

Investigating student perceptions and vulnerability to heat stress in campus residences using Reddit: Climate change, health, and wellbeing

Yuki Yeung  | Susan J. Elliott

Department of Geography and Environmental Management, University of Waterloo, Waterloo, Ontario, Canada

Correspondence to / Adresse de correspondance

Yuki Yeung, 200 University Ave West, Waterloo, ON N2L 3G1.
Email/Courriel: cy5yeung@uwaterloo.ca

Abstract

This exploratory research investigated the sufficiency of existing infrastructure to adapt to high temperatures and explored the perceptions of heat stress from students in on-campus residences at the U15 Group of Universities in Canada. The prevalence of air conditioning in student residences was used to estimate the adaptive capacity of existing infrastructure, and posts and comments on Reddit relevant to the perceptions of heat stress were collected in January 2023 through a query of relevant key words within each institution's subreddit. Most institutions (80%) had some residences with air conditioning. However, four main themes emerged through the thematic analysis of 409 posts and comments on Reddit: (1) complaints, (2) impacts on wellbeing, (3) adaptation strategies, and (4) climate change. The perceptions of heat stress from students suggest that existing available cooling strategies do not provide sufficient adaptation to high indoor temperatures. Recognizing student perceptions and experiences is necessary in designing and implementing future adaptation strategies to promote the health and wellbeing of postsecondary students in Canada.

KEYWORDS

climate change, indoor temperatures, perceptions, Reddit

Résumé

Cette étude exploratoire se penche sur l'efficacité des infrastructures existantes pour s'adapter aux températures élevées et analyse les perceptions du stress thermique des étudiants dans les résidences sur les campus du groupe d'universités U15 au Canada. La prévalence de la climatisation dans les résidences étudiantes a été utilisée pour estimer la capacité d'adaptation des infrastructures existantes. De plus, les messages et commentaires sur Reddit relatifs à la perception du stress thermique ont été recueillis en janvier 2023 par le biais d'une requête de mots clés dans le subreddit de chaque institution. La plupart des établissements (80%) ont des résidences climatisées. Cependant, quatre éléments principaux ont émergé de l'analyse thématique de 409

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messages et commentaires sur Reddit : (1) les plaintes, (2) les impacts sur le bien-être, (3) les stratégies d'adaptation et (4) le changement climatique. Les perceptions du stress thermique par les étudiants suggèrent que les stratégies de climatisation existantes sont insuffisantes. Il est nécessaire de tenir compte de ces informations pour concevoir et mettre en œuvre de futures stratégies d'adaptation visant à promouvoir la santé et le bien-être des étudiants de niveau postsecondaire au Canada.

MOTS CLÉS

changement climatique, températures intérieures, perceptions, Reddit

Key messages

- Extreme heat is a threat to global health and is of increasing concern, even in traditionally cold countries like Canada.
- The importance of extreme temperatures in the indoor environment is often overlooked despite its impact on health and wellbeing, and its significance in climate change adaptation.
- Postsecondary students are vulnerable to heat stress, with evidence suggesting that Canadian postsecondary students currently experience adverse impacts on wellbeing as a result of high indoor temperatures in on-campus residences.

INTRODUCTION

Canada is warming at twice the rate of the global average, with literature suggesting that many regions in Canada are projected to experience unprecedented warming despite optimal greenhouse gas reductions (Bush & Lemmen, 2019; Intergovernmental Panel on Climate Change [IPCC], 2022). Climate change is observed to have adverse impacts on human health and wellbeing. Gatrell and Elliott (2015) define health as the availability of resources that can help someone achieve their full potential. The Intergovernmental Panel on Climate Change (2022, p. 1079) recognizes this broad perspective of health that acknowledges the importance of wellbeing, which is defined as “the capacity to fulfill one's potential and fully participate in society.”

Following climate projections, heat stress, which is correlated with increased mortality, is expected to increase (Ebi et al., 2021). While mortality associated with outdoor heat stress is well established, the knowledge of indoor heat stress is underappreciated and lacking (Lundgren Kownacki et al., 2019). As people in high-income countries spend about 90% of their time indoors, the dangers of indoor temperatures are an increasingly important aspect of health and wellbeing (Uejio et al., 2016; Wierzbicka et al., 2018). In British Columbia, Canada, the heat dome event in 2021 led to a 440% increase in deaths (Henderson et al., 2022). The significance of indoor temperatures is further illustrated as most victims of heat waves are found dead within their homes (Quinn et al., 2014).

Heat waves can also increase morbidity. Data from 65 million deaths in nine countries suggest that extreme temperatures are associated with cardiorespiratory and metabolic diseases, as well as suicide and other injuries (*The Lancet*, 2021). While heat exposure does not always lead to death, a survey in nine cities in Canada found prolonged heat stress negatively impacts health and wellbeing by causing functional disorders (e.g., sleep disturbances), perpetuating existing diseases (e.g., inflammatory diseases), and promoting harmful behaviours (e.g., alcohol consumption), with heat-related morbidity projected to increase as climate change progresses (Bélanger et al., 2014, Ebi et al., 2021). Furthermore, chronic heat stress has been found to cause and perpetuate psychological disorders, and thus impact psychosocial health, which refers to psychological and social wellbeing (Alayyannur & Ramdhan, 2022; Hayes et al., 2019).

The IPCC (2022) projects a loss of economic activity in relation to extreme heat, as some regions are approaching heat conditions that limit labour productivity. Within the classroom, elevated temperatures negatively affect academic performance for primary schools, with student surveys revealing that thermal satisfaction increases when temperatures decrease from 24°C to 21°C (Montazami et al., 2017). In Australia, Humphrys et al. (2022) interviewed 16 key informants working in the fields of manufacturing, water utilities, homecare, and early childhood education. Results showed that 20% of informants reported an instance where they were unable to work due to high heat in the past year (Humphrys et al., 2022). Researchers also found workers to have experienced a loss of appetite, slower reaction times, difficulties with concentration, feelings of irritability, and reported mental deterioration (Humphrys et al., 2022).

In Canada, perceived health impacts of heat were investigated in disadvantaged neighbourhoods in Quebec, and researchers found that 46% of people reported adverse health impacts during hot summer conditions (Bélanger et al., 2014). In the Region of Waterloo, Ontario, Eady et al. (2020) interviewed seniors and found that low income, social isolation, and lack of access to cooling systems were risk factors of adverse health impacts during heat waves.

In the United States, heat-related fatalities drastically declined after 1960, with the decline associated with the accessibility of air conditioning, which has been identified as protective against heat-related health impacts (Barreca et al., 2016; Jay et al., 2021). Therefore, the existence of residential air conditioning, or lack thereof, is associated with vulnerability to heat stress. However, the diffusion of such technology will accelerate climate change, and thus, sustainable cooling strategies are necessary to adapt to future climates, which starts with the identification of vulnerable populations (Jay et al., 2021).

Postsecondary students are a vulnerable population to multiple stressors. In 2019, Canadian postsecondary students reported high levels of stress in a national survey as a result of limited finances and rising tuition, and resulting food insecurity (American College Health Association, 2019; Maynard et al., 2019). While university students may be seen as a privileged subgroup, research suggests that students are particularly vulnerable to heat stress, as the onset of common mental disorders typically occurs during adolescence, and within this developmental period the brain is extremely sensitive to stress, substance use, and sleeping problems (Jamieson et al., 2020; Roberts & Lopez-Duran, 2019; Tervo-Clemmens et al., 2020). Heat stress can perpetuate all three. The perceptions of heat stress from multiple groups have been investigated, yet none of these investigations address the perceptions of heat stress within a higher education student residence environment.

The choice of an innovative social media methodology was informed by the literature on the need for mixed methods in addressing health and wellbeing, as well as by the nature of the population under study (Hay & Cope, 2021). With respect to the latter, we know that the age group that dominates the postsecondary population is driven by the world of social media to both obtain and share news, events, and experiences (Wang, 2021). While data taken from social media are not representative of populations under study, some leading scholars argue they have greater validity than other data collection techniques such as surveys (see, e.g., Stephens-Davidowitz, 2017). While surveys and interviews have been used to understand perceived heat stress, Reddit specifically has been used to collect perception data from younger populations about, for example, mental health. Drysdale et al. (2021), for instance, investigated student mental health in higher education by examining student narratives on Reddit to identify contributing factors and potential solutions following two student suicides at a Canadian university.

This paper reports the results of an exploratory investigation on the existence of air conditioning within university residences, and the perception of heat stress from students using Reddit for the U15 Group of Canadian Research Universities, which includes Université Laval, McGill University, Université de Montréal, McMaster University, University of Ottawa, Queen's University, University of Toronto, University of Waterloo, Western University, University of Alberta, University of Calgary, University of Manitoba, University of Saskatchewan, Dalhousie University, and University of British Columbia. This study aims to address the following objectives: (1) to investigate the sufficiency of existing infrastructure in on-campus residences at Canadian universities to adapt to climate change induced heat; and (2) to explore the perceptions and experiences of heat stress from postsecondary students in on-campus residences at Canadian universities.

METHODS

The U15 universities, which consist of the 15 leading research universities across Canada, were selected for this research as they provide geographic representation as well as a parsimonious sample that represents a very large student body of around 623,220 (U15 Group of Canadian Research Universities, 2023). The data collection process occurred from January to March of 2023. Data on air conditioning prevalence were collected through each university's website for all on-campus student residences. If information was insufficient, an email was sent to the institution for confirmation. Institutions were then separated by province or region following Government of Canada (2012) guidelines. The percentage of residences with air conditioning was then identified for each institution.

Reddit is a website with subcommunities called subreddits (usually represented as "r/" followed by the name of the community), which allows users to post, comment, and vote on content with which they agree or disagree (Gozzi et al., 2020). Relevant posts and comments, collectively referred to as submissions, were searched for within each U15 university subreddit using the following keywords: "heat," "hot," "AC," "air condition," "temperature," and "sweat." Submissions with variations of keywords were also included (e.g., "air conditioning," "air conditioner," "sweaty," "sweating," and "sweats"). For bilingual subreddits, keywords were searched for in English and French, using the following keywords: "chaleur," "chaud," "clim," "AC," "climatisation," "température," "sueur." The translation of keywords was undertaken with the help of five bilingual assistants.

Following Caplan and Purser's (2019) suggested steps to using Reddit for qualitative analysis, after searching for each keyword, posts and comments were then sorted by most popular. Furthermore, posts were sorted by "All Time," which means that no timeframe was set when searching to maximize results and representation of perceptions.

Top submissions since the date of subreddit creation, which ranged from 06 May 2009 to 31 August 2011, were collected in January 2023 and copied into a Word document using the "copy and paste" approach as suggested by Caplan and Purser (2019). Two documents were created for each institution to capture results for both posts and comments. Submissions were only collected if they contained a keyword and discussed indoor temperatures of on-campus residences. During data collection, usernames were removed to anonymize Redditors.

All collected data were then filtered for irrelevant mentions through line-by-line reading. Submissions were included if they had information related to indoor temperature experiences in residences. Submissions discussing the availability and functionality of air conditioning in residence were excluded. For example, there were many posts from first-year students with inquiries about the availability of air conditioning, which were all excluded as they were just factual points of information, and not a reflection of the ambient indoor environment. Furthermore, submissions with “/s,” which is Reddit slang to denote sarcasm, were excluded to only include serious submissions. In total, 74 posts and 335 comments were selected from the 15 subreddits for analysis.

For this research, the qualitative data analysis process was guided by grounded theory, which represents an inductive method of deriving theory from data (Glaser & Strauss, 1967). Thematic analysis is a theoretically flexible method that narrates data sets in rich detail through reporting themes (Braun & Clarke, 2006). Following Braun & Clarke's (2006) guidelines to thematic analysis, initial codes were generated through line-by-line reading, and interesting or repeated mentions relevant to the experiences of heat stress within residences were documented. Themes were then generated from the initial codes and the data set was reread to search for the identified themes. As guided by grounded theory, once features of the data (themes) have been compiled, they can be used to hypothesize relationships and provide descriptions of the social phenomena relevant to the research topic (Martin & Turner, 1986).

It is important to note that themes capture an important aspect of the data in relation to the research question, and prevalence does not equate to cruciality; thus, themes and their prevalence can be flexible to the research (Braun & Clarke, 2006). For this research, the prevalence of each theme was counted throughout the data set, the method chosen to demonstrate sufficient evidence of themes as required by Braun and Clarke (2006).

RESULTS

Air conditioning in residences

The Ontario institutions had the highest average percentage of air conditioning of the U15 institutions at 59.7%, while the Atlantic region had the lowest at 9.1%. Within Ontario, the percentages of on-campus residences with air conditioning ranged from 31.3% (Queen's University) to 87.5% (University of Ottawa). Quebec was found to have the highest range from 0.0% (Université Laval) to 100.0% (Université de Montréal). The Prairie provinces had the lowest range of 0.0% (University of Alberta and University of Calgary) to 33.3% (University of Manitoba). The Atlantic and West Coast regions, which only consist of one institution per region, had a prevalence of 9.1% (Dalhousie University) and 19.1% (University of British Columbia) respectively. In total, 80.0% of all institutions reported some residences having air conditioning.

Themes

Four major themes emerged through the 409 submissions collected from the U15 subreddits, each having several subthemes (Table 1).

Theme 1. Complaints (Table 2)

Mentions of room being too hot

The Ontario institutions had the most results under this subtheme, followed by the West Coast institution. The existence of high temperatures within residence rooms was evident as this subtheme had the most mentions across all regions:

Had to sleep in only t-shirts and a thin bed sheet because it was so f----- hot. (West Coast)

If it's 30°C outside, it's 30°C inside. (Prairie provinces)

Rooms are 93 degrees AND a ton of people still have online classes. (Quebec)

Others noted that this is only a problem in the summer and fall terms:

They do get extremely hot during August/beginning of September when you first come here because there is no AC, but it gets better after it starts getting cooler. (Prairie provinces)

However, another Redditor described that high temperatures were always present:

When I lived in (Institute Residence) it was never cold, always hot no matter the time of the year haha. (Prairie provinces)

TABLE 1 Themes and subthemes related to heat stress in residences.

Themes (# of mentions)	Subthemes (# of mentions)
Complaints (174)	Mentions of room being too hot (124)
	Mentions of "sweating," "sweaty," or "sweat" (10)
	Broken thermostat with no effect on temperature (8)
	Windows unable to be opened (7)
	Dissatisfaction towards institution (25)
Impacts on wellbeing (48)	Problems with sleep (17)
	Mentions of dying or killing (13)
	Covid-19 concerns (3)
	Academic concerns (2)
	Other health and wellbeing concerns (13)
Adaptation strategies (185)	Purchase or use of portable AC (17)
	Recommendations to purchase or use portable AC (27)
	Purchase or use of a fan (31)
	Recommendations to purchase or use a fan (75)
	Need for public cooling areas (11)
	Informal cooling strategies (24)
Climate change (29)	Acknowledgement of climate change-induced heat (8)
	Heatwave (21)

Mentions of "sweating," "sweaty," or "sweat"

Most results for this subtheme were found in the Ontario institutions, followed by the West Coast institution. Commenters complained about how the lack of air conditioning was causing them to sweat in their rooms:

I was just sweating in my non-air-conditioned room which faced a tree so I constantly had beetles on my windowsill. (Ontario)

It is 30 degrees inside my (Institute Residence). I can't even stand up without sweating. (West Coast)

Broken thermostat with no effect on temperature

Results emerged from institutions in Ontario, the Prairie provinces, and the West Coast region under this subtheme, with commenters discussing a lack of temperature control:

I was in (Institute Residence) which technically had climate control, but all you could do was change the number with no actual impact on temperature. (Ontario)

The thermostats are basically fancy wall décor. (Prairie provinces)

Windows unable to be opened

Results for this subtheme were found in institutions in Ontario, the Prairie provinces, and the West Coast region. Students complained about being unable to open their windows enough for sufficient air flow or for portable air conditioning installation, which some Redditors referred to as "suicide windows":

The windows only open an inch and heat illness is a real thing. (Ontario)

Brings back my memory when I lived in (Institute Residence) during summer where there is no AC and they limit how much you can open the window which makes the room feel like a baking oven. (Ontario)

TABLE 2 Number of mentions of each subtheme under the theme of complaints.

Theme: Complaints	
Region	# of mentions
Quebec	7
Ontario	89
Prairie provinces	19
Atlantic region	3
West Coast	58
Mentions of room being too hot	
Quebec	5
Ontario	67
Prairie provinces	15
Atlantic region	3
West Coast	35
Mentions of "sweating," "sweaty," or "sweat"	
Quebec	0
Ontario	6
Prairie provinces	0
Atlantic region	0
West Coast	4
Broken thermostat with no effect on temperature	
Quebec	0
Ontario	3
Prairie provinces	4
Atlantic region	0
West Coast	1
Windows unable to be opened	
Quebec	0
Ontario	5
Prairie provinces	1
Atlantic region	0
West Coast	1
Dissatisfaction towards institution	
Quebec	2
Ontario	6
Prairie provinces	0
Atlantic region	0
West Coast	17

Dissatisfaction towards institution

This subtheme emerged in Ontario and Quebec, and had the most mentions in the West Coast region, with commenters describing their frustration towards their respective institution:

Imagine having to live in (Institute Residence) with no AC AND having to deal with a COVID outbreak, all for the low low price of \$1,200 of rent a month. Not predatory towards students at all. (Ontario)

The (Institute Residence) authority should have done something about this sweltering heat. (Quebec)

While there were seven results combined in Ontario and Quebec, the West Coast had 17 results under this subtheme. The West Coast institution experienced a heatwave in 2021, and the institution released infographics on Instagram detailing the impacts of heatwaves. One Redditor responded:

Am I the only one who finds it kind of tone-deaf of (Institution) official IG to post these infographics when most students in rez don't have access to AC? (West Coast)

Others commented:

It's just pretty rich to see (Institution) officially share content that explicitly talks about the negative cognitive impacts of heatwaves on students living in unairconditioned dorms ... after years of students (...) raising this with (Institution Student Housing Center) and being completely dismissed, so much so that the newest and future buildings still don't incorporate AC (despite rising prevalence of heatwaves in the past few years!). (West Coast)

For real though, if someone dies from the heat in res (knock on wood), I wonder if (Institution) would finally start installing AC's in dorms. (West Coast)

In 2022, the same institution sent out an email to students advising them to prepare for extreme heat. Redditors responded:

(Institution) housing telling us to prepare for extreme heat because air conditioning is not common, even though not adding AC is a choice they made.(West Coast)

Yeah this is all f----- we shouldn't have to demand (Institution) upgrade its buildings so that they're livable. So many people on this thread downplaying the heatwave when hundreds of people died, many more got sick, and countless animals died. The climate in Vancouver has changed and AC is absolutely a necessity now for summer housing. (West Coast)

Additionally, Redditors discussed dissatisfaction about future directions with the institution:

Many of the older units (...) were built without cooling, and even more recent builds like (Institute Residence), which was completed in 2019, traded away A/C's to obtain a (glaringly awkward) LEED Gold certification. (West Coast)

In the same institution, some Redditors made jokes about a staff member:

I recommend putting mirrors in your residence window and aim it so the sunlight gets reflected towards (Institute Staff Member's) office window, and that will remind him the importance of air conditioning. (West Coast)

Theme 2. Impacts on wellbeing (Table 3)

Problems with sleep

Mentions of sleep disturbances emerged from institutions in Ontario, the Prairie provinces, and the West Coast:

Beginning of fall term couldn't sleep because it was so hot. (Ontario)

I'm on the top floor and everything in my room is just pure heat. First day of classes and I'm not going to get any sleep I guess better the first day than before a midterm. (Prairie provinces)

Consecutive nights of sustained ~30-degree temperatures are ruining my ability to sleep. (West Coast)

Mentions of dying or killing

Some Redditors use the terms of "dying" or "killing" when discussing the impacts of heat. Institutions in Ontario, Quebec, the Prairie provinces, and the West Coast region had submissions which used these statements to describe the impacts of heat within residence rooms:

TABLE 3 Number of mentions of each subtheme under the theme of impacts on wellbeing.

Theme: Impacts on wellbeing	
Region	# of mentions
Quebec	1
Ontario	14
Prairie provinces	3
Atlantic region	0
West Coast	28
Problems with sleep	
Quebec	0
Ontario	8
Prairie provinces	2
Atlantic region	0
West Coast	7
Mentions of dying or killing	
Quebec	1
Ontario	3
Prairie provinces	1
Atlantic region	0
West Coast	8
COVID-19 concerns	
Quebec	0
Ontario	2
Prairie provinces	0
Atlantic region	0
West Coast	1
Other health and wellbeing concerns	
Quebec	0
Ontario	1
Prairie provinces	0
Atlantic region	0
West Coast	12

The heat in residence is killing me. (Ontario)

I'm dying out here in (Institute Residence), my little alarm clock got a little temperature gauge. Today my room hit 30 degrees.
Imma die this weekend. Farewell. (West Coast)

COVID-19 concerns

COVID-19 concerns emerged from the Ontario and West Coast institutions' subreddits. This subtheme includes any mentions of COVID-19 in the context of high temperatures within residences. One commenter discussed the benefits of air conditioning for COVID-19:

They don't have AC? I thought they did lmaoo damn. Isn't ventilation better for covid too ahaha. (Ontario)

Another commenter reported experiencing issues with heat during quarantine:

Remind me of last year where I had to quarantine at (Institute Residence) with no AC with the 2 weeks of heatwave. Definitely not fun. I drenched my towels in water to put over my body as a way to cool down. (West Coast)

Academic concerns

Results emerged under this subtheme in the institutions in the Prairie provinces and in the West Coast institution. Commenters expressed concerns with writing tests due to the inability to sleep:

It only dips there into 27° in the nights. Is it just going to stay like this for the rest of the Fall? (Institution) I can't do my tests if I'm falling asleep at 4:30AM sweating. (West Coast)

Other health and wellbeing concerns

Other concerns related to health and wellbeing also emerged within the Ontario and West Coast institutions' subreddits:

This heat is honestly making me so lazy and unmotivated. (West Coast)

Other commenters reported difficulty breathing, inability to think, and one commenter directly stating that students are suffering “mentally and physically,” with the lack of air conditioning affecting “their social/academic/emotional wellbeing.” Others noted:

I literally cannot function in this with heat-triggered health conditions. At least the ER would have air conditioning, I guess. (West Coast)

Some students have health conditions that make them highly sensitive to heat. (West Coast)

Theme 3. Adaptation Strategies (Table 4)

Purchase or use of portable air conditioning

Results emerged for this subtheme from institutions in Ontario, the Prairie provinces, and the West Coast. This subtheme includes any mentions of purchasing or using portable air conditioning in response to uncomfortable temperatures:

My portable AC is the best \$500 I ever spent. (West Coast)

I bought a portable AC off Facebook marketplace for \$85. It's the only reason why I haven't peeled my skin off. (West Coast)

Recommendations to purchase or use portable air conditioning

Many Redditors recommended that others purchase portable air conditioning to cope with the heat. Recommendations were identified in institutions in Ontario, the Prairie provinces, and the West Coast region. Many commenters had direct recommendations:

Buy a portable air conditioner or suffer. (West Coast)

Order portable AC RIGHT NOW. (West Coast)

Furthermore, Redditors discussed difficulties with purchasing portable air conditioning:

Buy a portable AC before it becomes worse. It will all sell out and u will die. (West Coast)

Purchase or use of a fan

Using fans was a commonly mentioned cooling strategy, with results found in Quebec, Ontario, and the West Coast institutions. This subtheme includes discussions on the purchase or use of a fan to cope with heat:

I bought a small fan for \$12 at Walmart. (Quebec)

The only thing saving us are fans. (Ontario)

TABLE 4 Number of mentions of each subtheme under the theme of adaptation strategies.

Theme: Adaptation strategies	
Region	# of mentions
Quebec	4
Ontario	82
Prairie provinces	10
Atlantic region	3
West Coast	86
Purchase or use of portable AC	
Quebec	0
Ontario	2
Prairie provinces	1
Atlantic region	0
West Coast	14
Recommendations to purchase or use portable AC	
Quebec	0
Ontario	7
Prairie provinces	2
Atlantic region	0
West Coast	18
Purchase or use of a fan	
Quebec	2
Ontario	17
Prairie provinces	0
Atlantic region	0
West Coast	12
Recommendations to purchase or use a fan	
Quebec	2
Ontario	52
Prairie provinces	6
Atlantic region	3
West Coast	12
Need for public cooling areas	
Quebec	0
Ontario	1
Prairie provinces	1
Atlantic region	0
West Coast	9
Informal cooling strategies	
Quebec	0
Ontario	3

(Continues)

TABLE 4 (Continued)

Theme: Adaptation strategies	
Region	# of mentions
Prairie provinces	0
Atlantic region	0
West Coast	21

Other Redditors claimed that fans do not help with cooling:

I got 3 fans going, but the heat doesn't seem to go away. (West Coast)

I am stuck with only a small desk fan for airflow which lamely just blows hot air around. (West Coast)

Recommendations to purchase or use a fan

Some commenters recommended that others should purchase or use fans. This subtheme had the most mentions within the theme of adaptation strategies and had results in every region. Many Redditors simply stated that they “highly recommend box fans,” and to “make sure you have a fan for summer months cause it gets hot as f---.” There was also discussion about the placement of fans to maximize cooling:

Put a fan blowing from the windows at night, so the cool air from the outside can flow in. (West Coast)

If u have a fan, set up the fan with the back pointing to the outside, and have it blow into ur room. (West Coast)

Need for public cooling areas

Results under this subtheme consists of submissions where Redditors discuss the need for public cooling areas due to high temperatures within their residence bedrooms. This subtheme had results in Ontario, the Prairie provinces, and the West Coast. Many Redditors recommended that others leave their rooms:

Go hang at grocery stores, public libraries, or any public space honestly ... going to the theatre is a really fun way to pass time and beat the heat. (West Coast)

Other Redditors discussed the need for cooling areas within the campus:

Hopefully (Institution) can make (Institution Buildings)/other air-conditioned spaces into cooling zones or something? (West Coast)

Some Redditors made posts looking for places to take refuge from the heat, commenters asked for buildings that were “open 24/7” where they could “bring a sleeping bag and crash,” and for an “air-conditioned building open on Saturdays into the evening.” There were also discussions of personal experiences with students leaving their residences due to the heat. One Redditor reported spending “the day at the beach” to take refuge from their residence rooms.

Informal cooling strategies

This subtheme had mentions from Ontario and the West Coast institutions and includes submissions that discuss informal strategies to cool residence rooms. In Ontario, informal cooling strategies included running the shower, sleeping only in shorts and a tank top, and purchasing a black-out curtain. In the West Coast subreddit, Redditors mentioned strategies like spraying water on themselves, “cold showers every hour,” and sleeping with a cold towel and ice packs. Many commenters created lists of informal cooling strategies:

Tip 1. Multiple fans. Put them everywhere. Like two in your bedroom is ideal, one circulating and one placed directly at you, with a bowl of ice water on a table in front of it or a cold damp cloth hanging over it.

Tip 2. Tinfoil on windows, reflects sunlight away instead of trapping it inside. This helps immensely if you have a lot of windows.

Tip 3. Buy a personal mister or spray bottle.

Tip 4. Wear lightweight, breathable clothes, like bedsheets light ideally.

Tip 5. Frozen damp towel around your neck will do wonders.

Tip 6. Drink ice water and/or have frozen treats constantly.

Tip 7. Last but not least! Do jumping jacks until you pass out from heat exhaustion causing you to hallucinate the sun goddess. Use this chance to beg her for forgiveness. (West Coast)

Theme 4. Climate change (Table 5)

Acknowledgement of climate change

Mentions emerged for this subtheme from institutions in Ontario, the Prairie provinces, and the West Coast region. This subtheme includes discussions related to climate change:

They turn off the AC after Sept 21 (cause "fall") even though global warming has heat waves until mid-October, and they don't turn it back on until April. (Ontario)

I don't think you have to worry about extreme heat in the fall, in a few years, sure. (Prairie provinces)

Some commenters argued that air conditioning is a necessity:

TABLE 5 Number of mentions of each subtheme under the theme of climate change.

Theme: Climate change	
Region	# of mentions
Quebec	0
Ontario	4
Prairie provinces	1
Atlantic region	0
West Coast	24
Acknowledgement of climate change	
Quebec	0
Ontario	1
Prairie provinces	1
Atlantic region	0
West Coast	6
Mentions of heatwave	
Quebec	0
Ontario	3
Prairie provinces	0
Atlantic region	0
West Coast	18

Climate change would disagree, it's only gonna get worse the following years. AC is slowly becoming a necessity in Vancouver. (West Coast)

While others discussed the sustainability of air conditioning usage:

AC contributes both to urban heat island effects and to climate change overall. (West Coast)

Mentions of heatwave

Most mentions of this subtheme were from the West Coast institution, followed by the Ontario institutions. Many Redditors discussed the impacts of heatwaves and relevant adaptation strategies:

Honestly, especially given this heat wave, it'd be incredibly petty for Housing to cause a problem over this. AC literally saves lives. Do what you need to do. (West Coast)

People who have lived through a heat wave while in res, how did you do it? I need any help I can get. (West Coast)

While some Redditors acknowledged the increase in frequency of heatwaves due to climate change, some commenters argued that heatwaves are "a rare occurrence":

The heatwave isn't really a major issue for young people who are otherwise healthy. Sorry, it just isn't. (West Coast)

Were you here during the heatwave last summer where temps reached high 40s????????? wtf are people on in that thread hundreds of people died from heat in Vancouver last summer. (West Coast)

Many Redditors argued about the need for air conditioning within residences, and whether heatwaves are dangerous for young people, with comments stating that it is unrealistic to expect air conditioning within residences.

DISCUSSION

This research used Reddit to investigate perceptions of heat stress in residences at the U15 group of universities. While most universities have some residences with air conditioning, 80% of the universities had complaints of high temperatures, with every region, except for the Atlantic region, reporting adverse impacts on wellbeing. It is important to note that institutions usually turn off or switch between air conditioning and heat, which explains the complaints within residences with air conditioning. Some areas in Canada have started to implement mandates for air conditioning. In Vancouver, all newly built multi-family homes will require mechanical cooling starting in 2025 (City of Vancouver, 2002). While this mandate and the 174 heat-related complaints found in this research may support the implementation of air conditioning, less energy intensive cooling strategies are needed. Previous research on adaptation to extreme heat has described potential sustainable cooling strategies at the urban (e.g., shading infrastructure), building (e.g., insulation), and individual (e.g., electric fans) scales (Jay et al., 2021). However, almost all the potential cooling strategies listed for the individual scale were mentioned by students on Reddit. These results suggest that the existing infrastructure does not provide adequate air conditioning, and the existing cooling strategies are insufficient. Further research can explore the adaptation strategies which can be implemented by Canadian institutions to promote student wellbeing.

The themes that emerged within this research align with adverse health impacts found in previous research. First, sleep disturbances emerged as a subtheme. Previous research found sleep problems to be significantly associated with perceived temperature (Quinn & Shaman, 2017). This research also found mentions of academic concerns, which align with the negative impacts of heat on academic performance in elementary schools (Porras-Salazar et al., 2018). Previous research found high heat to be associated with fatigue, difficulty with concentration, and overall decreased workplace productivity (Humphrys et al., 2022), which were all symptoms mentioned by students on Reddit. Redditors from the West Coast institution discussed heatwaves, with some Redditors stating that heatwaves are rare and harmless to young people, while others argued that heat waves can lead to death. These perceptions align with results from an examination of the 2009 heatwave in Vancouver, where Stewart et al. (2017) found residents to under-estimate their vulnerability due to the rarity of heatwaves. These findings underscore heat stress as a problem for Canadian postsecondary students; perceived impacts on wellbeing align with previous research on the impacts of heat stress on other studied populations.

These findings have policy implications, as the results suggest that an adaptation gap exists. As suggested by data collected from nine countries, the inability to adapt to extreme heat can lead to cardiorespiratory and metabolic diseases, as well as suicide and other injuries (*The*

Lancet, 2021). In the Canadian context, hot summer conditions can have adverse impacts on physical or mental health by perpetuating functional disorders and unhealthy coping mechanisms (Bélanger et al., 2014). These adverse impacts are concerning as adolescents and young adults are particularly vulnerable to the onset of substance use and other mental health disorders (Solmi et al., 2022), furthering the need to address the identified adaptation gap.

Furthermore, these findings suggest that institutions need to address this gap to prepare for climate change-induced heat. The need for public cooling areas was identified as some students asked for air-conditioned areas where they could sleep in comfort, while others stated that they had already been sleeping elsewhere to cope with the heat. While there may be difficulties with air conditioning in dorm rooms, there is a need for public cooling areas offered by postsecondary institutions. Moreover postsecondary institutions must be cognizant of the impacts of heat stress on the health and wellbeing of their student population and address these issues in relevant policy and practice decisions.

The findings from this research suggest that students feel that their wellbeing is overlooked. Students from the West Coast argued that the institution was “tone-deaf” in its choice of heatwave adaptation strategies and expressed disappointment about how heat-related issues raised by students were dismissed. Students also expressed dissatisfaction with existing residence-related institution policies (e.g., windows which do not fully open). One student complained about high indoor temperatures when quarantining, which limits their capacity to cope with the heat as they cannot seek out other cooling locations. These results suggest that there is a need for new residence policies to promote student wellbeing.

There are limitations to this research. As in most research, we took a sample of postsecondary institutions in Canada representing the U15. While it is not possible to extrapolate from this sample to the entire population of postsecondary institutions in Canada, these findings do have policy and practice implications for senior administrators. Furthermore, at the time of analysis, when searching in Reddit, there were six options when sorting by time: (1) Past Hour, (2) Past 24 h, (3) Past Week, (4) Past Month, (5) Past Year, and (6) All Time. Further research can employ the use of Reddit's application programming interface or collect data immediately after a high heat event. Furthermore, since Redditors are anonymous, user demographics cannot be identified, and therefore it is impossible to confirm if users are actually students. This research is a first step towards addressing indoor heat stress for the postsecondary population in Canada and encouraging future research using larger sample sizes and mixed methods to understand further the impact of this climate change issue on student health, wellbeing, and academic performance.

This research provides information on heat-related impacts on postsecondary students in Canada. The results contributed to identifying the individual adaptation strategies (e.g., portable air conditioning and informal cooling strategies) that students currently use to cope with high temperatures. This research extends existing knowledge and begins to fill the gap on perceptions of heat stress in an indoor postsecondary environment.

ACKNOWLEDGEMENTS

We would like to thank Vicky Chen, Justin Krivov, Hana Hopson, Areeba Hasan, and Han Wu for assisting us with the translation of English keywords to French.

ORCID

Yuki Yeung  <http://orcid.org/0009-0005-5979-142X>

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

How to cite this article: Yeung, Y., & Elliott, S. J. (2024). Investigating student perceptions and vulnerability to heat stress in campus residences using Reddit: Climate change, health, and wellbeing. *Canadian Geographies / Géographies canadiennes*, 68, 394–409.
<https://doi.org/10.1111/cag.12912>