

USING THE SCIENCE OF STRESS AND CHRONIC DISEASE TO FACILITATE RECONCILIATION IN CANADIAN UNIVERSITY STUDENTS

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Abstract

The purpose of this study was to determine whether a stepwise reflection process that occurred over a 12-week period would result in attitudinal change and increased empathy regarding intergenerational trauma associated with the Indian Residential School System in a sample of Canadian health sciences undergraduate students. The study employed two forms of mixed methodologies: *Two-eyed seeing* and a quantitative and qualitative mixed methods approach. The results were based on the differences in reflection content at the beginning and end of a health sciences course, as well as the responses to six post-course questions. Twenty-one of 34 students agreed to participate (58.8%). The student reflections contained evidence of attitudinal change and increased empathy for Indigenous people affected by the Indian Residential School System. In conclusion, when attempting to implement reconciliation efforts, it may be important to consider both the mechanisms for fostering change as well as reducing barriers to empathy.

Key words

Empathy, intergenerational, residential, trauma, undergraduate

Résumé

Le but de cette étude était de déterminer si un processus de réflexion par étapes déployé sur une période de douze semaines aurait comme résultats des changements attitudeux et une augmentation de l'empathie envers le trauma intergénérationnel associé au système des pensionnats autochtones auprès d'un échantillon d'étudiant·e·s canadien·ne·s en sciences de la santé. L'étude a utilisé deux formes de méthodologies mixtes : l'approche à deux yeux et l'approche à méthodes qualitatives mixtes. Les résultats s'appuient sur les différences du contenu réflexif au début et à la fin d'un cours en sciences de la santé, ainsi que sur les réponses à six questions obtenues après le cours. Vingt-et-un des trente autres étudiant·e·s ont accepté de participer (58%). Les réflexions étudiantes suggèrent un changement attitudeux et une augmentation de l'empathie envers les personnes autochtones affectées par le système des écoles résidentielles. En conclusion, dans la mise en œuvre d'efforts de réconciliation, il pourrait être important de considérer tant les mécanismes qui permettent d'instaurer des changements ainsi que de chercher à réduire les obstacles à l'empathie.

Mots clés

Empathie, intergénérationnel; résidentielle; trauma; premier cycle

The Canadian Journal of Native Studies XLII, 1 (2025)

Introduction

In Canada, over 150,000 First Nations, Inuit, and Métis children attended church-run residential schools from the 1870s to the mid-1990s (National Centre for Truth and Reconciliation [NCTR], 2015). The Indian Residential School system (IRSS) in Canada forced Indigenous children to live at schools where various forms of neglect and abuse were common (Bombay et al., 2014). These schools taught Indigenous children that their traditions, cultural beliefs, and languages were something to be ashamed of and were more intent on assimilation than providing a sound educational experience (Deiter, 1999; Friesen & Friesen, 2002). In addition to the significant number of mortalities and children who went missing from these schools, many were also victims of chronic mental, physical, and sexual abuse and neglect (Hurley & Wherrett, 1999).

To address the legacy of residential schools, the Final Report of the Truth and Reconciliation Commission of Canada (NCTR, 2015) contains information on the Principles of Reconciliation and 94 Calls to Action (CA), several of which are relevant to health educators. For example, CA 10. iii. recommends “Developing culturally appropriate curricula” (p.24). CA 19 recommends the closure of the “gaps in health outcomes between Aboriginal and non-Aboriginal communities” (p. 30-31). CA 23 iii. recommends provision of “cultural competency training for all healthcare professionals” (p.33). Lastly, CA 24 states: “We call upon medical and nursing schools in Canada to require all students to take a course dealing with Aboriginal health issues, including the history and legacy of residential schools” (p.34).

For the lay public, including students in the K-12 system, there continues to be a disconnect between knowledge of IRSS and the long-term impacts including intergenerational trauma (IGT). IGT has been described as how “the experience of trauma in one generation can influence subsequent generations” (Bombay et al., 2014, p. 321). IGT is the accumulation of stress and trauma within communities that causes an increased risk for negative health and social outcomes among subsequent generations of Indigenous peoples (Bombay et al., 2014; Walters et al., 2011). Importantly, the more generations that attended the IRSS, the more impact on mental health is experienced by subsequent generations (Bombay et al., 2014). Most of the research on IGT has focused on the psychological effects observed among subsequent generations with a focus on parenting (Bombay et al., 2014), with little emphasis on physical health (Walters et al., 2011). In addition to parenting concerns, survivors may have the inability to be an active family member due to being separated from their families while attending residential schools. The social and practical consequences of the IRSS system are well-established. For example, exposure to the IRSS by a grandparent and or parent has led to more time in the child welfare system, higher psychological distress, and more depression in offspring (McQuaid et al., 2022). In the health and medical literature, there is ample evidence that Indigenous peoples in Canada have poor mental and physical health when compared to non-Indigenous people (Wilk et al., 2017).

The pathophysiology of how stress and trauma impact the human body are relatively well understood (Mora et al., 2012). As such, this area of science can be used as a tool to bridge the gap between understanding the traumatic events associated with the IRSS and the magnitude of mental and physical health consequences that can occur in any human. Stress science focuses on how the perception of a stressor alters physiologic systems, and in some cases, results in permanent changes

in anatomy and physiology. For example, childhood trauma of the magnitude experienced by children attending the IRSS has been linked to altered physiology that can result in mental health challenges (Heim et al., 2008) and a host of other chronic diseases, with some linked to accelerated aging (Dallé & Mabandla, 2018; Sumner et al., 2015; Webster Marketon & Glaser, 2008).

Therefore, when addressing the Truth and Reconciliation CA, using the science of stress and trauma to reveal fully the impacts in health education settings may be useful. However, when attempting to educate those in health care about the legacy of the IRSS, presenting the facts may not be enough. For example, a recent study by Melro et al. (2023) explored the effect of a mandatory course provided for first year health professional university students on colonialism and its lasting impacts. The impacts of this course had unintended effects; students reported either no change in attitudes towards Indigenous people or an increase in negative attitudes such as blaming (Melro et al., 2023). Therefore, providing information about the lasting impacts of the IRSS alone may not be sufficient to produce attitudinal change (Pedersen et al., 2011).

Fostering empathy in healthcare students has long been considered (Pedersen, 2010), and developing empathy in non-Indigenous peoples is stated within CA 63 (NCTR, 2015). To avoid unintended consequences (Melro et al., 2023; Wideman, 2005), attempts to increase empathy in healthcare students must be carefully implemented. Medium stability factors such as “current belief and value systems, education and training, group influences, work experiences and culture, supervisory influences, and the professional identity” (Yu et al., 2022, p.5) are considered effective areas to focus on. Other characteristics to foster when attempting to increase empathy are to create emotional connections to patient groups (Wilson, 2011), to develop an understanding that specific health issues can be complex (Wilson, 2011), to hear directly from patient groups about their challenges and concerns (Barker et al., 2022), and to re-humanize as a part of the reconciliation process (Halpern & Weinstein, 2004). In addition to fostering certain characteristics and experiences, barriers to empathy must be considered (Bayne et al., 2013). Barriers to empathy may include guilt about the IRSS, race, and religion as well as adherence to untrue stereotypes (Singh et al., 2018). For example, reviewing the atrocities committed in IRSS by people with privilege may create a defensive response in students who associate themselves with colonizing peoples. Defensiveness can be considered a barrier to fostering empathy and attitudinal change. Context, group membership, and interpersonal relationships are necessary to consider when attempting to foster empathy (Chen & Liu, 2016).

To address the CAs regarding education of healthcare professionals, the purpose of this study was to determine whether a stepwise reflection process that occurred over a 12-week period would result in attitudinal change and increased empathy regarding IGT associated with IRSS in a sample of Canadian health sciences undergraduate students. The reflection process began with first-hand accounts of the IRSS expressed by survivors, then gradually over a 12-week period, the physiological effects of stress and trauma were explored. Following completion of the course, additional questions were posed regarding the entirety of the process. While there were no specific hypotheses, the aim was to determine whether evidence of attitudinal change occurred based on student reflections, specific open-ended questions, and a subjective rating of a change in empathy before and after the educational intervention.

Methods

Relationality and methodology

Author 1 is Nlaka'pamux ([Ing-khla-kap-muh] Nlaka'pamux peoples' territory surrounds the lower Thompson River in southern British Columbia, Canada) from the Kanaka Bar Band (Kanaka Bar is the anglicized name for T'eqt''aqtn [t-cluck-cluck-tin], which means the crossing place) and married into Shxw'ōwhámél (Shxw'ōwhámél means *where the river flattens and widens*) First Nation of the Stó:lō (Stoh-low) Nation (Stó:lō will be used to refer to the territory and the people of the river in the area that is commonly known as the Fraser Valley in British Columbia, Canada). Due to the impacts of colonization, she was primarily raised in the shared territory of the x^wməθk^wəyəm (Musqueam [MUS-kwee-əm] is the anglicized name for x^wməθk^wəyəm which means *place of the river grass*), Sk̓wx̓wú7mesh (Squamish [SKWA-mish] is the anglicized name for Sk̓wx̓wú7mesh which means *mother of the wind and people of the sacred water*), and Tsleil-Waututh ([tSLAY-wah-tooth] Tsleil-Waututh means *people of the inlet*) Nations until she moved to Stó:lō territory in her mid teens. She has worked within Stó:lō and Indigenous communities for over twenty years, focussing on employment, training, and post-secondary education until her transition to the University of the Fraser Valley in 2013. Her mothers' and grandparents' generations are Residential School Survivors; her husband is a Sixties Scoop survivor; as well as, she has personal connections to Missing and Murdered Indigenous Women (MMIW) and the Child welfare systems, and experiences of systemic racism within the Justice and Health Care systems. She dedicates her work to her family and friends who are survivors and victims by sharing her personal stories, truths, and realities to foster reconciliation, decolonization, and Indigenization. The principles that she uses are two-eyed seeing (Marshall, 2004) and the Five Rs (Kirkness & Barnhardt, 2001). She takes her direction from Indigenous story-work (Archibald, 2008).

Author 2 is a white settler who currently lives and works on the traditional lands of the Stó:lō people. He is an educator with approximately 20 years experience teaching courses on physiology, neuroscience, and stress and chronic disease. His motivation to do this work stems from the Truth and Reconciliation CAs. His guiding principles include two-eyed seeing and working to honour the promises made within the CA.

The study employed two forms of mixed methodologies. One of the mixed methodology approaches has been described as *two-eyed seeing*. Two-eyed seeing is a methodologic framework intended to approach science through a Western lens as well as through the lens of Indigenous knowledge (Marshall, 2004; Martin 2012). The main premise behind two-eyed seeing is that by acknowledging and respecting Western and Indigenous perspectives, a new way of understanding that respects the differences that each can offer is possible. The current study also utilised a quantitative and qualitative mixed methods approach (Bryman 2007; Fetters et al., 2013).

Participants

Participants in this study were undergraduate students in a Health Sciences Faculty of a Western Canadian University. The participants were students in a third-year course on stress and chronic disease, which took place in the fall of 2021. Inclusion criteria were that participants must have registered in and attended the class, completed course reflections, and provided consent to

utilise the reflections and answer follow-up questions about the reflection process once their final grades had been submitted.

Procedure

The data collected for this study originated from written reflections on content covered in the stress and chronic disease course as well as specific questions about the reflection process completed after the final grades for the class had been entered. This course focused on the causes and physiological consequences of stress or trauma and how it can play a key role in the aetiology of chronic disease. Stressors, and how they are perceived and reacted to, are discussed in relation to the multi-factorial causes of chronic disease. A portion of the course is dedicated to reflecting on content in the context of the survivors of the IRSS and the IGT this has caused for families and communities. The reflections constituted 15% of the final grade for the course.

As shown in Table 1., the reflection process began with an up to 500-words reflection of the participant's current understanding of IGT related to the IRSS. It was stressed that there were no right or wrong answers, and students were requested not to research the topic, but rather, to provide simple, honest answers based on their current understanding. Once the initial reflections were submitted, an in-class discussion began regarding the truth about Indian Residential Schools in Canada. The step that followed the initial reflection was labelled the *Truth and Reconciliation Process* (Table 1). To begin, a five minute and 32 second video was shown in class entitled *Residential school survivors on the scars of abuse* (Canadian Broadcasting Corporation [CBC] News, 2021). While watching the video, students were asked to reflect on the truth of what happened in the IRSS and to focus on emotions expressed by survivors and on emotions they felt while watching. Following the video, students were asked to describe the emotions that survivors experienced as well as their own emotions. Common emotions expressed by the students include guilt, shame, anger, and sadness. The next phase of the process was called *Barrier Reduction*. Here, the students were asked to watch the video a second time, but this time to focus on what the elders are asking for: that non-Indigenous people learn more about the schools and walk beside them on the path of reconciliation. The in-class discussion that followed focused on the students not being responsible for what had happened in residential schools, but sharing the responsibility of advocacy and reconciliation.

As shown in Table 1., at the end of Units 3 through 8, students work in small groups to predict the health consequences of the IRSS based on unit content. Each of those classes concluded with the health statistics for Indigenous people from Canada or North America based on the peer-reviewed scientific literature. This allowed the students to compare their predictions with the scientific literature. Students were then asked to provide 150-200 words reflections on the question of IGT in Indigenous people based on the content from those units. At the end of the course, students submitted a 350-500 words summary reflection contrasting their initial understanding with their current understanding of IGT in Indigenous people (Table 1).

Once the final grades for the course were submitted, students were asked permission to utilise their reflections to help analyse the efficacy of the process. In addition, students were asked to answer six questions related to the reflection process. Students were asked to describe their knowledge on the IRSS prior to taking the class, what they found most impactful, what affected

them emotionally, and whether the process helped them understand IGT. In addition, they were asked to rate the level of empathy they had for Indigenous people impacted by the IRSS before and after taking the course on a scale from 1-10 with 1 being *no empathy* and 10 being *very high empathy*. The ethics of the research were reviewed and approved by the University Human Research Ethics Board.

Data analysis

The strategy for the use of a mixed methods in this study was to quantify the nature and frequency of themes and empathy ratings. Qualitative analysis involved the development of interpretive themes within pre-determined categories. The thematic development was informed by Indigenous methodologies with a focus on recurring concepts within the conversations grounded by relational contexts epistemology (Denzin & Lincoln 2008; Kovach et al., 2009). Quantitative analysis of empathy ratings was performed using a two-tailed paired t-tests (Microsoft® Excel® v.2303) with effect size calculated using Cohen's *d* (Cohen, 1988).

Results

Participants

Twenty-one of 34 students agreed to participate in this study (58.8%), with 20 allowing access to course reflections as well as completing the six question post-course survey, and one student providing consent to access course reflections only. Participant responses were anonymized using numeric participant labels (for example, P001). No participant identified as Indigenous in the reflection content.

Initial reflection

Figure 1 (annexe 1) illustrates the integration of themes and attitudinal change that occurred during the reflection process. From the initial reflections, several themes emerged, including 1) the events at the Tk'emlúps (teh-KUM-lups) te Secwépemc (te suh-WHEP-muhc) First Nation (Kamloops is the anglicized name for Tk'emlúps; Secwépemc [Shuswap] is their language) IRSS, 2) the use of emotional language to describe the IRSS, 3) the cognitive and emotional effects of the IRSS, 4) negative stereotypes such as coping through substance use, 5) a lack of counselling for IRSS survivors, 6) systemic issues on reserves, and 7) the impact of Christian education in private schools.

Content from the Initial Reflections was categorized regarding whether a student had minimal, moderate, or high levels of pre-existing knowledge about IRSS and IGT. Reflections with minimal pre-existing knowledge contained superficial knowledge about the IRSS such as children were removed from their communities, were abused, with some dying. Reflections with moderate pre-existing knowledge contained the content above, plus specifics regarding the impacts of the IRSS as well as some of the psychological and physical consequences of IGT. Reflections rated as having high pre-existing content had the qualities described as moderate plus detailed study on the topic of IRSS and knowledge gained via Indigenous peers and their families or contact with Indigenous elders. Of the 21 participants, 10 participants were rated as having minimal pre-existing knowledge, with six rated as moderate, and five rated as high.

The lasting impact of the Canadian IRSS garnered international attention in May of 2021 when the remains of 215 children buried at the Kamloops Indian Residential School were announced by the Tk'emlúps te Secwépemc First Nation. This was mentioned by 11 of the 21 participants in their initial reflection. For some, hearing about this tragedy was a gateway to their learning journey: "I only began to hear about it in recent months as the graves at the previous residential schools were being, are still being, found" (P007). For others, it provided further evidence of a much greater tragedy:

We are recently hearing much news about all these mass graves of children from residential schools all over Canada being found, but in reality, there are most likely tons more that are unfound and people are now realizing how big of a deal this is. (P013)

Nine of 21 participants used emotional language to describe IRSSs that was less apparent in their summary reflections. Common words and phrases were "stripped of culture," "torture," "families ripped apart," and "genocide." For example, P002 stated, "They were beaten and even killed in these schools ... everything they knew was stripped from them".

Ten of 21 participants mentioned the potential cognitive or emotional effects of the IRSS with no mention of other health consequences. Many participants speculated that the impetus for cognitive or emotional effects was fear generated from hearing the IRSS survivor's stories. For example, P002 stated, "they may have passed down some of their stories about their experiences in residential schools therefore their fear is likely instilled in their children." Many of the participants stated the fear was based on witnessing trauma in others, not directly experiencing trauma, for example:

Much of the trauma and the fears that have developed because of those injustices, are taught to the youth in those communities. This can then cause certain issues to develop in younger generations, even though they may not have dealt with the trauma directly. (P010)

Fourteen of 21 participants mentioned coping with mental health challenges through substance use. One participant described: "substance abuse is an unfortunate coping mechanism many survivors struggle with because of the residential schools ... This, in turn, negatively affects survivors' children which can lead to the formation of childhood trauma for the younger generations" (P005). P003 elaborated "When people have gone through repeated abuse, they can

develop extremely unhealthy views of themselves and people similar to themselves ... that can lead them to abusing things such as drugs and alcohol to try and cope.”

Other minor themes included mention of systemic issues on reserves such as the lack of clean water, described by four participants, and that no counselling was offered for survivors, stated by five participants. Two participants addressed the dissonance that occurred between being raised Christian and subsequently learning about trauma and deaths in schools run by Christian organizations. One participant stated:

As a white and Christian Canadian, I was embarrassed that this concept was just being brought to my attention and that I had not contemplated it sooner ... I was truly embarrassed and ashamed of my country and the religious community that these horrific events and schools took place. (P007)

Summary reflection

At the end of the course, students were required to submit summary reflections based on what they had learned in each of the units. Three themes were evident in the summary reflections: 1) science fills the gaps, 2) calls for more education, and 3) advocacy. Nineteen of 21 participants noted that understanding the changes in anatomy and physiology that can occur in the human body when exposed to stress and trauma helped them to fill the gaps in understanding IGT related to IRSSs and when this happened, acceptance increased. P014's response represented much of what other participants described:

Before learning the material in this course my assumption on how the residential schools resulted in IGT was based on how they chose to cope. I connected it to how their actions, addiction or mental health struggles would impact the environment of their offspring. I now have a much better understanding of the physiological changes that can occur within the brain and body systems and just how much early trauma can impact a variety of mental illnesses or diseases. Residential schools are not just something for them to get over, they [the IRSS] have created a number of obstacles that continue to impact their life both mentally and physically.

Seven of 21 participants felt there was a need for more education regarding IGT and IRSS. For example, P018 stated:

I think that this information should be widely shared. Residential Schools and their effects are a more recent topic of conversation, and there can be people who still might have misconceptions or belligerent views and opinions. By explaining the cause of the IGT through science, and the various effects that stress and trauma have on the body, more people will have compassion.

Lastly, eight of 21 participants described some form of advocacy they were involved with during the course, or advocacy that they intended to be involved with in the future related to the newly learned content. For example, P005 described feeling empowered as an advocate:

I have listened to others and noticed some people are very insensitive towards survivors. I have shared the knowledge I have learned in this course with those around me. Many were shocked to hear how much trauma can

affect physiology and increase one's risk for disease ... Overall, I am excited to share this incredibly important knowledge with others and use it as a physician later on.

What was most impactful?

One of the questions was: What part of the IGT reflection process did you find most impactful? Participant responses were grouped into three themes: 1) applying the physiology, 2) magnitude, and 3) the entire process. Thirteen of 21 participants commented that being able to apply the physiology to the issue of IGT had the greatest impact on them. Students in applied health professions may require more in-depth explanations for them to understand a process and to make it *real*. As an example, P005 commented, "I found applying the physiology most impactful. I never questioned the trauma that residential school survivors experienced, but I never understood the connection between chronic disease and trauma. I like having the full picture when trying to understand things." There was also evidence that this deepened understanding helped to foster empathy:

Throughout the reflection process, being able to connect research about the physiological impact stress and trauma have on the body, to the residential school survivors was eye opening to me. Making that association to the trauma they endured and how it continues to impact following generations made me feel more empathetic... (P014)

Other themes were related to how the magnitude of the abuse is reflected in changes to anatomy and physiology, described by three participants, and four others stated that some found the entire process impactful.

What affected you emotionally?

Another question asked was: Was there anything that affected you emotionally regarding the experiences of those who attended residential schools, or the consequences faced by them or their families? Three themes emerged: 1) the magnitude of impact, 2) hearing stories directly from survivors, and 3) the effect on families. Six of 21 participants stated that understanding the magnitude of the impact IRSS had, not only on the children who attended but their families and offspring, affected them emotionally. P003 described it this way:

Reflecting upon statistics showing the disproportionate prevalence of stress-related diseases in Indigenous communities had an emotional effect on me. Gaining a deeper understanding of how residential schools predisposed these communities to this type of negative behavioural and health development made me feel more empathetic towards Indigenous people living in these situations.

Four of 21 participants regarded the effect on families as what affected them emotionally. Some expressed sadness:

It affected me most that they took these children and didn't even allow them to visit their parents regularly, talk to their siblings in school, or participate in their own culture. Residential schools stripped them of their childhood in such a deeply traumatic way and that greatly saddens me. (P017)

Nine participants reported that hearing stories directly from survivors had the greatest emotional impact on them. P014 explained:

Watching the videos in the beginning of class where their experiences were described affected me emotionally. Thinking about how young they were when having to go through such things broke my heart. I couldn't even imagine having such things happen to my niece and nephew, thinking of how young they are and making a connection to how it would feel to have them taken away really made the residential school experience feel real to me.

Benefits of the reflection process

The final question asked of participants was: Did the process of reflection help you to better understand IGT? If so, how? The two main themes emerged related to this question were 1) the benefits of learning the science and 2) applications to real life. Thirteen of 21 participants expressed that learning about the science of stress and trauma was beneficial for them. For instance, P019 commented "We took what we learn[ed] in class and applied it to the various stressful traumatic experiences that the survivors experienced, which really opened my eyes to why the survivors and their offspring experienced the trauma and IGT". Seven of 21 participants noted that applications to real-life were beneficial for them:

Learning how stress and trauma [a]ffect our bodies and being able to relate it to a real-life scenario was eye-opening. I now understand the physiological effects as well as the physical impacts that have been cause[d] from residential school and how it effects IGT. (P013)

Quantitative results

Once the course was completed, participants responded to the following: Empathy has been defined as the ability to understand and share the feelings of another. Rate the level of empathy you had for Indigenous people impacted by residential school system *prior* to the course. Rate on a scale from 1-10 with 1 being *no* empathy and 10 being *very high* empathy. They also responded to a question with the similar wording, but with the word *after* replacing *prior to*. The paired *t*-test performed on the pre and post reflection responses was significant, $t(20) = 6.8388$, $p < 0.001$, $d = 1.9$ very large effect. Self-reported empathy significantly increased following the reflection process (Annexe 2- Figure 2).

Discussion

The purpose of this study was to determine whether a stepwise reflection process that occurred over a 12-week period would result in attitudinal change and increased empathy regarding IGT associated with the IRSS in a sample of Canadian health sciences undergraduate students. Based on the difference in reflections at the beginning and end of the course, as well as the responses to the post-course questions, there appeared to be evidence of attitudinal change and increased empathy in this sample of participants. Participant comments on the initial reflection were focused more so on the cognitive effects of IGT, that the fear created in the offspring of survivors was based on the trauma experienced by survivors, and that the ineffective coping in response to these fears was something the offspring could *get over*. The attitudes expressed in the

summary reflections had changed substantially. Instead of a blaming attitude (Melro et al., 2023), there was increased understanding, compassion, and empathy. What the participants considered most impactful was applying the physiology to the concepts of IGT in IRSS survivors. This allowed them to comprehend the magnitude of the impact on the physiology of survivors and their offspring and that the stepwise reflection process assisted them with this change in attitude.

A benefit of the current strategy included targeting medium stability factors for attitudinal change such as participant belief and value systems, culture, and professional identity (Yu et al., 2022). In addition, the application of the physiology of stress science may have allowed for an increased understanding of the complexity of IGT (Wilson, 2011). The importance of *filling in the gaps* in IGT with physiology may be important for healthcare students who prefer comprehensive understanding. Another benefit reported by participants was the effect of hearing directly from the IRSS survivors (Barker et al., 2022), which generated emotional responses and connections with Indigenous peoples (Banales et al., 2021; Wilson, 2011). The 12-week reflection process may have been longer than other interventions and allowed participants to reflect in a manner that did not over-load them with content, providing them the time and space to process the information effectively to challenge their existing values and beliefs. These factors may have worked to re-humanize survivors with the common ground being the effects of trauma on the human body (Halpern & Weinstein, 2004). Further evidence of re-humanizing were the participant's transitions in language, such as initially referring to First Nations children, to recognizing that they were indeed survivors.

In addition to fostering certain attitudes and experiences, barriers to empathy must be considered (Bayne et al., 2013). In the present sample, barriers to empathy may have included guilt about IRSS and defensiveness that can occur when associating with colonizers and religion. This is where hearing the stories and perspectives of elder IRSS survivors may have also had an impact. In the video presented to participants, elders were asked: What do you want non-Indigenous people to know? One of the elders responded "I want non-Indigenous people to know... how painful it was and how the colonization hurt us so badly. How its still hurting us with the racism. They need to understand and stand beside us, it's not their fault. I'm not bringing this up to blame anybody, but I want the history to be known" (CBC News, 2021). Another stated, "I want the non-Indigenous people to understand ... to learn more about the schools, and that's one of the reasons I'm doing this, to educate the public about what happened in residential schools and how I went through about 20 years of my life to where I am today" (CBC News, 2021). Both statements resonated with participants in this study. The first response allowed some participants to change the perception that they are to be blamed because of their association with the colonisers. The second statement motivated them to act, which is consistent with Indigenous methodology. When the statements are combined, participants' defensiveness may have been reduced because they could have done nothing to stop the atrocities of the IRSSs and they now have a responsibility to act - to become educated about the IRSS and to walk beside Indigenous people on the path to reconciliation.

Two of the participants were educated in private Christian high schools. Both commented on the lack of education on the IRSS and the role the church played in the schools. CA 59 states: "We call upon church parties to the Settlement Agreement to develop ongoing education strategies

to ensure that their respective congregations learn about their church's role in colonization, the history and legacy of residential schools..." (NCTR, 2015 p.66). Given that the participants would have graduated high school several years after the CA were published, it is apparent that some Christian educators have not acted upon CA 59.

Limitations

This study had several limitations. The first limitation was the response rate of 58.8%. This means that 41.2% of students in the course chose not to respond. While their reasons are unknown, such reasons could have included having a different response to the reflection exercise than those who chose to participate. Another limitation is that while all participants rated their empathy as the same or higher than the start of the course, their estimates may have been affected by retrospective recall of how much empathy they had at the outset of the course, or that what they identified as empathy was in fact something more like sympathy (Lanzoni, 2018). While some participants may have mischaracterised sympathy as empathy, there does appear to be evidence in the participant responses for empathy such as the ability to put oneself in the place of another and to see things from another's perspective (Lanzoni, 2018). Finally, it must be acknowledged that the attitudinal and empathic changes were reported during and following the reflection process. The permanence of these changes was not measured and as such, they may be reduced over time.

Conclusion

Some have criticized science as a colonial construct that represses disadvantaged people (Seth, 2009). Others have argued that a focus on science in health education can be a barrier to empathy (Pedersen, 2010). An alternative perspective is that science is neither inherently good nor bad; it is both a process and a tool. In this study, science was used as a gateway for understanding the IGT associated with IRSS. Participants provided evidence consistent with attitudinal change and increased empathy for Indigenous people affected by IRSSs. When responding to the Truth and Reconciliation CAs, it is important to consider both the mechanisms for fostering change as well as reducing barriers to empathy, such as feelings of guilt and defensiveness associated with being a settler. Educational and religious institutions should continue their efforts to foster change in accordance with the CAs.

Glossary

Interior Salish Indigenous Language Groups

Nlaka'pamux (Ing-khla-kap-muh) Nlaka'pamux peoples territory surrounds the lower Thompson River in southern British Columbia, Canada

T'eqt''aqtn (t-cluck-cluck-tin) Kanaka Bar is the anglicized name for T'eqt''aqtn which means "the crossing place." This First Nation is located 14 kilometers south of Lytton, British Columbia, Canada

Tk'emlúps te Secwépemc (teh-KUM-lups te suh-WHEP-muhc)

Kamloops is the anglicized name for Tk'emlúps. In the Secwépemc (Shuswap) language, Tk'emlúps means "the

people of the confluence.” Their territory stretches from the Columbia River along the Rocky Mountains, west to the Fraser River and south to the Arrow Lakes in British Columbia, Canada

Coast Salish Indigenous Language Groups

- Shxw'ōwhámél (Sh-wow-HA-mel) Shxw'ōwhámél means “where the river flattens and widens.” This Stó:lō band is located near the town of Hope in southern British Columbia, Canada
- Sḵw̓x̓wú7mesh (SKWA-mish) Squamish is the anglicised name for Squamish. Sḵw̓x̓wú7mesh means “mother of the wind” and “people of the sacred water.” Their territory is on the North Shore of Vancouver and Squamish, British Columbia, Canada
- Stó:lō (Stoh-low) Stó:lō means “river” in Halq'eméylem and for the purpose of this article, it will be used to refer to the territory and the people of the river in the area that is commonly known as the Fraser Valley in British Columbia, Canada
- Tsleil-Waututh (tSLAY-wah-tooth) Burrard band is the anglicized name for Tsleil-Waututh. In the hənqəmínəm language, Tsleil-Waututh means “people of the inlet.” Their territory is centred on the Burrard Inlet between Maplewood Flats and Deep Cove in North Vancouver, British Columbia, Canada
- xʷməθkʷəy̓əm (MUS-kwee-əm) Musqueam (MUS-kwee-əm) is the anglicized name for xʷməθkʷəy̓əm which means “place of the river grass.” Their territory encompasses the western half of what is known as the Greater Vancouver area in British Columbia, Canada

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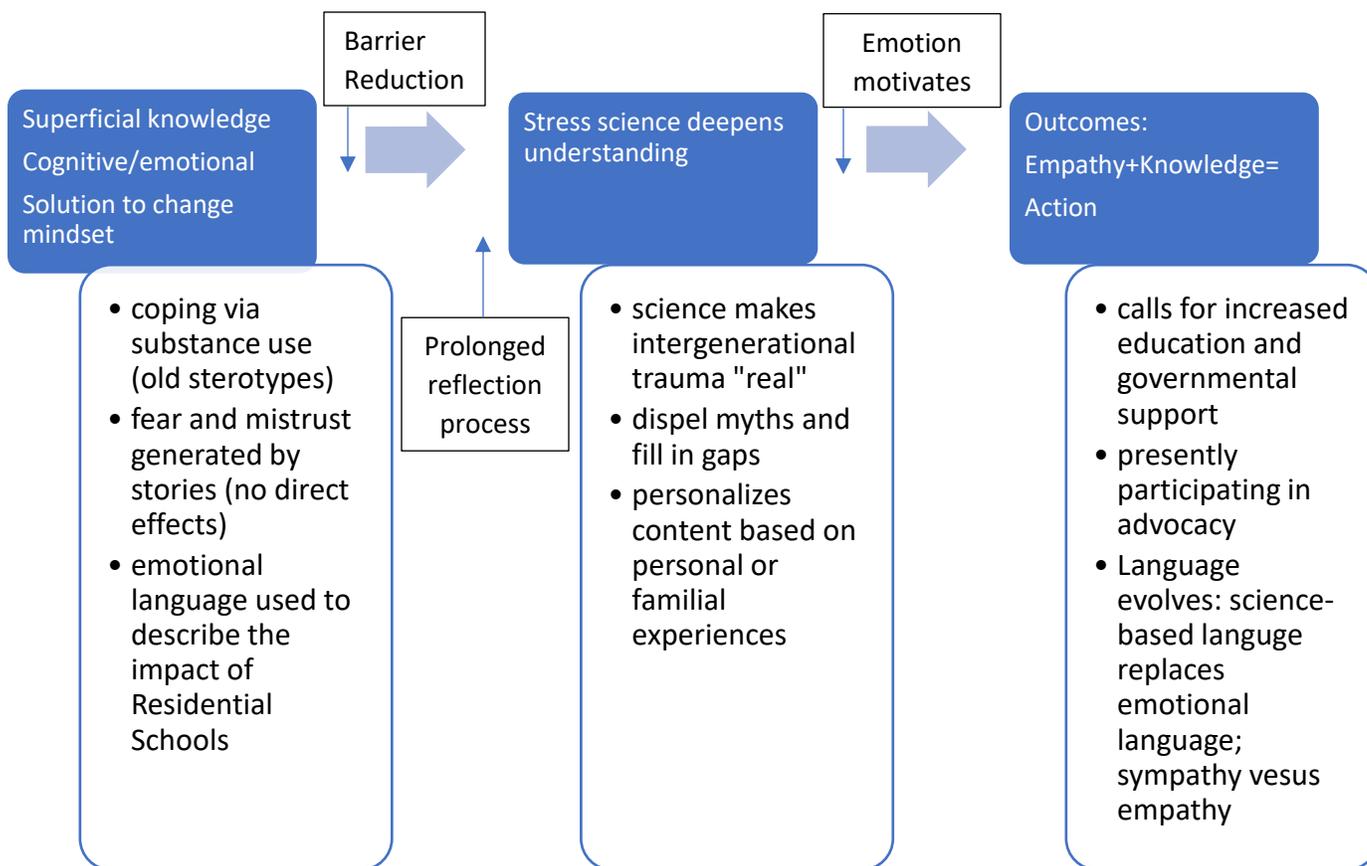
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Annexe 1: Figure 1. The journey of understanding inter-generational trauma caused by the IRSS.



Annexe 2: Figure 2. The mean difference in empathy self-reports before and after the reflection process.

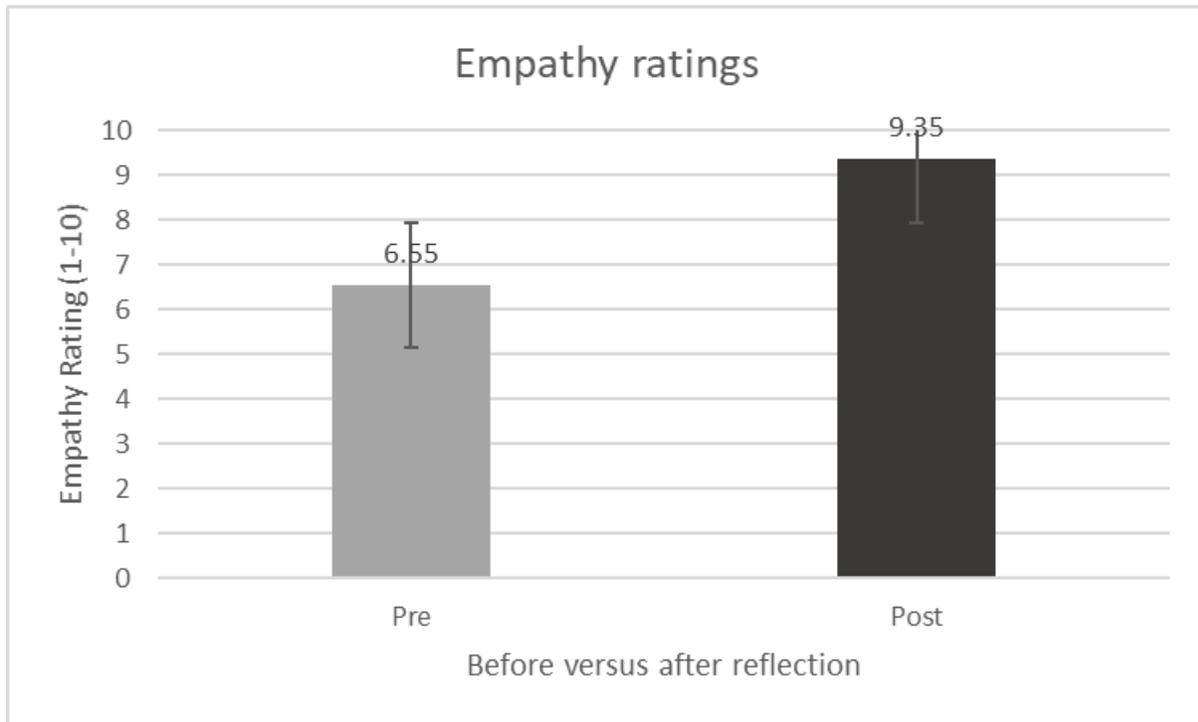


Table 1. The reflection process.

Reflection Phase	Description
1. Initial Reflection	An honest statement regarding what you know about "Indian Residential Schools" and intergenerational trauma (up to 500 words).
2. Truth and Reconciliation process	Truth: Play survivor's video. Reflect on the truth. a. Focus on emotions expressed by survivors. b. Focus on emotions you are feeling while watching.
3. Barrier Reduction	Play survivor's video again. Discuss the wisdom of elders. Listen to what elders are asking for. Discuss guilt versus walking together.
4. Unit reflections	8 Units (200 words per reflection). a) Review basic science content on stress/trauma on physiology; b) In groups, discuss/predict present impact on Indigenous people; c) Test predictions by reviewing stress/health literature with Indigenous participants.
5. Summary reflection	An in-depth reflection on how intergenerational trauma associated with residential schools impacts physiology, mental health, and disease (400-500 words).