Weather Impact in Mental Well-Being on Canadian and Latin American Students Living in Canada

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INTRODUCTION

Severe weather conditions, especially during challenging seasons such as winter, wield an influence on the emotional well-being of individuals. This impact can become more pronounced when considering international students from Latin America. These students often come from regions characterized by distinctly warm climates and seasons. The transition to Canada's weather presents a unique challenge for these students and can have the potential to exert a more substantial impact on their mental health as they navigate life in a new country. Therefore, understanding and addressing this intersection between weather and emotional well-being is crucial for providing effective support to this specific demographic during their stay in Canada.

The intricate interplay between weather and mental health has been a subject of considerable exploration in various articles. Liu et al. (2021) showed a relationship between mental well-being and extreme weather in people living in tropical and subtropical areas, where the hot temperatures had a negative impact on people's mental health. Also, in a research performed in a large Dutch general population sample it was found that participants had significantly higher positive scores during warmer seasons compared to colder seasons. (Winthorst et al., 2020). In line with this, the purpose of this research is to compare and analyze the impact of weather on the mental well-being of international Latin American students and domestic Canadian students. We are aiming to determine if seasonal changes have a higher impact on international students' moods than domestic students.

The results we would expect for this study are that Latin American students have a lower mood especially during winter, due to the contrast in weather of their home country. Whereas Canadian students may be used to this type of weather and because they live in a familiar place, it is expected that this extreme weather has a lower impact on their mental well-being. Additionally, to further understand the

relationship between weather and mental well-being, we will study the impact weather has on the overall well-being of all students.

METHODS

Collected Data

We decided to quantify the mood on a scale from 1 to 5, 1 being very sad and 5 being very happy. During the research a Google form consisting of a digital form with a series of questions was provided to Latin American and Canadian students, either electronically or in person, to collect data. The form provided contained the following questions:

1. Are you an international or domestic student?
2. Which Country are you from? (Insert country)
3. On a scale from 1 to 5 how would you rate your mood this past summer? (1 being very sad and 5 being very happy)
4. On a scale from 1 to 5 how would you rate your mood this past winter? (1 being very sad and 5 being very happy)
5. Do you think weather has an impact on your mood? (yes or no)
6. Do you prefer cold or hot weather?

The answers were transferred into a table where the statistical tests were performed to analyse the data.

Analysed Data

The research had a total of 29 participants, 11 domestic students and 18 international students from different Latin American countries. In order to visualise the responses for the question a series of graphs were plotted comparing the results of international and domestic students and their mood during summer and winter. Furthermore, a two sample student t-test was performed to determine if there is a statistical difference between the moods per season between international and domestic students, as well as a paired student t-test to determine if there was any overall fluctuation in the mood between seasons.

RESULTS

The results show no significant difference in mood scores between domestic and international students during the winter season ($t_{25} = 0.0349,\ P = 0.730,\ Fig1$). However, in the boxplot of Figure 1 and in the winter histogram (Fig 3) it can be appreciated that Latin American students had more variability between their moods for the winter season, whereas, domestic students had a low mood overall.

On the other hand, there is a small difference in mood between Latin American and Canadian students during the summer ($t_{26} = 4.532,\ P = 0.000113,\ Fig1$), being the international students group the ones with a higher mood score again (Fig 2). This implies that factors influencing mood may vary more distinctly between domestic and international students in warmer months.

Nevertheless, the results show that season does affect the mood of the students overall ($t_{28} = 4.89,\ P < 0.0001$) with students being generally happier during the summer season.

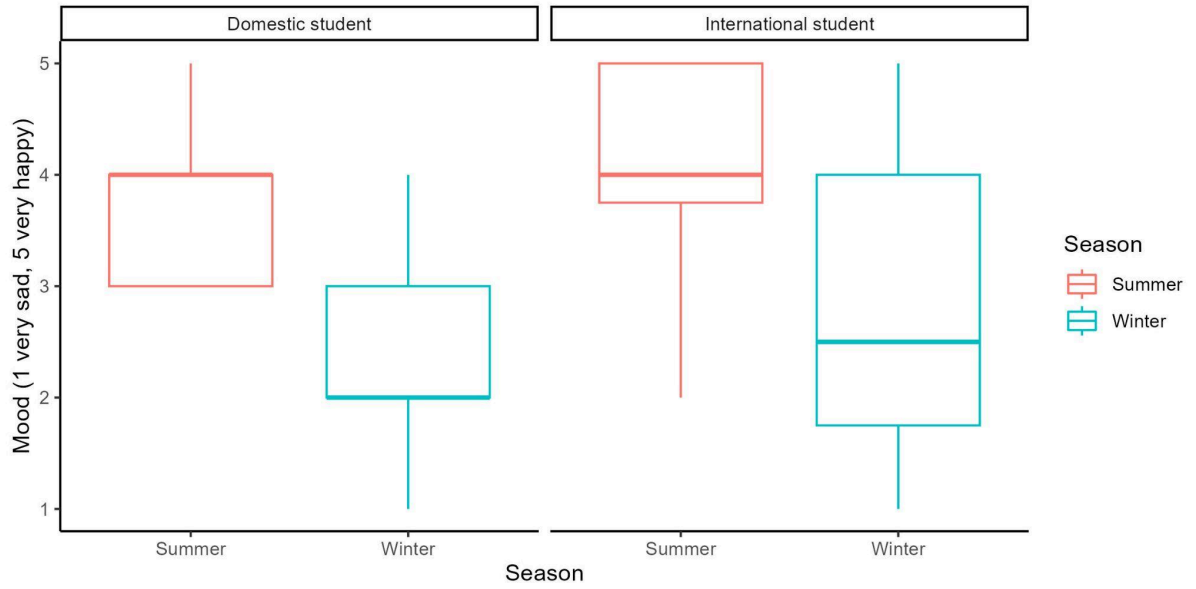

Fig 1. Box plot of the difference in mood among students during summer and winter. Both Latin American (n=18) and domestic students (n=11) were asked the same question about their mood during this past summer and winter . The box plot visualizes the differences among the moods of these two groups, blue for winter and red for summer.

Based on a mood scale rate from 1 to 5, 1 being very, 2 sad, 3 neutral , 4 happy and 5 very happy.

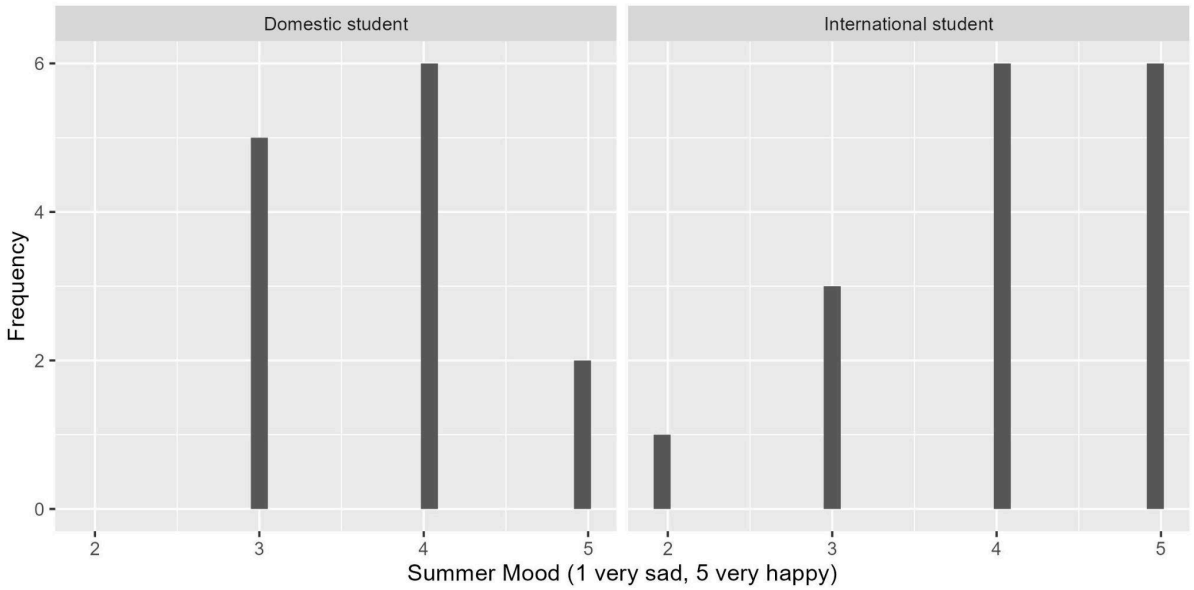

Fig 2. Latin American students have a happier mood during the summer than domestic students. The histogram is showing the distribution of answers for the mood during summer of domestic (n=11) and latin american students (n=18). Based on a mood scale rate from 1 to 5, 1 being very, 2 sad, 3 neutral , 4 happy and 5 very happy.

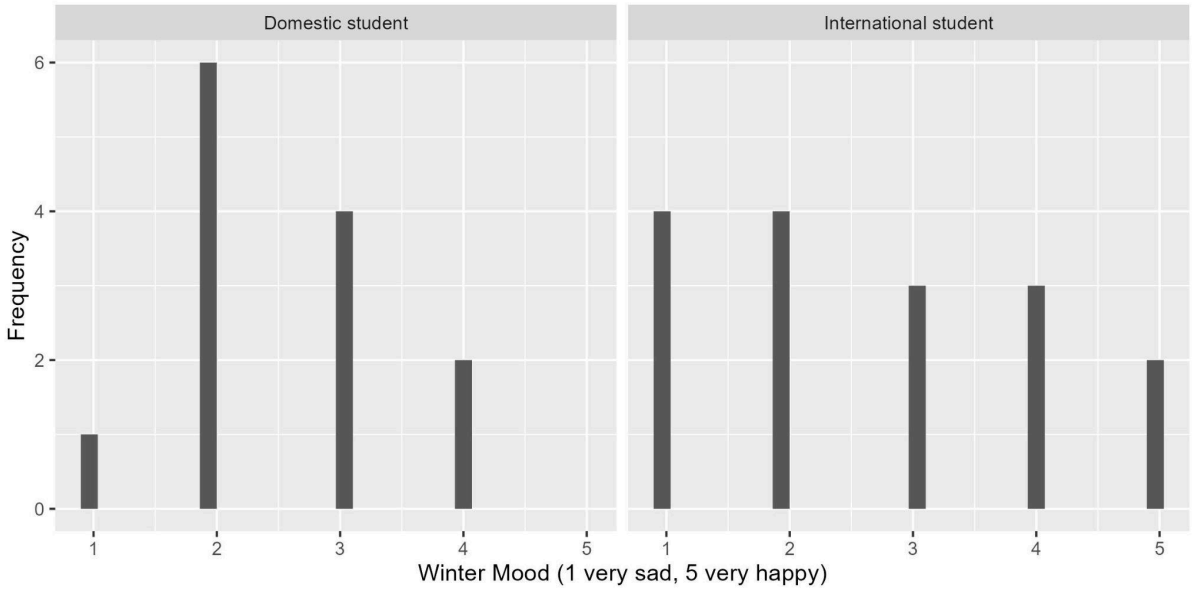

Fig 3. Domestic students have a sadder mood during winter, whereas Latin American students' mood is very diverse. The histogram is showing the distribution of answers for

the mood during winter of domestic (n=11) and Latin American students (n=18).Based on a mood scale rate from 1 to 5, 1 being very, 2 sad, 3 neutral , 4 happy and 5 very happy.

To further show the effect season and weather has on students and the differences between the experience of Latin American and Canadian students. We asked for their opinion, if they think weather can affect their mood. The frequency of the responses were plotted in a bar plot (Fig 4). The results show that all Canadian students feel that the weather can affect their mood, whereas, even if most of the Latin American students agree, some feel that their mood is independent of the weather.

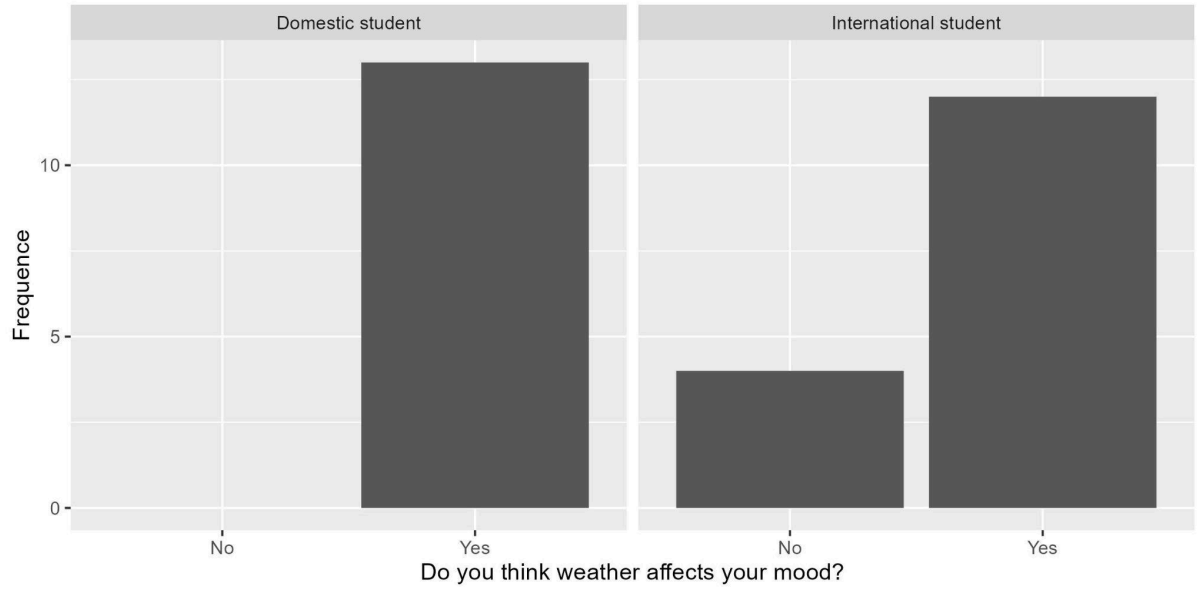

Fig 4. Domestic students and most Latin American students think that weather has an impact on their mood. The bar plot is showing the frequency of answers for student's personal opinions on how the weather has an impact on their mood (domestic students n=11, Latin American students n=18)

Finally, we ask them their weather preference, also to further show the different impact weather can have. The responses were also plotted in a bar plot (Fig 5). The results showed no significant difference in preference between groups of students, as well as not a big difference between cold or hot weather preference.

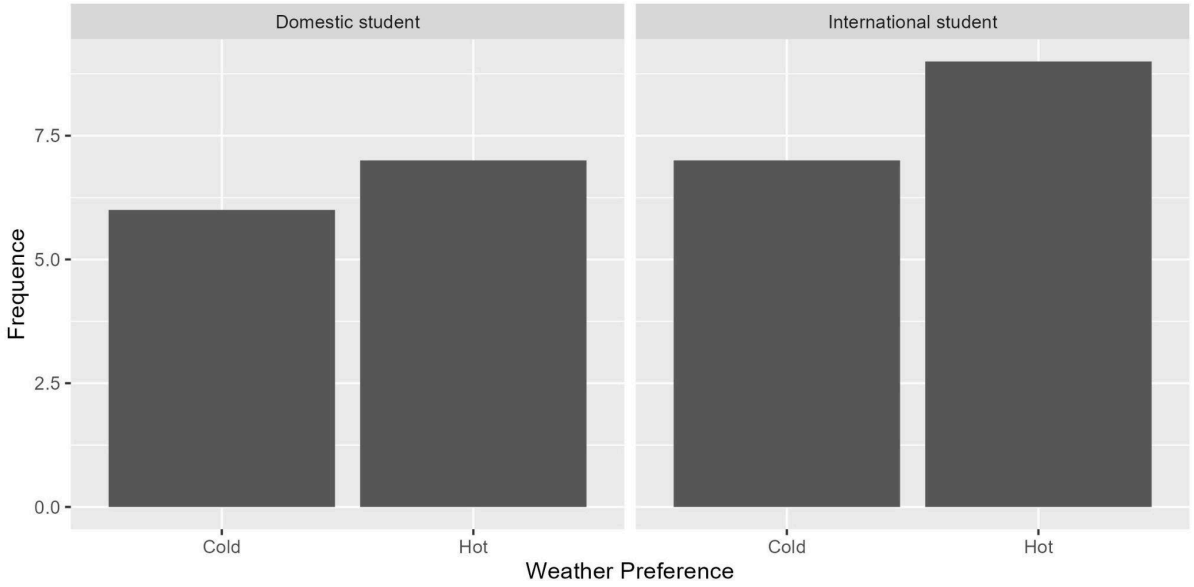

Fig 5. Weather preference does not diverge among groups. The bar plot is showing the weather preferences of domestic (n=11) and Latin American students (n=18). Even if there is a small preference towards the hot weather for both groups it is not significant enough to take it into consideration as a confounding variable.

DISCUSSION

The findings of this study show a relationship between weather conditions, particularly seasonal changes, and the emotional well-being of international Latin American students compared to domestic Canadian students. Understanding these dynamics is crucial for providing targeted support to individuals facing the challenges of adapting to new climates, especially during the demanding winter seasons. These results align with the expected from previous cite research where participants tend to experience overall happier moods during warmer seasons compared to colder seasons.

The lack of a significant difference in mood scores between domestic and international students during the winter season (Fig 1) is an interesting observation. However, the increased variability in mood among Latin American students during winter, as evident in the box plot (Fig 1) and winter histogram (Fig 3), suggests that the impact of colder weather might be more individualised for this group. This could be attributed to varying levels of adaptation to winter conditions among international students, influenced by factors such as their length of stay in Canada or prior

exposure to colder climates; this could also be intriguing for some due to being their first time experiencing Canadian winter.

Conversely, the notable difference in mood between Latin American and Canadian students during the summer season (Fig 2) underscores the influence of weather on emotional well-being. The international students, coming from regions with predominantly warm climates, exhibit higher mood scores during warmer months. This emphasises the potential challenge of adapting to the Canadian summer for those accustomed to milder temperatures as warmer months are shorter than colder months in Kamloops.

The overall impact of seasonality on students' mood is highlighted by the significant difference in mood scores across all participants (Fig 1). The general trend of increased happiness during the summer aligns with existing research showing a positive correlation between warmer weather and improved mental well-being (Liu et al., 2021; Winthorst et al., 2020).

This study prompts considerations for support systems, particularly during challenging seasons, for international students facing climate transitions. Universities could implement targeted mental health resources and cultural integration programs to assist these students in adapting to new weather conditions. Additionally, the findings emphasize the need for a holistic approach to mental health that recognizes the impact of environmental factors, such as weather, on emotional well-being.

In conclusion, the study provides valuable insights into the intersection of weather and mental health for international students, highlighting the need for nuanced support systems that consider the unique challenges associated with climate transitions. Further research could explore deeper into the individual factors influencing mood variations among international students and Canadian students during winter, contributing to the development of more targeted interventions and support strategies.

REFERENCES

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