultural diversity. New policies to ease the transition of visible minority immigrants to Canada are required.

ROXANNE KHASOW

The Implications of Social Media on #BlackLivesMatter

This essay explores the world of social media and its implications for social movements such as #BlackLivesMatter. #BlackLivesMatter was created after the death of Trayvon Martin, and stems from the inaction from the judicial system toward his murderer, George Zimmerman. The movement sought to bring attention to all Black lives that were being discriminated against by the state and the police in the United States, through underlying ideologies of inequality and exploitation. On social media websites such as Twitter, the activists behind #BlackLivesMatter found a place where they could push back, strive for collective action, and protest against the state and mass media organizations. Social media has created a space where people around the world could exchange thoughts, ideas, emotions, and debates on social injustice—a community designed for those who are outraged and seek change in a world they see as unjust. But social media has also been manipulated by political and economic elites, and corporations can control what society sees online. Some cyber activists seek attention instead of actual change for Black lives. This project concludes that social media affects #BlackLivesMatter in both positive and negative ways, but it is up to the people to seek active change and to make a difference.

ADAM LAKE

Canada's Inequality Story

Racial injustice and young Black men

Racialized youth are highly overrepresented in the Canadian juvenile justice system. This study, designed to investigate the persistence of biases within the justice system, gathers information from young African-Canadian adults 19–26 from the Greater Toronto Area (Canada). Racial stereotyping and anti-Black racism are constant and communities mistrust the police. Results suggest that institutional and systemic forms of discrimination contribute to the criminalization of minority youth.

British Columbia's Carbon Tax

A carbon tax, implemented in the Canadian province of British Columbia in 2008, is intended as an incentive to decrease greenhouse gas emissions, leading to a more sustainable future. The purpose of this project is to determine whether British Columbia's carbon tax is an effective solution to rapidly rising carbon dioxide (CO₂). This study applies Robert Gibson's seven-part framework for analyzing environmental policies to the BC carbon tax. Results indicate that BC's carbon tax is not a successful policy solution for decreasing CO₂ emissions as it does not fully meet the requirements of Gibson's framework.

You're More Judgemental Than You Think

Positive and negative personality traits appear to be attributed to individuals from wealthy and poor backgrounds respectively. Using the Implicit Association Test, 29 undergraduate students (Glendon College, Toronto) classified positive and negative traits with synonyms for rich and poor as fast as they could. It was predicted that associating the congruent condition (rich/positive traits; poor/negative traits) would take less time than associating the incongruent condition (rich/negative traits; poor/positive traits). Results showed that participants had a significantly lower association time when performing in the congruent condition than the incongruent condition. This supports the importance of research studying implicit stereotypes.

Apocalypse Now!

Anthrax bioterrorism and the public health challenge

Governments, scientists—and even terrorists—all understand how easy it is to develop and release severely dangerous pathogens such as anthrax. The anthrax agent, developed from Bacillus anthracis bacteria, can truly be considered the terrorist's agent. Made solely for the convenience of the aggressor, it is easy to disperse, nearly impossible to detect, and difficult to diagnose and treat. The possibility of an anthrax attack is one of the most dangerous threats for civilian populations, as there is an risk of exponential growth in the number of infected people and high death tolls. This project seeks to explore anthrax pathogenesis and the challenges this presents for an effective response. The September 2001 anthrax attacks in the United States are used as case studies to examine the difficulties of mitigating a potential outbreak. Future objectives, such as managing surge and decontaminating healthcare settings, are discussed. The establishment of effective quarantine and communications systems is emphasized as are ongoing research and education about bioterrorism.

TANYA NARANG

HIV and Stigma in the Indian Health Care System

A systematic review

India ranks third in the world in terms of the number of HIV cases. As of October 2016, the government of India offered 528 anti-retroviral therapy (ART) centers and provided free medication, counselling, and ART adherence support to people living with HIV/ AIDS (PLWHA). However, stigma and HIV share a cyclical relationship, whereby people who experience stigma are marginalized and more vulnerable to HIV, and those with HIV are more vulnerable to stigma. This research study asks: What are the underlying mechanisms of stigma in the health care system in India? Do they pose a significant barrier to the prevention and treatment of HIV/AIDS? A review of the literature explores HIV stigma in workers in the health care system and its impact on treatment. Results show mistreatment by staff, discrimination in policies and procedures, and a lack of cultural sensitivity. The study concludes with recommendations to counter stigma and improve quality of care.

PAMELA NASH, NICOLE CASTILLO, JADYN HOULE,
ANDREA MOCLAIR, ASHLEY SUKHDEO, & ISHI WANG

Exploring Community-Based Participatory Research Approaches with Low-Income Communities

Universities often collaborate with neighbouring communities, particularly those in low-income or high crime rate areas, to offer donations, provide support, and sponsor events. However, universities are not always aware of how their donations are spent or if they have helped to achieve community project goals. The York University Faculty Association (Toronto, Canada) has a Community Projects committee (YUFA-CP) that provides up to \$1500 to local organizations for community outreach, advocacy development, or initiatives to improve access to higher education. Any community organization in the local Jane-Finch community can apply to receive this funding. This study seeks to identify the community projects funded by YUFA-CP in 2010–2017, identify who received funding, how funds were expended, and whether funding met committee goals, especially with respect to community engagement and improved access to higher education. Selected community agencies were surveyed about funding received and events sponsored. Survey results suggest that events to improve access to higher education for under-represented groups was funded least. The study concludes with recommendations to better align funding with YUFA-CP mandates.

Societal Fears of Female Sexuality in Witchcraft

In 1663, in Brunswick, Germany, Tempel Anneke was tried, found guilty of witchcraft, and sentenced to death. This project, supported by a literature review, theorizes that the trial and execution were the result of a 17th century fear of uncontrolled female sexuality and the inversion of prescribed societal norms. Witches represented a fear of female sexuality and the power of female sexuality threatened the basic social order. Tempel Anneke was labelled a witch because she was single (widowed) and did not adhere to the archetype of a mother. Her sexuality threatened existing gender norms and German societal norms.

PATRICIA PLUMMER

The Roses that Grew from the Cracks in the Canadian Culture Mosaic

This research examines the perception of Canada through two generations of immigrants. Canada has been viewed as a cultural mosaic, an inclusive safe haven, by immigrants, regardless of gender, age, or religion—always welcoming, a beautiful and flawless “masterpiece.” However, does Canada truly fulfill this depiction? Are we a cultural mosaic? Are the tools for success provided to immigrants and to our citizens? Uncovering the marginalized stories of individuals who immigrated to Canada for a better life, filled with opportunity, will reveal the real narrative of our nation.

Combatting Loneliness Amongst Seniors with Dementia

Loneliness is defined as the subjective negative evaluation regarding the quality and the quantity of current relationships. The Canadian senior population (individuals aged 65 and over) has been rapidly increasing over the past century and now exceeds the population of children aged 14 and younger. With the aging of the Baby Boom generation, the number of seniors is estimated to be 25% of the population of Canada by 2036. Loneliness is frequently listed as a risk factor for advancing cognitive decline and is a very strong predictor of dementia, independent of other factors such as social isolation, depression, or living alone. This project aims to raise awareness and combat loneliness among seniors through health promotion strategies, including intergenerational programs, visits to retirement homes and schools, and stimulating activities to reduce the risk of cognitive decline.

Why Bolivia?

An examination of water privatization

This study explores water privatization in Bolivia in 1998. A literature review was conducted and the historical and capitalistic factors leading to water privatization were examined. Historical factors include Bolivia's mass debt and the popularity of neo-liberal ideology (a belief that the government should have little control over markets). Capitalistic factors include the role of the state and of social class (pressure on Bolivian officials from external organizations and wealthy citizens), and a prioritizing of profit over social or environmental factors. Together, these factors created the perfect scenario in which the privatization of water in Bolivia was inevitable and, ultimately, detrimental to many Bolivian people, who could no longer afford water. The study recommends that government protection should extend to goods that are a basic human necessity; a desire for profit must not overshadow social and environmental concerns.

LESLIE QUINTANILLA

Children and Legal Representation in Canadian Divorce Cases

This study explores children’s legal right to representation in divorce cases in Canada. Undertaken to gain a deeper understanding of theoretical and conceptual issues relating to children and international human rights, the study identifies the various legal fragmentations arising from the division of powers under the Canadian Constitution. Article 12 of the United Nations Convention on the Rights of the Child, ratified by Canada in 1991, states that children have the right to be heard in proceedings that affect them. The study concludes that Canada needs consolidated legislation to ensure that children have legal representation in order to fully meet the Convention’s mandate.

Japanese–Canadian Internment Camps in World War II

During World War II, the situation of Japanese Canadians grew dire as Canada headed into battle with the forces of Imperial Japan. Discrimination increased against Japanese Canadians, who were labelled enemies within Canada. Tragically, the Canadian government created internment camps to illegally detain Japanese Canadians, removing them from their homes and placing them in squalid conditions, with little or no freedom of movement. This poster examines the reasons given by the Canadian government for the internment of Japanese Canadians and explores post-war responses by Japanese Canadians to internment. Responses included political mobilization, recovery from economic insolvency due to government seizure of properties, assets, and businesses, and re-insertion into the fabric of Canadian society. The study methodology involved researching accounts from internment camp survivors, consulting Japanese-Canadian and Japanese-American memorial centres, and reviewing historical newspaper articles from key Canadian newspapers. Despite the seizure of their property and assets, interned Japanese Canadians were able to unite and revitalize communities in the face of social trauma.

The Impact of Facebook Use on the Psychological Well-Being of Young Adults

With over 2.13 billion monthly active users (2018), Facebook is one of the most extensively used social networking sites in the world. It is so extensively used among young adults that many regard it as an extension of their daily lives. A literature review was conducted to determine if Facebook use positively or negatively impacts the psychological well-being of young adults. Unlike some previous studies, the results of this research show that Facebook has a positive impact on young adults' psychological well-being, especially for those with high emotional needs. Facebook provides an online community of support, promotes personal growth, coping strategies, and autonomy, and increases the likelihood that users will make healthy decisions. This research gives rise to the possibility of using Facebook in a controlled setting as a coping tool for those with low psychological well-being. Further research is needed on whether the social networking site could be used to improve the psychological well-being of young adults in educational or health care settings.

Does a History of Depression Affect Employability?

Accommodations for people with disabilities exist today in most institutions. Nevertheless, negative stigmatizing attitudes towards mental illness may still lead to employment discrimination. This 2018 empirical study asks if people with depression are less likely to be offered jobs by future employers. 162 undergraduate students (50% female; 50% male) from Glendon College (Toronto, Canada) were asked to pretend they were an employer and, as such, to read a fictitious scenario and estimate the likelihood that they would offer a job as a sales rep to a seemingly qualified male applicant. All study participants evaluated the same job applicant, but half (40 males & 41 females) were told the candidate had a major depressive disorder, while the other half (40 of males & 41 females) were not. The likelihood of offering the job to the candidate was ranked from low to high. Results show that the job applicant where depression was mentioned was less likely to be offered the position than the candidate where depression was not mentioned. It appears that, even in an academic setting where accommodations are common, young educated adults (i.e., future employers) hold stigmatizing attitudes towards individuals who experience depression and are less inclined to hire them. The study concludes that increased education through awareness campaigns can help reduce stigma toward mental illness.

LINDSEY SWARTZMAN

Social Media

Agent for change for women in the Middle East

The Middle East and North Africa may rank among the most challenging places in the world to be a woman. This study explores the relationship between communication instruments (social media) and women's movements in the Middle East by focussing specifically on the right for women to drive in Saudi Arabia. A positive correlation between social media and Saudi women's movements would suggest that social media has led to successful awareness and mobilization campaigns, even if no legislation overturning the ban against women driving is passed. In fact, the driving ban was finally overturned 27 years after the initial public protest. The relationship between social media and women's activism is also positive because, through use of the communication instruments, women were able to mass mobilize, launch micro-movements, and gain international attention in ways that were previously unfathomable. Interestingly, the study also shows that a positive correlation can lead to negative phenomena, such as increased surveillance or the harassment female digital activists faced as a result of using social media to spark change.

ANDREW WALKER

Grey Power and Valence Issues in Canadian Federal Elections

This project situates Canadian seniors within the multitude of factors that electors face each time they are asked to cast their vote. The research question asks how have the valence issues related to seniors, long-term/home care, and income security in retirement impacted Canadian federal elections since 2006? Research shows that pensions and retirement savings have long been a concern for all three political parties, whereas long-term care and health becomes relevant as the baby boom generation ages. This throws into doubt the perceived grey power of the aging population of Canada: electoral success has not yet been conclusively linked to the valence issues of long-term care and retirement savings.

MICHELLE YOUNG, LARA CALUCAG, KATREENA DALISAY,
& SANDRA GABRIELE

How Can We Enhance the User's Gym Experience at the Tait McKenzie Fitness Centre?

“TaitGo” is a mobile app that links York University (Toronto, Canada) Athletics and Recreation with the user’s personal fitness goals. The system tracks a user’s personal activity in relation to the Tait McKenzie Fitness Centre facility. The app encourages students and community gym members to become more involved with York University athletics and to achieve their fitness goals while connecting with others. Researchers observed users of the fitness facility, conducted two surveys, ran user tests and did post-test analysis. Users of the app can access York University athletics information, activity schedules, and session sign-ups as well as a compilation of their personal goals, activities, and statistics. The database track a user’s goals and progress and tailors their online experiences using data analytics and filters. It also facilitates entry to the fitness centre—no need for bracelet tag or student ID card. The app gamifies the experience of working out, achieving goals, and engaging with the fitness community.

Abstracts (2019)

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<https://yourreview.journals.yorku.ca/index.php/yourreview/issue/view/2217>

Biculturalism and Psychological Well-Being

Investigating the role of socioeconomic status

This online study investigated the role of socioeconomic status in previously established relationships between bicultural identity integration (or bicultural self-efficacy) and psychological well-being (or life satisfaction) among bicultural immigrant students at a large Canadian university (N = 403). A comprehensive measure of socioeconomic status was utilized to measure income, level of education, and occupational status of participants' guardians, as well as to determine participants' access to financial resources and sources of psychosocial supports and stressors (in the domains of interpersonal relationships, home and neighbourhood environment, individual health, and religious affiliation). The study found that socioeconomic status is responsible for a large variance in the relationship between bicultural identity integration (or bicultural self-efficacy) and psychological well-being (and life satisfaction). Within socioeconomic status, the domains of interpersonal relationships and surrounding environment were significant contributors to these relationships, while guardians' incomes, levels of education, and occupational statuses were insignificant along with participants' financial resources, individual health, and religious affiliation.

The Effects of Climate Change on the Survival of Polar Bears (*Ursus Maritimus*) in Western Hudson Bay of the Canadian Arctic

The Canadian Arctic is home to approximately two-thirds of the world's polar bear population. In the Hudson Bay, polar bears are dependent on sea ice for survival and are now on the verge of extinction due to increased Arctic melt caused by climate change which greatly affects their survival during the open-water season. This research project aims to find out how the survival of polar bears in Western Hudson Bay has been affected by climate change during the open-water season. Relevant studies were reviewed to investigate how significant results have supported this research. In the Western Hudson Bay, climate change has reduced the ice coverage to about 50 percent from 1970 to 2004; this forces polar bears to fast seven to eight days earlier every decade. Thus, polar bears are forced to deal with prolonged periods of fasting during the open-water season, mainly due to the scarcity of goods, which greatly affects their survival.

Reach After-Effects as a Measure of Implicit Learning After Abrupt and Gradual Visuomotor Rotations

Humans have an incredible ability to learn new movements and adapt our movements to changing circumstances. Visuomotor adaptation can be observed when subjects reach out to a target holding a cursor with their unseen hand while the visual feedback of the cursor's motion is manipulated. Motor adaptation engages both implicit and explicit learning processes. Some measures of motor adaptation are considered to measure primary implicit learning, such as reach after-effects, which occur when subjects continue to make deviated reaches after the cursor's rotation has been removed. In this study, we look at how a higher contribution of implicit learning influences visuomotor adaptation as measured in reach after-effects and retention. We changed the contribution of implicit learning by introducing the visual feedback of the cursor's rotation either abruptly or gradually. An abrupt change in cursor's motion is more likely to be recognized by subjects, thus, it should evoke more explicit learning and a gradual change should evoke more implicit learning. We expect greater reach after-effects and retention of learned hand movements following gradual rotation training. Participants (N=27) did both a gradual and abrupt version of the same visuomotor adaptation task in a counterbalanced order. Contrary to our expectations, we found no difference between reach after-effects and retention in the two conditions. Perhaps an even larger, more explicit deviation would be necessary to reveal relative contributions of explicit and implicit adaptation to gradually and abruptly introduced visuomotor perturbations.

Canadian Pharmacare

A tough pill to swallow

As communicable diseases continue to devastate low-income countries and non-communicable diseases elevate the global burden of disease, policymakers are beginning to investigate how to best reform the pharmacare system to meet the growing demand. The current discourse surrounding pharmacare accessibility heavily focuses on the perils of intellectual property rights. Although this is a central component to understanding and addressing the issue, it lacks contextual depth. This article frames the debate around the historical and contemporary frameworks which inform pharmaceutical policy and practises; namely capitalism, colonialism and imperialism. This is through an exploration of the governance mechanisms and power structures that are in place both locally and globally. This article also presents a case study of the Cuban healthcare system to appraise its quality and the possibility of expanding similar practices to the Canadian system. This investigation found that current pharmaceutical governance models are inadequate in protecting global health interests, that a self-sufficient national pharmaceutical system like the one implemented in Cuba can create health outcomes that surpass high-income counterparts, and that current ideologies and practises are only effective in profit creation, not the creation of equitable health outcomes. The author attempts to use this analysis to inform awareness campaigns and possible policy reform within a Canadian context. As the Canadian public and government continue to discuss the possibility of implementing a national pharmacare program, insight into how this nation can meet the needs and become a global provider would be incredibly valuable.

A Hypothesized Role of Uncharacterized Gene CG 10809 in Parkinson Disease and Neurodegeneration

This study looks at different resources that implicate the function of the CG10809 unknown gene and designs an experiment to verify (or falsify) the hypothesis. Given the evidence and information, we predict that the CG10809 is a calcium ion transport channel protein that is part of the nuclear pore complex.

Green Roofs

The sky's the limit in Toronto

In a 2012 speech, United Nations Secretary-General Ban Ki-moon called for the world's mayors and local governments to engage in the creation of sustainability policy for cities by stating that "Our struggle for global sustainability will be won or lost in cities." The application of green roofs at a city-wide scale improves urban sustainability and is a function of local government policy creation. The City of Toronto introduced a municipal green roof by-law to increase the amount of green roof space to primarily mitigate the urban heat island effect and decrease the amount of stormwater runoff. However, there are many benefits to green roofs beyond these two functions. This research presentation uses the City of Toronto as a case study to understand the role of policy in green roof implementation at a city-wide scale before analyzing the benefits of green roofs for cities from an architectural, ecological, and planning perspective. In an increasingly urbanized world, transforming densely populated urban agglomerations into sustainable spaces is a critical component to mitigating the effects of climate change. Green roofs increase the sustainability of urban areas, and with careful consideration of the negative aspects, help create healthier cities. The City of Toronto's green roof bylaw as a case study is a useful guide for cities wishing to create evidence-based green roof policies which contribute to healthier cities and a more sustainable global urban future.

SARAH EWEN

Evaluating the Use of Picture Books and “Read Aloud” Discussions to Explore Complex Topics with Kindergarten Students

Read-aloud discussions are highly recommended for classroom literacy practice and for stimulating classroom discussion. In this lesson plan, the practice of read-aloud discussions was explored with respect to its potential to teach kindergarten students about complex concepts such as community awareness. To address this research question, we conducted the read aloud with a book about community with four students. Students’ comments and reflective drawings were then utilized to assess the effectiveness of the activity. Overall, we determined through this lesson plan that complex topics can be explored through read-alouds and that learning does not have to be a linear process.

The Quinoa We Grow

*This paper illustrates how quinoa (*Chenopodium quinoa* Willd.) is an important crop because of its potential to help fight poverty and significantly impact the global food shortage crisis. This work also provides a detailed profile of quinoa as an angiosperm that highlights the notable peculiarities which make the crop highly stress-resistant and adaptable to a wide range of conditions. Two approaches were taken to describe the plant: biological, to highlight its advantages, and sociocultural, to mark its significance. We conclude that the popularity of *Chenopodium quinoa* Willd. will increase in the upcoming years. This is something to be aware of because, although international organizations are focusing on bringing it to the impoverished, increased popularity and improved reputation typically persuade sellers to increase the price of a product. Thus, a crop selected to fight hunger may become too expensive for those who need it the most.*

Vitamin C

Nature's 'flu shot'

Annually millions of people heed the multiple flu warnings and flock to walk-in-clinics and hospitals to receive their flu shot. However, many still end up contracting the flu. Consuming high doses of vitamin C is a low-cost, proven means of both preventing and treating influenza by enhancing overall immune function. With new strains of influenza arising each year and with the flu shot becoming increasingly ineffective, vitamin C needs to be implemented into our diets via oral or inhalational supplementation and used as a means of resistance.

MANDY HUYNH

Can We Predict and Prevent a Flash Flood Disaster in the Desert?

Desert flash floods are an intense and unpredictable natural phenomenon that kill many individuals and destroy many homes. This study focuses on the formation of flash floods in the desert, their impact, and the technology used to predict and prevent flooding events. A reading of the primary literature found that, despite the destruction caused by flash floods, they are a necessary phenomenon to recharge groundwater, support plant diversity, and maintain the population of native fish species. Predicting locations prone to flash floods became possible when GIS and remote sensing technology became more advanced. However, it is still very difficult to accurately identify all areas prone to flash floods. The timing of flash floods is even harder to determine. It is important to educate the public on the risk of living in areas prone to flash floods.

An Ancient Greek Problem

Can We Trisect an Angle with Ruler and Compass?

Ancient Greek mathematics is considered to be the most important and basic foundation of modern mathematics. Many great mathematicians discovered theorems and formulas which are fundamental to modern mathematics. For example, most individuals learned the Pythagorean theorem in elementary school. Euclid's Elements is known to be the greatest textbook in the history of math up until the 12th century. However, there were many other problems that cannot be solved; one of them is angle trisection. Trisection is the process of dividing something into three equal parts. Our goal was to prove the impossibility of trisection of an angle using only a ruler and compass.

Newcomers with Disabilities

Challenges and service implications

On June 18, 2018, Canada changed the medical inadmissibility policy for immigrants and refugees to be more welcoming of people with disabilities. To better understand the needs of this population, this project reviews the challenges faced by immigrants and refugees who have physical disabilities in Canada. Results suggest logistical, emotional, and community challenges, with implications for social work. A literature search was conducted to find peer-reviewed journal articles about immigrants and refugees with physical disabilities in Canada. Challenges were categorized into themes and analyzed in terms of how they lend themselves to social work.

Sculpting Gender Relationships

Classical idealization in *Pygmalion and Galatea* (1813–1819)

The extent to which idealization is visible in Anne-Louis Girodet's classical painting Pygmalion and Galatea (1813-19) is explored through the critique of classical elements and a comparison to an earlier biblically based work: Palma Vecchio's painting Adam and Eve. The flawless depiction of their ivory bodies moves away from a model of realism in order to embellish subjects and reinforce traditional gender roles. Comfortable within the literary canon, the myth of Pygmalion involves the creation of the ideal woman who displays physical features such as a tiny waist and glowing skin that continues to be viewed as desirable today. The depiction of the myth presents a power struggle between man and woman, and man and religion, through Pygmalion's creation of his ideal woman with divine intervention.

CHRISTINA MARTON

The Distribution, Behaviour, and Reproduction of the Endangered Desert Pupfish (Cyprinodon Macularius)

The pupfish is a small sized fish species found in North American deserts that is being threatened by water loss resulting from climate warming. These desert-adapted fish have unique characteristics in their distribution, behaviour, and reproduction that has allowed them to tolerate the extreme desert climate and adapt to survive climate warming which is eliminating the few suitable environments available for survival. Through peer reviewed scientific journals, this amazing species can be studied and analysed for its favorable traits and adaptations to environmental conditions so researches not only understand the unique characteristics this species has evolved to survive in extreme desert environments but also to seek out and create access to safe spaces for the species to populate. This understanding will not only prevent the loss of another species to the effects of a changing climate resulting from human activity, but also give insight into the characteristics that other desert species may be using to survive one of the world's most extreme environments.

Elite Skill and Concussion

It is commonly known that elite athletes in the sport of ice hockey have superior eye-hand coordination and visuomotor skill allowing them to perform at the highest level in their sport when compared to the non-elite population. Previous research has identified a protective motor skill reserve in asymptomatic elite athletes with a history of concussion. This study sought to explore the possibility of lingering visuomotor effects in elite asymptomatic athletes with concussion history. This study sampled male NHL draft prospects and male Kinesiology & Health Science students at York University (Toronto) to examine their visuomotor skills when learning to perform a novel motor learning task. Haptic robotic equipment was used to create a virtual environment allowing participants to navigate the movement tracer around obstacles in the x, y, and z planes of motion. This study supports the findings that the suspected impairments in visuomotor skills are not apparent between elite athletes with and without concussion history when analyzing key performances measures outlined to participants as goals for the task: fastest time to complete the task, and the number of obstacles hit. When analyzing the progression in performance between the three groups studied, it was found that the elite and non-elite groups having no concussion history demonstrated similar improvement outcomes over the course of the ten trials when visuomotor skill was self-controlled by each participants' motor skills. The elite group with concussion history displayed variable and inconsistent performance through the progression of their consecutive trials at the novel motor learning task.

Walmart

The benefits of outsourcing

This study is based on the controversial topic of multinational corporations outsourcing their production lines to nations with lower standards for work safety. I believe that outsourcing not only affects the corporation in a positive way, but it also economically helps individuals in those countries. Through my analysis that included topics such as the bottom line of Walmart's financial statements, real-life events that included an increase in jobs in those countries, negative events that occurred in these countries such as factories collapsing, and events in the past that affected the safety standards in the United States, I conclude that my belief favours outsourcing. This project identifies both the positives and negatives to outsourcing and critically analyzes them.

Determining the Potential Role of the *Drosophila* Gene CG12299 in Cytoskeletal Development with Emphasis on Neuronal Development Related to Amyotrophic Lateral Sclerosis

Drosophila melanogaster is a species of fly which has been used for over a century as a model organism. Two benefits of using *Drosophila* as a model organism is that it has a fully sequenced genome and it contains homologs to at least 75% of human genes. However, many different genes in the *Drosophila* genome still have uncharacterized functions. One such gene is CG12299 which, when mutated in a *Drosophila* model of amyotrophic lateral sclerosis (ALS), has been shown to reduce the severity of an ALS model-associated phenotype, resulting in an appearance approaching that of an unaffected (wild type) fly. This suggests that CG12299 plays a role in the pathogenesis of ALS and determining its function could lead to a better understanding of ALS and the development of novel therapeutics for the treatment of ALS. In this project, the function of CG12299 was predicted using multiple literature searches (which included a comparison of the amino acid sequence of the protein produced by the CG12299 gene to the amino acid sequence of proteins with known functions from other species), an analysis of the expression pattern of CG12299 across the body of the flies, and a search and characterization of the proteins known to interact with the gene product of CG12299. Multiple potential experiments were also designed which could determine the function of CG12299. It is hypothesized that CG12299 is involved in the development of the cytoskeleton in neuronal cells and, since the cytoskeleton is essential to maintaining cell viability, any disruption to the cytoskeleton will lead to cell death, as seen in individuals affected by ALS.

“Womb for Rent”

Socio-cultural implications of reproductive tourism in India

Commercial surrogacy in India has become an increasingly controversial human rights and global health issue. Indian women living in dire poverty are the most vulnerable group in this transnational phenomenon. Reproductive tourism can be defined as the process whereby affluent people, predominately from Global North countries (i.e., Canada) seek assisted reproduction in the Global South (in this case, India), to accomplish fertility and kinship formation goals while remaining oblivious to the inevitable social issues associated with this international trade. This study investigates how the media and academic anthropological research present current understandings of family and kinship regarding commercial surrogacy. I argue that reproductive tourism is a multi-faceted social issue with significant socio-cultural implications for kinship in India and the Global North with roots in a gendered division of labour, culture-specific belief systems, technological advancement, race and class stratification, capitalist structures, and globalization. I critically analyze diverse media sources that offer insights within these realms, and I use research in anthropology as ethnographic evidence to support, challenge, or extend claims reported by the media. The commodification of reproductive labour has had vast impacts on the cultural meanings of kinship in India and in Global North countries. Transnational surrogacy must be perceived by governments as a public matter rather than a private one, in order to adequately derive holistic solutions to halt the exploitation of vulnerable Indian women while balancing the desire of infertile individuals to utilize surrogacy as a means of kinship formation.

ARIANNA PECCHIA

Luca Pacioli's Influence on Modern-Day Accounting

In this study, Luca Pacioli's influence on current accounting practices is demonstrated by comparing the times prior to, during, and after Pacioli's records. Through extensive research, it becomes evident that Pacioli did impact the way in which accountants currently record transactions.

A Patriotic Fan Letter in the Archives

*The purpose of this project was to perform an in-depth analysis of selected materials in the Clara Thomas Archives and Special Collections (York University, Toronto). This study focused on what we, as historians and patrons of the Archives, can learn about a particular author or individual from a set of documents. The document I chose was a fan letter written to Canadian author Margaret Laurence about her book *The Stone Angel*. I debate whether the letter, written by Dawn E. Clarke in 1972, endures in the Clara Thomas Archives because of, or in spite of, Margaret Laurence. I approached my analysis, first and foremost, by examining the items in the Margaret Laurence Fonds. I chose Dawn E. Clarke's letter because it was the only document in the fonds to discuss *The Stone Angel*. I then analyzed the letter's content, physical characteristics such as Clarke's handwriting, and considered the reasons why this particular document was archived. I deduced the following: Dawn's handwriting, word choice, and neat presentation of her letter suggest she held Laurence in high esteem. Dawn's admiration and her national pride establishes Canada as a viable literary destination. Dawn acknowledges her role as a female reader and asserts her right to this readership and even authorship by composing her document. The existence and preservation of this document show the impact of an author on an individual.*

In the Closet

Intimate partner violence in same-sex female relationships

Over the course of the past several decades, the issue of intimate partner violence (IPV) has become increasingly prevalent in research, legislation, and public discourse. Although the concept of IPV has evolved to include people who are in non-marital relationships, there is a noticeable lack of research on IPV in the LGBTQ+ community. This study explores why the phenomenon of female same-sex intimate partner violence (FSSIPV) is ignored. There is evidence that a correlation exists between the use of traditional measurement instruments of IPV and the absence of FSSIPV. What has become abundantly clear is that IPV is often framed within a heteronormative, gender stereotypical context, thus making it very difficult to include FSSIPV in the discussion. This is because FSSIPV fundamentally challenges both the notion of what a “normal” relationship looks like within the context of a heteronormative society, and how gender stereotypes manifest in IPV. Further research needs to be conducted to create FSSIPV-specific measurement tools that can capture the nuances of the phenomenon, as well as restructure victim services to meet the needs of victims. Finally, further resources must be allocated for educating both healthcare providers and the general public on how stereotypes can influence what is perceived as IPV.

The Impacts of Oil Sand Operations on the Development, Survival, and Reproductive Capabilities of Fathead Minnows (*Pimephales Promelas*) in Alberta, Canada

*Toxic contaminants discharged from oil sands mining processes are accruing in and around freshwater environments. The aim of this review is to arrive at a consensus regarding the impacts that these toxic pollutants have on the development, survival, and reproductive capabilities of fathead minnows or *Pimephales promelas*—a species of ray-finned fish in Alberta, Canada. The choice to focus specifically on fathead minnows was based on the fact that they are an indicator species, commonly used in environmental toxicology assessments. Additionally, they are both abundant and native to the oil sands region of Alberta. Based on my findings, toxic pollutants such as naphthenic acid fraction components, can either induce increased mortality of fathead minnow embryos or increase developmental abnormalities (typically cardiovascular irregularities) during hatching. Furthermore, wastewater generated from oil-sand handling can, for example, increase their hematocrit levels (ratio of red blood cells), decrease their leucocrit levels (ratio of white blood cells), and circulate lymphocytes in the blood. This suite of potential developmental complications has been observed to reduce the survivorship of fathead minnows. Lastly, large quantities of toxic pollutants, such as naphthenic acid accumulating in freshwater ecosystems, impairs the reproductive physiology of fathead minnows. The accumulation of toxic pollutants released by oil sands mining operations in freshwater ecosystems is significantly impairing the life cycle of the fathead minnow. It appears that even the smallest doses of such pollutant, can cause detrimental effects on fathead minnow populations.*

Tapping into Health Disparities

Canada's Indigenous water crisis

In Canada, many Indigenous communities experience environmental racism through the appalling lack of access to safe drinking water. The well-documented health challenges posed by the denial of this basic human right disproportionately affect Indigenous populations. The continuing oppressive impacts of colonization are evident, given that current public perceptions and policy decisions discriminate against Indigenous peoples. Water system maintenance is a public health necessity, and the government has recklessly off-loaded this responsibility onto Indigenous populations, despite their varying degrees of social, financial, and structural ability to manage this crucial task. By boiling down the overlapping historical and cultural conditions that have allowed this state to develop and perpetuate, this research explores how health policies can strategically enact multi-faceted and tailored approaches to end this injustice. The results demonstrate that current top-down Indigenous health policy tactics are failing and will continue to destroy the lives of many people. Spiritual, mental, and physical health are interconnected and, when analyzing these through a water access lens, the negative effects are visible at the population level. Many Indigenous people have lost faith in the future, given that their circumstances are failing to improve; this is compounded by severe physical ailments resulting from bathing in and consuming tainted water. Moving forward, policy planning needs to address the various social determinants of health that are disadvantaging Indigenous populations while collaborating with communities to develop approaches formulated to address their unique needs.

Effects of Sex Hormones on Central Chemoreflex Function

Women in the low hormone phase of the menstrual cycle (LH) have greater light headedness compared to when they are in the high hormone phase (HH). Both cerebrovascular reactivity to CO₂ and central chemoreflex activity might play a role since CO₂ can elicit both cerebrovascular dilation and activation of sympathetic nerve activity (SNA). Research has shown that women in the HH phase demonstrate higher SNA and may also have higher cerebrovascular reactivity. We investigate the effect of hypercapnia on ventilatory and cerebrovascular responses in women throughout the menstrual cycle. Women (n=8) breathed five minutes of 5% CO₂ during LH (day 2–5 or placebo pill) and HH (day 18-24 or maximal dose pilQ phases). Ventilation (Ve; Pneumotachometer), blood flow velocity through the middle cerebral artery (MCA; Transcranial Doppler), and blood pressure (BP; ccNexFin) were measured. Ve equals tidal volume x breathing rate. Cerebrovascular conductance index (CVCi) equals MCA mean + BP. Paired t-tests were used to compare the change due to CO₂. There was no effect of phase on the Ve response to CO₂ (LH: +0.09± 0.081/min; HH: +0.10± 0.091/min; p; 0.57) though there was a tendency for a greater increase of CVCi in the HH phase during CO₂ inhalation (LH: +0.11±0.08cm/s/mmHg; HH: +0.19±0.09 cm/s/mmHg; p; Q,08). Furthermore, there was no effect of phase on the BP response to CO₂ (LH: +2.16±2.94mmHg; HH: +1.81±2.20mmHg; p; Q,63). Our results suggest that the presence of estrogen and progesterone may not affect the central chemoreflex but tends to increase cerebrovascular reactivity.

CHARLOTTE WEST

Deforestation

How tree loss affects climate

Deforestation and climate change are two of the biggest environmental disasters facing the planet today. It is important to understand the interaction between these threats. Using meta-analysis, we looked at the effect that deforestation has on climate as well as on climate change. Ten research papers were selected from a pool of twenty-five on large rain forests, and these were used for statistical analysis. In order to produce relevant and applicable results, the studies were restricted to the last five years. We found that deforestation has both regional and global impacts on climate. This result has significant implications because it shows that slowing deforestation is critical not only for the local environment but also for the entire global climate.

Instructions for Authors

Revue YOUR Review invites student-authors who have recently presented their work at York University's annual juried Undergraduate Research Fair to revise and submit a paper for consideration for publication in this refereed e-journal. Calls for submissions are sent to participants after each annual Fair. Works must present original research, not yet published and not under consideration for publication elsewhere. Submissions should show evidence of scholarship appropriate to the field of study and are evaluated for originality, clarity, relevance, timeliness, and readability for an interdisciplinary audience. Authors are encouraged to attend a writing-for-publication workshop offered by members of the editorial board and of York University's Writing Department.

Submissions should be in MS Word or RTF format (double-spaced and in 12-point font) and are accepted in English or in French. Articles should not exceed 3500 words (up to 15 pages double-spaced) and must use APA style (7th edition) for layout, in-text citations, and bibliography, along with the *Canadian Oxford Dictionary* for spelling. Photographs or other images must be labelled and require permission from the creator or must be in the public domain. In addition to the paper itself, submissions should include: a title page with author name(s) and a permanent email address and/or telephone number, an abstract of 150-200 words (double-spaced), a list of key terms, a bibliography in APA style, and the date of presentation at York University's Undergraduate Research Fair as well as the date of submission for consideration for publication in this e-journal.

Submissions are reviewed by the editorial board and may be sent to expert readers in the discipline. Those articles accepted for publication or accepted with conditions may be copy-edited by students in an upper-year publishing course. Authors will be expected to work closely with copy editors, writing faculty, and/or the journal editors in editing and revising their work.

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