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Student Research Report

Reducing Greenhouse Gas Emissions from UBC Intercampus Air Travel

Directed Study
sponsored by the UBC SEEDS Sustainability Program

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Abstract

Air travel contributes to an estimated 3.5-5.0% of anthropogenic climate change. The University of British Columbia (UBC) has proposed achieving net zero emissions by 2035 at their Vancouver campus (UBCV) and 2050 at their Okanagan campus (UBCO), according to their draft Climate Action Plans 2030 (CAP 2030). UBC's air travel in 2019 was responsible for 18-21% of the university's total emissions, of which the UBCV to UBCO intercampus air travel comprised an estimated 17%. As UBC transitions out of fully remote and virtual activities during the Covid-19 pandemic (Covid) it is important to capitalize on the lessons learned and define a 'new normal' with reduced air travel emissions as well as increased access to equitable and effective alternatives. This directed study therefore aims to uncover the behaviours and motivations of UBC staff and faculty who travel the intercampus corridor by air for university-related activities, in order to gain valuable knowledge about ways in which air travel emissions can be reduced, ideally while maintaining or improving the quality of UBC's academic and operational objectives. Methods included an online survey and follow-up interviews with any UBCO/UBCV, administrator/non-administrator, staff and faculty members who have ever flown between the two campuses. The survey gathered information on the frequency of seven intercampus activity types: work-related meetings, professional development, public-facing events, visits/tours, research, teaching/learning and conferences; and which format was used: in-person (considered linked to air travel), virtual, or hybrid (a mix of in-person and virtual). To compare the effects of Covid on intercampus activity type and format, we collected this information for three one-year time periods: pre-Covid, during Covid, and a hypothetical post-Covid future. Overall, survey respondents' behaviour changed from mostly attending in-person, but using some virtual and hybrid formats, for all intercampus activities in the year before Covid, to conducting almost all of these activities virtually during the pandemic. Relative to pre-Covid times, respondents would like to return, post-Covid, to a lower use of the in-person format for intercampus activities (from 48.7 to 40.3 % frequency), and a higher use of the virtual format (20.2 to 30.1%), although in-person would still have a higher use overall than virtual. Respondents preferred not to change usage of the hybrid format (8.3 to 8.2%), which was already relatively low compared to the other formats. Interview results also captured the motivations of UBC staff and faculty behind choosing different formats for intercampus activities, with the main themes that emerged, apart from climate concerns, being equity, social cues, productivity, accessibility, convenience/cost, networking, technology challenges and side-benefits. An important consideration is the inequity experienced by UBCO staff and faculty, who are more frequently on the virtual side of the hybrid format. Survey and interview responses concerning barriers and solutions to reducing air travel led to a set of recommendations, listed in order of priority, from soft tactics encouraging behaviour change to hard ones that are more restrictive.

Introduction

Air Travel and Climate Change

Air travel is a major contributor to the worsening climate crisis, with climate scientists estimating that global aviation contributes roughly 3.5-5.0% of current anthropogenic climate change (Gossling & Humpe, 2020; Grewe et al., 2021; Lee et al., 2021; Ritchie 2020; University of Reading, 2020) Aviation emissions also alter a wide range of atmospheric processes including ozone formation, contrail-cirrus formation, and the depletion of methane (Grewe et al., 2021). However, despite evidence that air travel emissions exacerbate climate change effects, research suggests that commercial (e.g. passenger, cargo) aircraft emissions could triple by 2050 (Overton, 2019). Moreover, the reduction in aviation emissions due to the Covid pandemic is anticipated to be temporary, with emissions resuming growth after 2020, and domestic and international flights reaching 2019 levels by 2024 (Airports Council International, 2021; Grewe et al., 2021).

Reducing flying is one of the most impactful actions some individuals can make to reduce their carbon footprint (Wynes & Nicholas, 2017). However, flying is an activity disproportionately enjoyed by wealthier individuals; only 11% of the world's population used air travel in 2018, and only 1% of the world's population accounts for more than 50% of CO_2 emissions from passenger air travel (Gossling & Humpe, 2020). In Canada, only 22% of the population take 73% of all flights (Hopkinson and Cairns, 2020).

Air Travel and Universities

Many of these high-flying individuals are a part of academia and are flying on behalf of an academic institution. For example, Wynes & Donner (2018) reported that about 50% of the UBC Vancouver campus air travel emissions were produced by 8-11% of the campus community. To reduce aviation emissions, high-flying individuals must be held accountable for the disproportionate impact that their travel habits have caused.

To promote change, however, we must first understand academics' motivations for air travel. Academic researchers are among the highest emitters as a result of flying to conferences, project meetings, and fieldwork (Le Quere et al., 2015). One study of UBC faculty and staff found that out of 1769 trips made by 997 individuals, 60% of these trips were for conferences, 16% for fieldwork, 6% for general university business, 5% for lectures, and the remaining 13% for other miscellaneous and/or unreported purposes (Wynes et al., 2019). International conferences are vital to academia; however, in-person conferences come at a significant environmental cost.

In business, in-person meetings, in some cases requiring air travel, are a part of the culture in many industries and are considered critical for maintaining the social networks associated with career success (Wynes et al., 2019). A survey of climate change researchers in the UK found that most respondents perceived flying as cheaper, quicker, and sometimes the only way to reach their destinations. Additionally, a large proportion of these respondents felt that flying helped them maintain their work relationships and worried that reducing flying would limit their career progression (Le Quere et al., 2015).

Despite these perceptions, a groundbreaking study of 705 UBC academics found that there was no relationship between their air travel emissions and a number of measures of academic productivity, including their hIa (the h-index adjusted for academic age and discipline) (Wynes et al., 2019). This study found that individuals at the start of their careers were responsible for fewer emissions from air travel than senior academics, despite many early career researchers feeling pressure to fly frequently in order to further their academic career at its most vulnerable pre-tenure stage. Instead, Wynes et al. (2019) found a significant relationship between the academics' annual annual salary and their frequency of academic air travel, pointing towards an intergenerational inequity in the frequency of university-related flying.

UBC Climate Emergency Declaration

In December of 2019, UBC declared a climate emergency and UBCV began draft work on their Climate Action Plan 2030 (CAP 2030), a comprehensive plan to achieve net-zero emissions by 2035. Simultaneously, UBCO has been working on their CAP2030 with the target of achieving net-zero emissions by 2050, to be presented to the Board of Governors alongside UBCV's CAP2030 in November 2021. Both the Vancouver and Okanagan CAP2030s include a target of reducing air travel emissions by 50% from 2019 pre-Covid levels by 2030. Air travel is one of UBCV's largest sources of extended emissions and in 2019, aviation emissions accounted for 17,500 tonnes of CO_2 equivalent or about 18%. At UBCO, air travel emissions in 2019 accounted for 3,500 tonnes of CO_2 equivalent, approximately 21% of that campus' total extended emissions.

Flights between the two UBC campuses at Vancouver and Kelowna (in the Okanagan), the route for which is often termed the intercampus corridor, comprise a significant amount of the total number of domestic flights taken by UBC faculty and staff. A SEEDS project conducted by a UBCV Engineering course (CHBE 573) analyzed UBC's travel data, and found that intercampus air travel accounted for approximately 17% of total air travel in 2019 (Ellis et al., 2021).

At the outset, the CAP 2030 team sought to identify the types of UBC activities for which emissions could be reduced relatively easily. Capturing this 'low hanging fruit' is a crucial beginning step towards meeting climate targets. For this reason, the CAP 2030 team supported the SEEDS Sustainability Program to invest funding in the directed study that is reported here, which examines how to reduce greenhouse gas emissions from air travel in the intercampus corridor.

The 2020-2021 Covid Pandemic

This study comes at a very opportune moment. The UN Emissions Gap Report (2020) predicts that the dip in global emissions from Covid will make no significant long-term effect on the environment; however, "hope lies in a green recovery from the Covid pandemic". Grewe et al. (2021) also state that without climate action the impact of aviation will continue to grow, as the effects of the pandemic are likely to be temporary. The Covid pandemic has forced the university community to stop almost all flying between campuses and make the transition to remote, online working, proving that virtual intercampus collaboration is possible and can even be effective.

However, it is unknown how UBC staff and faculty feel about returning to air travel as opposed to choosing its alternatives, at least in terms of the post-pandemic future.

This directed study seeks to gain valuable knowledge about ways in which UBC air travel can be reduced in the future while hopefully maintaining or improving the quality of UBC's academic and operational objectives. For this reason, the study set out to uncover the flying behaviors (pre-, during, and in a projected post-Covid future) of UBC staff and faculty that are specific to each type of university-related activity (work-related meetings, professional development, public-facing events, research, teaching/learning, conferences, and tours/visits). As well, the study examines the motivations influencing UBC staff and faculty to travel the intercampus corridor by air for their university-related collaborations, as opposed to choosing alternatives to attending in-person (which is considered closely linked to flying although some driving is done between campuses); these alternative formats are considered to be either virtual or hybrid (i.e. a mix of in-person and virtual). The study also sought the opinions of UBC staff and faculty on the main barriers to choosing alternatives to flying, as well as solutions for overcoming these barriers in order to reduce UBC's emissions caused by air travel in the intercampus corridor.

Therefore, the research questions of this study were as follows:

1. How did the formats used by UBC staff and faculty for different types of intercampus activities change because of Covid, and which format would they prefer for the post-pandemic future?
2. What motivates UBC staff and faculty to choose different formats for their intercampus activities? ?
3. What barriers are hindering UBC organizers of different types of intercampus activities from choosing formats such as virtual or hybrid that provide alternatives to flying?
4. What solutions do these UBC community members believe would be most helpful in reducing intercampus flights?

The outcome of this study is a set of recommendations for UBC decision-makers that will support them in reducing the greenhouse gas emissions associated with intercampus air travel.

Methods

The two methods used in this study are an online survey and follow-up interviews.

Online Survey

The online survey was built using an online platform called Qualtrics. To qualify for the survey, respondents had to fulfil two criteria: 1) they must be a faculty or staff member at either the Vancouver or Okanagan campus of UBC; and 2) they must have taken at least one flight between these campuses for university-related purposes.

After seeking advice from a Research Ethics Review Coordinator at UBC Vancouver, it was decided that a formal Behavioral Research Ethics Board (BREB) application was not required for this survey as it was done for quality assurance/improvement purposes. Therefore, following approval from the newly instituted Survey Governance Committee overseeing all surveys

targeted at the university community, we began distributing our online survey on June 9, 2021, until a completion deadline of July 9.

Recruitment

Survey recruitment was wide-ranging across both UBC campus communities, but with prioritization of high-flying administrative units and/or individuals. This study involved two main strategies for contacting potential participants. The first strategy, suggested by the Communications Manager of Campus and Community Planning (CC+P) at UBCV, was to email communications administrators of the different faculties/departments and other administrative units with a message explaining the study's purpose and the survey's targeted audience (S. Puri, personal communication, 2021). Promotion of the online survey was then completed using each administrator's discretion as to the most appropriate mechanism, ranging from newsletters to email listservs. The second strategy was suggested by the UBC Travel Program Manager, who volunteered to contact known high-flying individuals directly with a statement explaining the project and a link to the survey.

Supplementary forms of recruitment were done through our connections on both campuses. For example, the survey was shared with the UBC CAP 2030 Steering Committee, who passed it on to their networks. Additionally, the survey was featured on the UBC Today webpage and the UBC Campus + Community Planning Webpage.

Content

The survey itself consisted of 19 questions, which are listed in Appendix A. At the center of the survey was a section containing three matrices for the respondent to fill out, representing a period before the onset of Covid, during Covid, and in a projected post-Covid future, respectively. For each matrix, the respondent was asked to enter the frequency of each type of intercampus activity (i.e. work-related meetings, professional development, research, etc.) over a one-year period, divided across the three main formats for bringing people together: in-person, virtual and hybrid.

Additionally, the survey contained demographic questions as well as questions about flight booking, levels of concern regarding travel emissions, effectiveness of in-person, virtual and hybrid formats, barriers to using virtual/hybrid format, and solutions to combat these barriers.

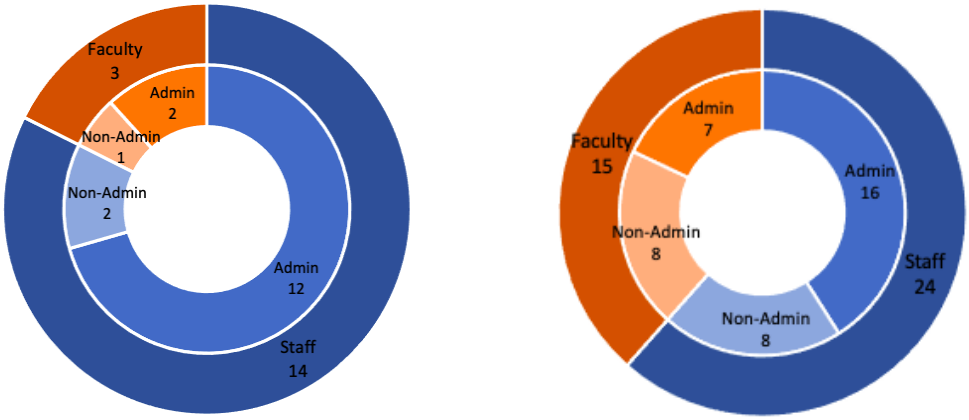
Response

The online survey received 95 responses, which was narrowed down to 56 that were correct and complete. Figure 1 features two pie charts that break down the respondents by campus, whether Vancouver (30%) or Okanagan (70%). As well, each pie chart indicates the relative proportion of faculty (32%) versus staff (68%), and non-administrator (34%) versus administrator (66%).

By coincidence, these survey response results mirrored trends reported by Ellis et al., (2021) who showed that staff and administrators are more likely to fly the intercampus corridor than faculty or non-administrators, respectively. According to the UBC Travel Program Manager, UBCO campus members also fly this corridor approximately 20% more, per capita, than their UBCV counterparts (J. Fograscher, personal communication, 2021). Similar trends were found by

Donner and Wynes (2018), who found that staff and administrators fly more frequently and over shorter distances, compared to faculty and non-administrators, in this case for all academic flights, not just the ones between campuses.

Figure 1: Breakdown of survey respondents into staff or faculty and administrator or non-administrator for the Vancouver (left) and Okanagan (right) campuses.



Semi-structured Interviews

Recruitment

The final question of the survey asked respondents whether they were willing to meet the researchers for a follow-up interview, and if so, to leave a contact email. Researchers then contacted these volunteers to set up a date for the interviews, mentioning the estimated length of time and who would be on the interview team, and asking permission to record the session.

Format

The interviews were conducted using a semi-structured style and lasted from 20 to 30 minutes. The topics covered were similar to those in the survey, but more in-depth.

Content

The interview questions, which are listed in Appendix B, were aimed at uncovering the motivations pushing people to choose to attend intercampus activities in-person, as opposed to choosing the other formats. Additionally, in the interviews we asked expanded questions about the barriers and solutions to reducing air travel between UBCO and UBCV campuses. These questions were modified each time in order to build upon the information provided in the interviewee's survey responses.

Overall, 11 interviews were conducted virtually by Zoom with staff and faculty members at both UBC campuses. **Table 1** breaks down the interviewees by: campus (UBCV or UBCO), staff or faculty, and administrator or non-administrator, demonstrating that a representative range of individuals were interviewed.

Table 1: Breakdown of interview participants by their identifiers

	Staff Admin	Staff Non-admin	Faculty Admin	Faculty Non-admin
UBCO	1	2	2	2
UBCV	3	0	1	0

The interviews were conducted virtually using Zoom technology. Each interview was recorded, which assisted the researchers with transcription. The script was then analyzed for important themes, using color coded highlighting of text, and organized into hierarchical categories.

Results and discussion

Question 1. How did the formats used by UBC staff and faculty for intercampus activities change because of Covid, and which format would they prefer in the post-pandemic future?

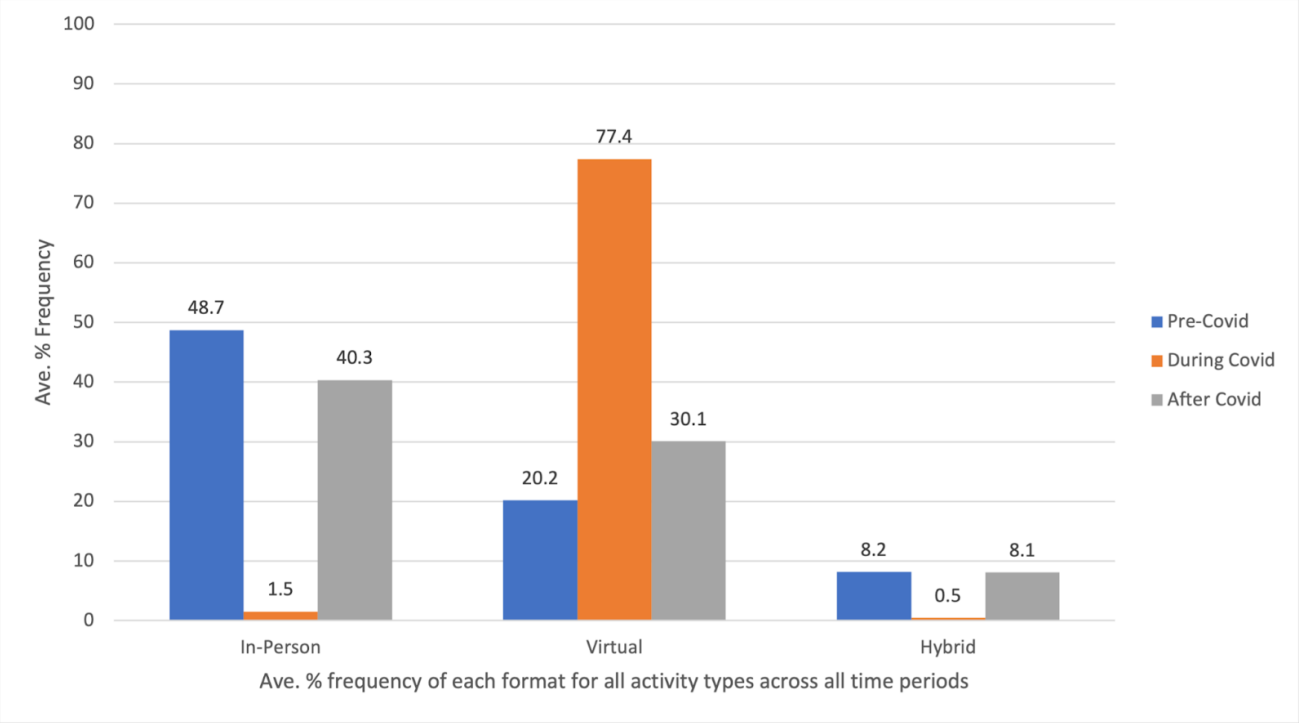
As a result of the Covid pandemic outbreak in March 2020, UBC issued a requirement that staff, faculty and students do almost all university-related activities online, incidentally restricting all forms of travel and decreasing emissions. This led to changes in the behavior of staff and faculty in terms of formats used for the different university-related activities, as shown in the survey. These new experiences led to changes in their attitudes towards the different formats.

The three matrix tables filled out in the survey documented differences in the behavior of respondents before and during Covid as well as in their desired behavior after Covid. The data in each matrix table initially appeared as frequencies; in other words, how many times in one year the respondent had undertaken an intercampus activity using each format: in-person, virtual and hybrid; for each type of activity: work-related meetings, professional development, etc. To prevent the data from being skewed by those respondents with very high frequencies of intercampus activities, the frequency data across formats (e.g. 50 activities in-person, 100 virtual, 50 hybrid), was converted to the proportion of times each format was used (e.g. 25% in-person, 50% virtual, 25% hybrid) for each respondent.

Figure 2 shows how the % frequencies of the three formats (in-person, virtual and hybrid) changed for all activities and all respondents combined over these three time periods. The first set of bars shows the average percent frequency of the *in-person* format for pre-, during, and post-Covid; they show a sharp drop in % frequency of in-person activities from 48.6% before Covid to 1.5% during Covid, with survey respondents preferring to return to a frequency of 40.3% once the Covid pandemic is over. In contrast, the second cluster of bars shows a sharp increase in % frequency of all *virtual* activities from 20.1% before Covid to 77.1% during Covid, with a preference to drop virtual activities to an intermediate level of 30.3% after the pandemic is over. Finally, the last cluster shows a drop in % frequency of all *hybrid* intercampus activities

from 8.2% before to 0.5% during Covid, and a desire to keep the % frequency of the hybrid format at the same relatively low level in the future as it was before Covid, at 8.1%.

Figure 2: Average % frequency of each format (in-person, virtual, hybrid) for all UBC intercampus activities and all respondents, divided into three one year time periods: pre-Covid, during Covid and post-Covid.



Survey results also showed that when the above compiled intercampus activities were divided by activity type, the work-related meetings were the most common activity, followed by public-facing events, and then by professional development activities. The others: conferences, teaching/learning, research, and tours/visits, were all at a similar level and were less popular activity types. Appendix C features figures resembling the one above, but divided into the seven activity types. Most activity types are further divided further into pairs: UBCO and UBCV, staff and faculty and administrators and non-administrators. However, for teaching/learning and research, we looked at only the faculty responses since these activities are relevant to their work only. This meant that the sample sizes for these categories were small (n=18); and as a result, we did not further divide these activities into UBCV and UBCO or admin and non-admin.

How did the formats used by UBC staff and faculty for intercampus activities change because of Covid?

Overall, the survey results show that the UBC community moved from a mix of predominantly in-person, with lower levels of virtual and hybrid formats, for their intercampus activities in the year before Covid, to conducting all of their activities virtually during the pandemic, in line with UBC lockdown policies. This was true across all activity types, including work-related meetings, professional development and conferences, where we looked at both staff and faculty data, as

well as research and teaching/learning, where we looked at faculty data only. The one exception was tours/visits, where there was only a low level of virtual activity (approximately 21%), and a small amount of in-person and/or hybrid format during Covid (6% and 3% for in-person and hybrid) during Covid, indicating that this activity type was mostly cancelled during the pandemic due to the challenges of holding it virtually. No differences in the above trends were observed between the different pairs, whether UBCO and UBCV, staff and faculty, or administrators and non-administrators.

Which format would UBC staff and faculty members prefer in the post-pandemic future?
As mentioned above, the matrix table results allowed us to understand what format type our survey respondents would prefer to use in the future. Overall, respondents would like to return to a lower use of the in-person format for intercampus activities (from 48.7 to 40.3 % frequency) and a higher use of the virtual format (20.2 to 30.1%) than before Covid, although in-person would still have a higher use overall compared to virtual. They preferred not to change usage of the hybrid format (8.3 to 8.2%), which was already relatively low compared to the other formats. However, some divergence from this general trend was observed for some activity types, and within activity types, for some pairs.

For example, for work-related meetings, survey respondents would prefer to slightly increase, rather than decrease, their in-person meetings in the post-Covid future, as well as increase virtual meetings in line with the general trend outlined in **Figure 2**. Another difference was that they would prefer to decrease the hybrid format quite strongly from pre-Covid levels, rather than keep it the same. In a comparison of staff and faculty preferences for work-related meetings, staff appear to have used the virtual format more often than faculty pre-Covid, which may be why in a post-Covid future, staff are more open to using virtual than in-person, whereas faculty prefer an equal mix of in-person and virtual. No differences were noticed between campuses or administrators and non-administrators.

For professional development activities, the results for all respondents grouped together were consistent with the general trend. Faculty and administrators diverge by wanting to increase in-person professional development activities post-Covid, but this may be because they started with relatively few in-person professional development activities pre-Covid compared to staff and non-administrators, respectively. No differences were noticed between campuses.

For public-facing events and tours/visits, results were consistent with the general trend. There were no significant differences between any of the pairs.

The format preferences for conferences were the same as the preferences for all activity types in the future with the only difference being respondents want hybrid conferences to slightly increase post-Covid. These trends were consistent across all pairs.

The results for teaching/learning and research showed that faculty members would prefer to decrease (teaching/learning) or maintain (research) their relatively high level of in-person intercampus activities. For both activity types, they would prefer to slightly increase the virtual format and more strongly increase the hybrid format in the future.

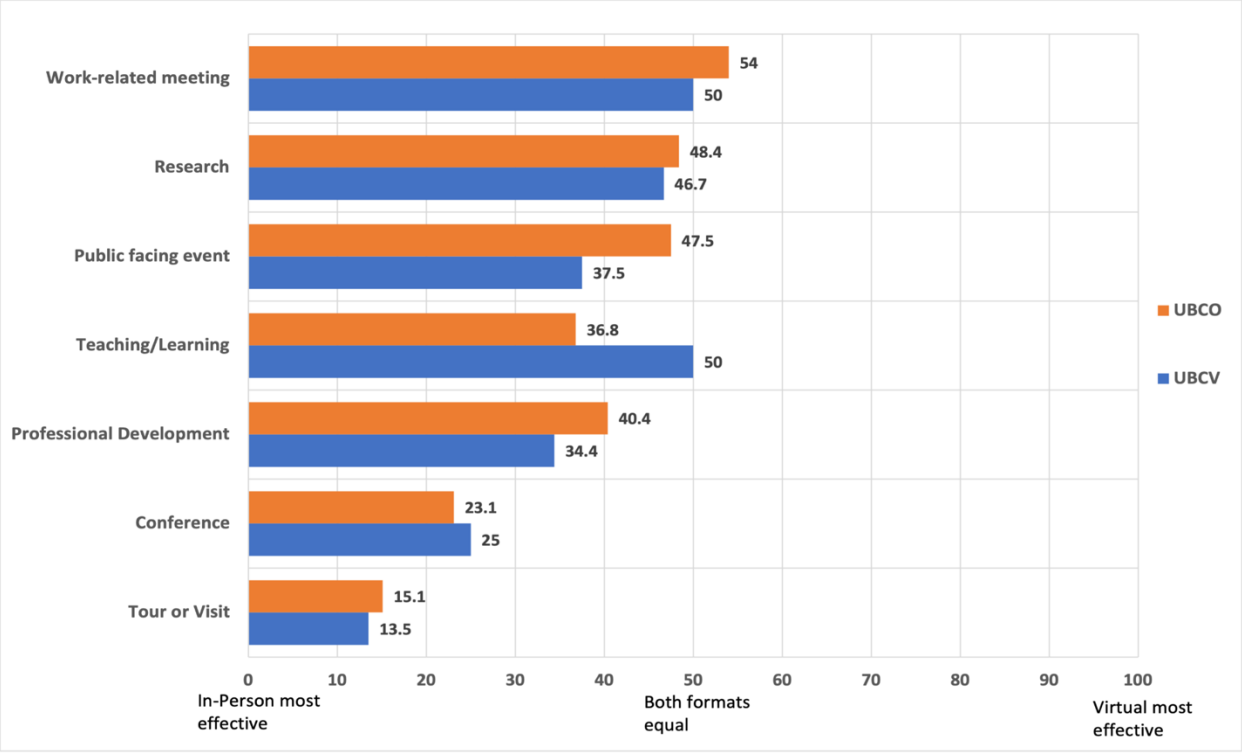
Question 3: What motivates UBC staff and faculty to choose different formats for their intercampus activities?

Virtual vs. In-person Format

To determine the preferences of respondents for the two most contrasting formats, in-person and virtual, one survey question asked participants to slide a bar across a scale to indicate which format they thought more effective: in-person or virtual, for each activity type (work-related meeting, professional development, public facing event, etc.).

Figure 3, below, shows the perceived effectiveness of both format types for all seven activity types, contrasting the responses from both campuses: UBCO versus UBCV (**Figure 3a**) as well as staff versus faculty (**Figure 3b**). These graphs both show that work-related meetings are considered the activity type most conducive to a virtual format relative to the other activities below; followed by research, public facing events, teaching/learning, professional development, conferences, and tours/visits.

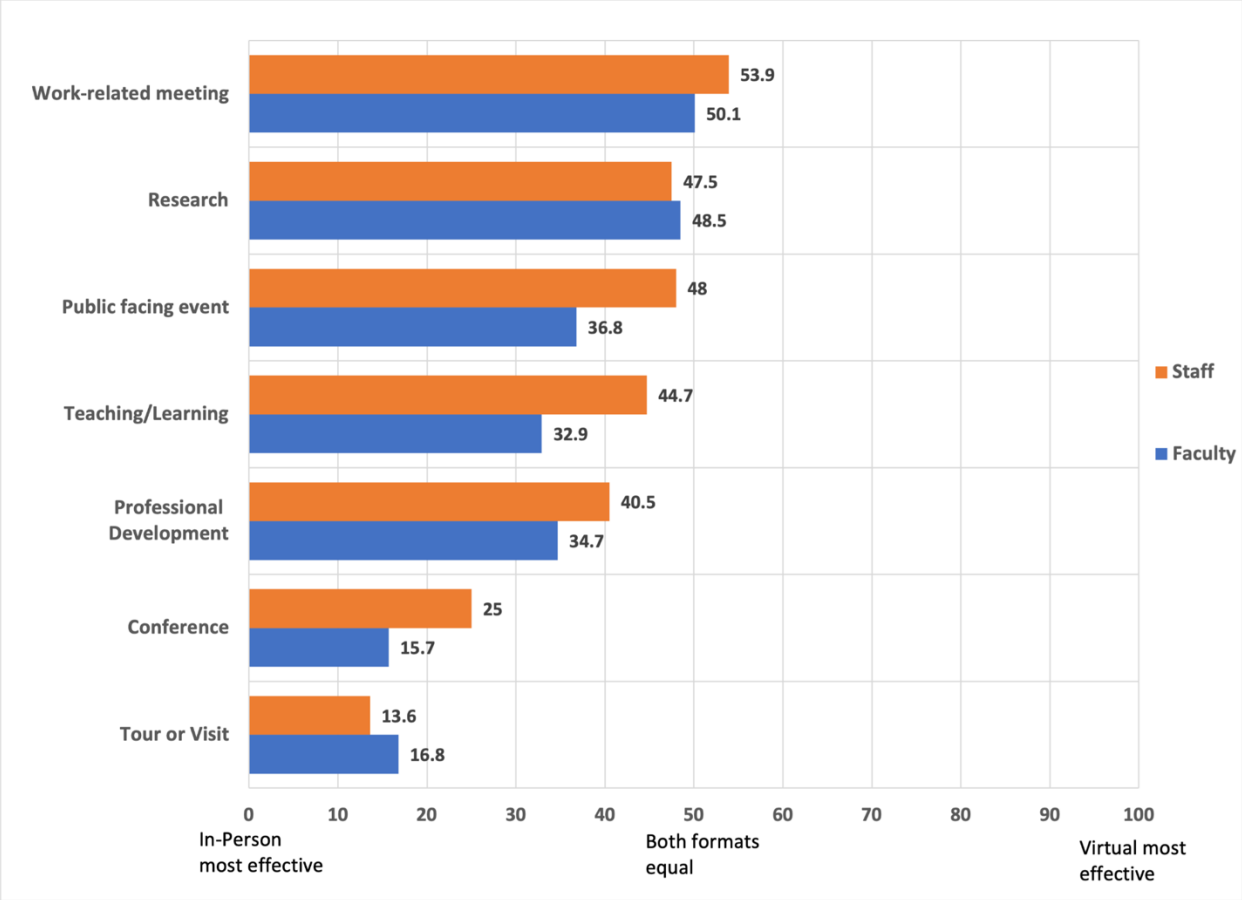
Figure 3a: Graph comparing responses from UBCO (orange) and UBCV (blue) on the effectiveness of in-person and virtual formats for different activity types



Looking at the breakdown of UBCO vs. UBCV, the overall result is that both campuses found in-person to be more effective for almost all activity types, with the main exception being UBCO who found virtual work-related meetings to be slightly more effective than in-person ones, whereas UBCV found the two formats to be equal. Another interesting result is teaching/

learning; UBCV respondents claimed in-person and virtual to be equal in effectiveness, but UBCO differed, favoring in-person. However, for both public facing events and professional development, there was an opposite trend with UBCO more in favor of a virtual format.

Figure 3b: Graph comparing responses from staff (orange) and faculty (blue) on the effectiveness of in-person and virtual formats for different activity types



Looking at the breakdown of staff vs. faculty, both groups feel that in-person is more effective for almost all activity types, with the main exception being that staff found virtual work-related meetings to be more effective than in-person ones, and faculty are finding the two formats to be equal. These results match the matrix table results for work-related meetings described earlier, where staff favour virtual over in-person in a post-pandemic future, in contrast to faculty, who prefer an equal mix of in-person and virtual. Similarly, while both groups prefer in person over virtual for all remaining activity types, staff appear to be more favorable to the virtual format than faculty for a number of the activity types, including public-facing events, teaching/learning, professional development, and conferences.

Benefits and challenges of the three formats

In organizing the themes from the interviews, it became clear that a number of benefits and challenges could be identified for each format type. The main themes that emerged, apart from climate concerns, were equity, reading social cues, productivity, accessibility, convenience/cost, networking, technology challenges and side-benefits.

In-person format

For in-person activities, the biggest benefit, according to the interviewees, was how this format made it relatively easy to read social cues; this can help groups make difficult decisions more easily. Another benefit of being in-person is the quality of the networking; having conversations around the coffee table allows you to get to know the whole person better. Lastly, another benefit of in-person activities, if it means flying the intercampus corridor, is the ability of the participant to bundle their travel on a university-related trip with some side-benefits, for example, a visit with friends, a holiday, or the collection of personal air miles.

Obviously, a big disadvantage of the in-person format is the negative effect that flying has on the climate. Moreover, flying the intercampus corridor is both time consuming and costly; many interviewees pointed out how inefficient it is to spend a total of 6 hours traveling with the flight option just to attend a 1-hour meeting.

Equity issues related to all formats were highlighted throughout the interviews and played a critical role in people's format preferences. For in-person activities, interview respondents stated that it is the people in the back of the room, who tend to be women, younger individuals, and minorities, who often speak less and find it harder to participate. It is also particularly difficult for parents to commute to in-person activities, especially if they involve flying between campuses, as they often need to find child-care over those same long hours.

Virtual format

One of the major benefits of the virtual format is the environmental benefits; the virtual format causes fewer greenhouse gases to be emitted compared to both in-person and hybrid formats. It was consistently mentioned in the interviews that a big benefit of the transition to virtual work during Covid was how it put everyone on a level playing field. When people attend virtually, everyone seems to have a much more equal opportunity to participate in discussions, with facilitators noticing them equally, for example, through the use of the 'raise hand' function or chat box.

Once virtual technologies have been acquired and learned, they prove to be relatively cheap and convenient to use. Interviewees said this has led to an increase in productivity as a result of saving time from not having to walk between meeting rooms and commute to campus.

Another benefit of the transition from in-person to virtual, was being able to use shared online document platforms such as Microsoft Teams, while simultaneously attending a virtual activity. This can be extremely effective for group work.

Similar to in-person, the ability to network can be a benefit of the virtual format, but in different ways. With the virtual format, people mentioned being able to collaborate more often with individuals on the other campus as well as around the world. Therefore, virtual formats increased the quantity of networking being done, as opposed to in-person where the focus was about the quality of the networking.

Generally, there were fewer challenges to the virtual format compared to the in-person and hybrid formats. However, one challenge is that virtual activities can decrease productivity as screen/Zoom fatigue wears people out more quickly than that same activity would if it were in-person. One interviewee said longer meetings do not seem to work as well virtually, as people get tired and tend to lose focus faster.

Technology issues, such as losing the internet connection, are never completely avoidable, and these problems were considered to be distracting, time-consuming, and difficult to fix.

As discussed previously in the in-person section, social cues are harder to pick up virtually, which can make certain activities less effective.

Hybrid format

The hybrid format involves some individuals attending in-person while others attend virtually. In the past, a hybrid format could be achieved by bringing the virtual participant into a room full of people via a laptop on the meeting room table. Pre-Covid, another version of the hybrid format existed in a number of special rooms on both campuses, which were set up with an older audio-visual technology that enabled the participation of people in both rooms. In the survey, we asked all participants if they had ever experienced an intercampus collaboration that used the hybrid format, with 37 out of 56 indicating that they had.

Both of these older types of hybrid technologies were problematic in terms of how well participants could see or hear one another. Starting this September, therefore, a new version of the hybrid format has been developed in an effort to overcome these weaknesses; this involves equipping a number of rooms with microphones and camera systems that can track the face and voice of the person speaking and project their face and voice onto the main screen.

The interviews highlighted many different opinions regarding the older versions of the hybrid format. The biggest benefit they noticed was accessibility for those who would otherwise not be able to attend; the hybrid format allows for the most flexibility compared to the other formats, as people can join virtually or in-person. In an interview, someone mentioned how hybrid meetings allow people who are sick to still be able to participate in an activity, whereas when in-person is the only option they would miss out.

Networking is a benefit of hybrid in similar ways as it is for in person and virtual; for in-person attendees, it involves an increased quality of connection, but for virtual attendees, there is an increased quantity of connection as people do not need to travel and can meet virtually from any location.

This relates to another challenge of hybrid, which is that social cues can be hard for virtual participants to pick up on. The same issues of reading social cues and body language exist for the hybrid and virtual formats, however the hybrid format brings another complication; not only do those virtually attending have a difficult time reading their other virtual colleagues' social cues, but they are having a much harder time picking up on the social cues of those in-person.

Moreover, those in-person attendants have a harder time picking up on the body language of virtual attendants.

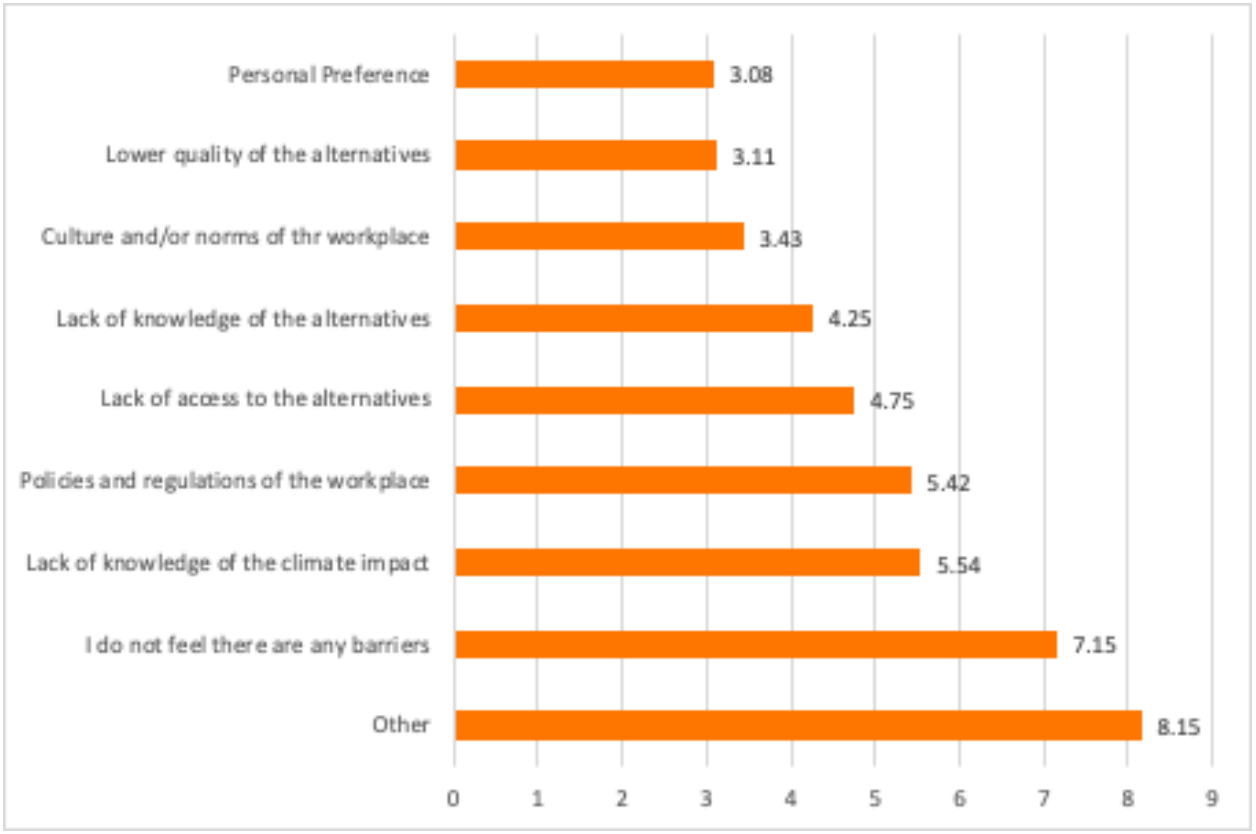
The equity concern associated with the hybrid format was ubiquitous across the interviews and generally speaking this concern was the biggest factor deterring individuals from choosing the hybrid format. Interviewees mentioned how inequitable it is to be the person attending virtually when there are many individuals attending in-person who, as a result, tend to dominate the activity. People also stated how hard it can be to see and hear everyone properly when they are virtual, and most of the other people are in-person. Our interviewees expressed the feeling that those in-person have the upper hand in hybrid activities as they are able to participate more and ultimately get more benefit from the activity. This concern was most strongly expressed in terms of intercampus inequity; Okanagan individuals tend to be the ones virtually tuning into an activity being held in Vancouver. Interviewees based at UBCO expressed frustration about these meetings and a desire to reduce the frequency of hybrid activities post-pandemic. This concern was especially important for the more active types of activities such as work-related meetings, but less so for the more passive forms of activities such as conferences.

Question 3. What barriers are hindering UBC organizers of different types of intercampus activities from choosing formats such as virtual or hybrid that provide alternatives to flying?

Survey

Results from the survey and interviews indicate that UBC faculty and staff feel there are a number of barriers deterring people from choosing alternatives to flying to intercampus activities. In the online survey, respondents were asked to rank a list of pre-selected barriers in order of importance. As can be seen in **Figure 4**, the most important barrier, looking at the average rankings over all 56 respondents, was the personal preference of the activity organizer, followed by the lower quality of the alternatives to flying, followed by the culture and/or norms of the workplace. These barriers may be somewhat interrelated, as personal preferences of the organizer, and culture and/or norms of the workplace may be correlated with one another. These results also highlight the importance of trying, if possible, to reduce those aspects of the alternatives to flying that cause them to be a lower quality option.

Figure 4: Graph showing which barriers survey respondents believe to be hindering them from choosing flying alternatives. The numbers associated with each bar are the average ranking from 1-9, e.g. personal preference was ranked as the biggest barrier.



The next most important barriers are also somewhat related: the lack of knowledge of the alternatives to flying, as well as lack of access to these alternatives. This suggests the need for awareness-raising of, as well as increasing access to these alternatives, whether it is access to knowledge, skills, or equipment.

Interestingly, the least important barriers were lack of awareness of the climate impacts of flying, and the policies or regulations of the workplace. The first one, lack of awareness, is difficult to interpret: is it because everyone is already aware, or because this argument is not that likely to pose that compelling a barrier to flying? The policies or regulations of the workplace may be ranked low simply because at the time of the survey, there were no policies or regulations related to flying, apart from the Covid specific ones. The lowest ranking went to the statement 'I do not think there are any barriers'.

Comparing the ranking of barriers by UBCV and UBCO respondents showed some noticeable differences. The biggest barriers indicated by UBCV respondents, in order of importance, were culture and/or norms of the workplace, lower quality of the alternatives, and personal preference. UBCO respondents chose the biggest barriers in order to be personal preference of activity organizers, lower quality of the alternatives, and culture and/or norms of the workplace. As said before, culture /norms and personal preferences of organizers may be quite related.

The comparison of staff with faculty in how they ranked these barriers show some interesting differences. Although overall rankings are very similar, UBC staff seem more inclined to favor culture/norms as well as policies/regulations of the workplace as barriers, whereas faculty

favored ‘I do not think there are any barriers’ relative to staff. The main conclusion drawn from this is that staff feel their travel decisions are less under their individual control and more a result of the workplace environment. Faculty on the other hand, seem more inclined to feel there are no barriers to their individual autonomy when choosing formats for activities. This sense of lacking autonomy when making travel decisions was backed up by several of the interviewees, who stated they do not feel the choice to fly is up to them and therefore punishing their behavior is not fair.

A comparison between administrators and non-administrators yielded no major differences.

Interviews

Many of the barriers discussed in the interviews were new ones not listed in the survey question on ranking a given set of barriers. One important barrier expressed by many of the interviewees was the issue of inequity between the campuses in terms of the hybrid format experience. UBCO individuals often feel that in the past, at least, they had to choose between two less favorable choices: attending an activity in Vancouver using the hybrid format (where they are the virtual attendees) or flying to attend the activity in-person. The first option is problematic for UBCO individuals, and the second one works against the efforts to reduce aviation emissions. However, UBCO individuals stated that they often felt obliged to fly, in order to avoid experiencing a hybrid activity where the virtual attendees are ignored.

Another barrier is that interviewees feel there are some topics and activity types that cannot be accomplished as effectively using virtual or hybrid formats compared to being in-person. For example, one person stated that some equity and inclusion work can be challenging if you can’t read the social cues, and another that the inspection of a new facility is only optimal if the viewing is in-person. In-person intercampus activities, and therefore air travel, is therefore sometimes justifiable.

One more barrier mentioned in the interviews is emerging from the push from UBC to recreate the vibrant campus life that existed before Covid. Part of that involves encouraging people to travel to the campuses from remote workplaces within a campus as well as from the other campus. The push for a lively campus life thus comes into conflict with reducing emissions from both commuting and intercampus air travel. This can make it confusing for organizers to choose a format, when they are facing contradictory advice from UBC decision-makers on what the post-pandemic future should hold.

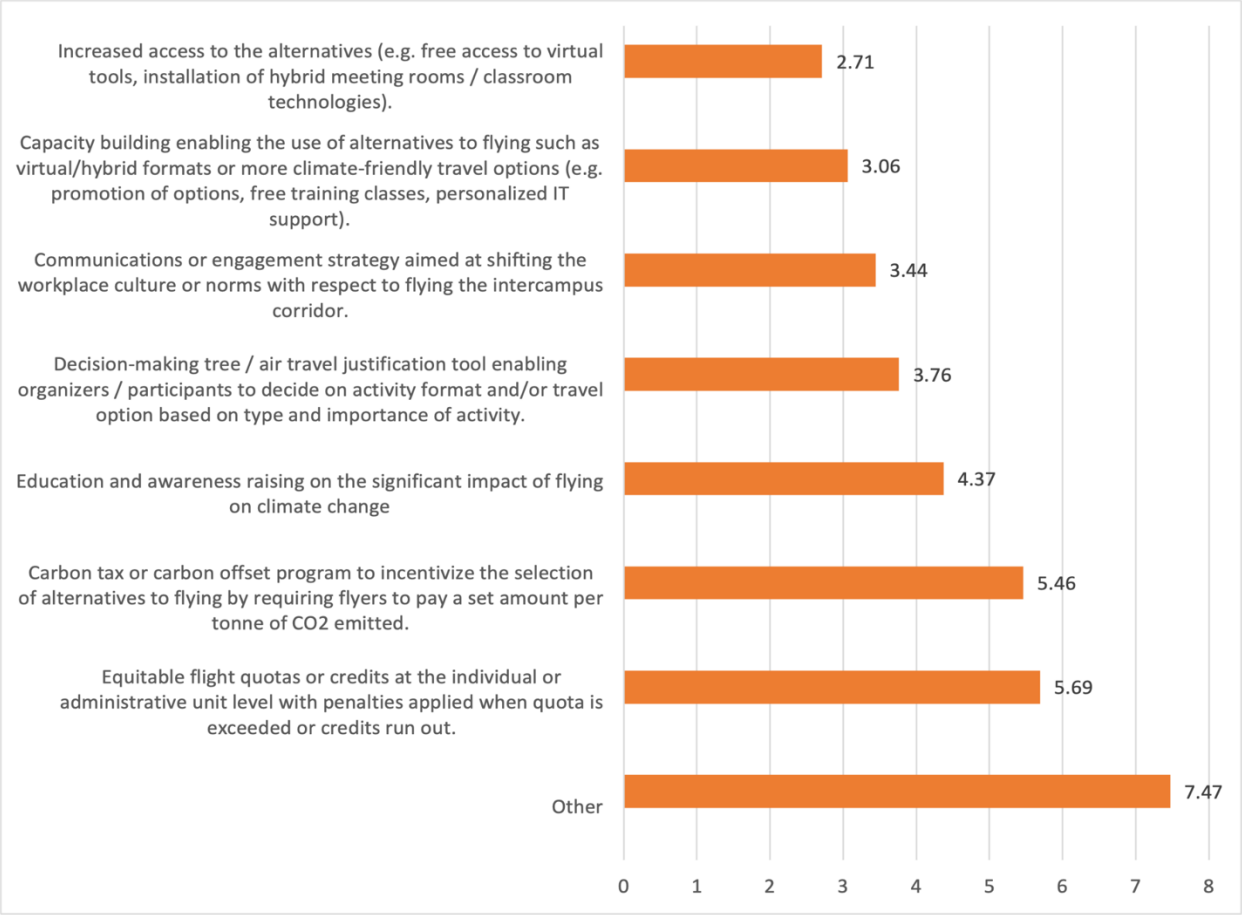
A final barrier that was highlighted in the interviews was how little UBC supports driving between the campuses. With flying, booking a flight is easy and a well-known system is in place to get reimbursed, whereas with driving, the process is less convenient. The creation of greater incentives to drive, especially if in a bus, by carpool or by electric vehicle, will lower greenhouse gas emissions.

Question 4: What solutions do UBC community members believe would be most helpful in reducing intercampus flights?

Survey

One survey question asked respondents to rank a list of solutions based on their helpfulness in reducing intercampus flying. As can be seen in **Figure 5**, the four most helpful solutions, averaged across all 56 respondents were, in order: increased access to the alternatives, capacity building enabling the use of alternatives, communications or engagement strategy aimed at shifting the workplace culture, and a decision-making tree/air travel justification tool.

Figure 5: Graph showing which solution survey respondents believe would be most helpful in reducing intercampus flights. The numbers associated with each bar are the average ranking from 1-9, e.g. increased access to the alternatives was ranked as the biggest solution.



The least helpful solutions proposed were education and awareness-raising on the impact of flying on climate change, a carbon tax or carbon offset program to incentivize the selection of alternatives to flying, and equitable flight quotas or credits at the individual or administrative unit level with penalties applied when quota is exceeded, or credits run out. A comparison of UBCV vs. UBCO, staff vs. faculty, and administrators vs. non-administrators showed very little differences in their solutions ranking.

Interviews

The interviews reinforced and elaborated upon many of the solutions listed above; many of these details appear in the recommendations, below. When analyzing the solutions data from the survey we noticed that the highest ranked solutions were ones that encourage change within the campus communities. The lowest ranked solutions were those that were more restrictive or punitive in nature, such as a carbon tax or offset program and flight quotas or credits, that would enforce change by implementing systems to limit the amount people can fly.

These results appear to show that many respondents do not feel that UBC staff and faculty arel ready yet for the harder tactics; instead, they feel that broader cultural shifts need to occur before punitive tactics are implemented. This is backed up by the survey's matrix table results, illustrated in Figure 2, where respondents still appear to prefer a greater use of the in-person format to the virtual or hybrid formats for almost all university activities, when asked about their preferences for a hypothetical post-Covid future, and the sliding table results, illustrated in Figures 3a and 3b, which indicate a preference for in-person over virtual, in terms of effectiveness.

Several interviewees further supported the claim that the softer solutions are the most strategic ways to implement initially, with the harder ones still being necessary, given UBC's ambitious targets for achieving net zero emissions, but better brought in later. One interviewee stressed the importance of using both a carrot and a stick. The carrot is any soft tactic which encourages and supports people to make the change to reduce flying, and the stick is any hard tactic which enforces the change.

Recommendations

Each recommendation is listed below in order of preference as indicated by the survey of ranked solutions, starting with four soft tactics and moving on to two hard ones.

1. ***Ensure access to alternative format technologies***

Our first recommendation comes from concerns that some campus community members may lack the knowledge, skills, equipment, and facilities that will enable them to use virtual or hybrid formats. We recommend that UBC use two steps:

1. inventory their hybrid and virtual assets, and
2. develop a plan for improving access to training, equipment, and facilities for these formats.

It was pointed out in the interviews that different activity types require different skills and technologies (e.g. options for virtual or hybrid formats in work-related meetings may differ from those available for conferences or public-facing events).

2. ***Engage the campus community to change cultural norms***

In several interviews it was mentioned that changing the cultural norms within the UBC work environment is crucial to enabling individuals to make the choice to organize fewer in-person

intercampus activities and/or to fly less to these activities. Interview respondents mentioned unspoken pressures to attend activities in-person.

A first element of this recommendation is to develop an engagement strategy for setting new cultural norms. Interviewees suggested this engagement strategy should emphasize raising awareness of the benefits of the alternative formats. This strategy might include appropriate customized messaging for different target audiences on campus, such as staff, faculty and students, administrators and non-administrators. Efforts could also include educating the community on the adverse climate impact of flying and the stance UBC is taking regarding flying and the climate emergency.

A second element of this recommendation is to ask high-level leadership to lead by example by personally opting for the virtual or hybrid alternatives to air travel. It would help if they also told stories about their experiences in order to raise awareness and inspire others to do the same. This would be an effective way of challenging and changing the cultural norm that in-person is the default format for university activities. However, a challenge mentioned in one interview is that even leaders sometimes feel their travel decisions face pressures to connect more deeply to their employees by attending activities in person, competing with their desire to model the advantages of using the virtual alternatives.

3. Develop a handbook to promote and guide the use of alternative formats

Our next recommendation is a handbook for UBC staff and faculty that promotes and guides the use of hybrid or virtual formats. The handbook will work alongside the previous recommendation for developing an engagement strategy to combat the cultural norms by being a useful resource for both organizers and participants of intercampus activities to engage with and learn from. A main component of this handbook would therefore be a detailed explanation of the benefits and challenges of each format, whether in-person, virtual, or hybrid. Mixed in with these pros and cons will be success stories of UBC community members using hybrid/virtual formats.

However, the handbook would go beyond discussing the benefits of hybrid and virtual formats to developing guidelines for effective use of them. Thus, alongside each of the challenges of virtual and hybrid formats, there will be solutions that will aim to address common problems associated with these formats.

Many of the issues surrounding hybrid or virtual formats can be avoided by developing guidelines for appropriate facilitation. With virtual facilitation, for example, screen/Zoom fatigue is an important obstacle. One solution for that is to integrate breaks into longer virtual meetings, so participants get the chance to move, go to the bathroom, get a coffee, and so on. Another example is that good facilitators of hybrid activities should be aware of the virtual participants and work to ensure they are being included and not forgotten. Proper facilitation for hybrid activities is different than for virtual activities; hybrid facilitation involves more consideration of equity issues between virtual and in-person attendants.

4. Air travel justification/decision-making tool

Our final soft tactic recommendation is to implement the use of an air travel justification/ decision-making tool. This tool will ask users a series of questions about their trip, such as the purpose, importance, duration, activity type, etc. This would get people to critically think about how strong their justification is for traveling.

One of this tool's purposes is to begin to change the cultural norms surrounding organizing activities as the first option of many organizers is to choose in-person. This tool will emphasize that in-person activities, while still being important and necessary at times, should not be the default. We believe this tool could enable organizers to accurately choose the best format for an activity based on all variables and considerations.

The recommendation, therefore, is to develop a tool, after continued consideration and consultation with the stakeholders. We do not have a fully developed tool to present here; however, below are a few important considerations for inclusion.

One key takeaway from the interviews is there are certain activities that are better conducted in-person, for example when the topic is sensitive or private, when a difficult decision needs to be made, for quality networking or team-building purposes, when the person needs to be physically present to view or otherwise interact with a place or some equipment,, etc. One example given was that of a sexual harassment hearing; the interviewee stated how reading body language is extremely important, therefore in-person would be the preferred format type. However, for the purposes of many activities, this tool would recommend alternatives to flying.

Another recommendation to include in this tool is a norm to reduce the inequities of the hybrid format. The norm would be this: if even one person must join a meeting remotely, organizers should make an activity virtual so that everyone joins remotely. One interviewee suggested this policy to combat some of the equity issues associated with hybrid formats. Due to the larger size of the Vancouver campus, most intercampus activities are held in Vancouver, and Okanagan individuals feel obligated to fly or attend virtually through a hybrid model. Since there are high levels of emissions associated with flying, organizers should favour more inclusive, virtual meetings whenever possible.

There are times, however, when the hybrid format is an asset. In particular, it is better to use a hybrid format if otherwise (if only in-person) people would be unable to attend the activity at all. This may be the reason survey respondents stated a preference for an increased role for hybrid format for three activities: research, teaching/learning and conferences, in the post-Covid future. A hybrid format can help to increase the accessibility of larger activities such as conferences, since it enables some participants to choose a hybrid format who wouldn't otherwise be able to attend in-person. This would open up the activity to more individuals, making it more cost and time efficient, while balancing overall goals of reducing air travel emissions and maintaining value in these activities. One interview participant was enthusiastic about the idea of implementing an 80/20 rule for conferences; meaning that conferences should employ a hybrid format that expects 80% of attendants to join virtually and the other 20% to be present physically. This suggestion would make conferences more accessible to a wider variety of

individuals. Individuals can save substantial amounts of money by avoiding travel and accommodation costs, as well as save time and stress. We see the value in this idea and see its potential to reduce emissions associated with large conferences, however it is not as relevant to the intercampus corridor.

Overall, our recommendation for a justification tool falls into the category of soft tactic, as something that would support staff and faculty to think more carefully about whether they should travel or not. However, a suggestion from one of our interviewees was that this tool could be used as a hard tactic, to determine whether a trip by air is funded by UBC or not. Since our results show the UBC community is not ready for the implementation of punitive tactics just yet, we do not recommend this policy be implemented at present, but we acknowledge its potential and encourage UBC to explore this idea for future use.

5. ***Develop a system for tracking air travel and set targets***

Our first hard tactic recommendation is to develop a system for tracking and reporting air travel data and set targets at the unit or departmental level. The targets would allow for comparisons to be made between units to get a clearer picture of the high-flying groups within the campus populations. In future, comparisons could also be made over time to ensure UBC is on track to meet their CAP 2030 emission targets. We are aware that Workday, the new system being implemented to book flights, collects more data about the flyer and flight than the previous system did, and captures more of the total flight data than the UBC Travel Program does. We recommend that UBC ensure Workday is capturing all data needed to understand who is causing air travel emissions (with demographic subcategories), when and where the flights are occurring, and why (which is linked to the air travel justification tool).

6. ***Explore the use of offsets, quotas, or credits to incentivize reduced air travel***

Our last recommendation is to explore the use of offsets, quotas, or credits to incentivize reduced air travel. From our data from the survey question where the solutions for reducing air travel emissions were ranked, respondents indicated that it would be premature to implement a system of offsets, quotas, or credits without first addressing the higher ranked solutions, which are also the recommendations explained above. When asked about the idea of some kind of carbon trading or flight quota system, interviewees expressed interest, but also concern about the logistics of a system like this and what implications it will have on their autonomy. One interviewee responded to this suggestion with concern that this would punish those individuals whose positions within the university require more intercampus travel.

Conclusion

Emerging from the Covid pandemic, UBC should consider the lessons learned from working remotely and apply these benefits to post-pandemic campus life. This study's survey and interviews gave us a better understanding of how the UBC community felt about the transition to virtual work with Covid. Many interviewees mentioned the numerous benefits they enjoyed from working remotely and how they are concerned about losing these benefits in the post-pandemic world. They also miss some of the advantages of the in-person format; however, they miss the hybrid format much less. For this reason, the overall preference appears to be to move to a future

where there is a lower use of the in-person format and a higher use of the virtual format compared to before Covid, and little change in the low frequency of the hybrid format.

Interview results also captured the motivations of UBC staff and faculty behind choosing different formats for intercampus activities, with the main themes that emerged, apart from climate concerns, being equity, reading social cues, productivity, accessibility, convenience/cost, networking, technology challenges and side-benefits. An important consideration is the inequity experienced by UBCO staff and faculty, who are more frequently on the virtual end of the hybrid format.

Survey and interview responses concerning barriers and solutions to reducing air travel led to a set of recommendations for reducing the greenhouse gas emissions caused by air travel in the intercampus corridor, listed in order of priority, from soft tactics encouraging behaviour change to hard ones that are more restrictive.

For soft tactics, the recommendations are:

1. ***Ensure access to alternative format technologies***
2. ***Engage the campus community to change cultural norms***
3. ***Develop a handbook to promote and guide the use of alternative formats***
4. ***Air travel justification/decision-making tool***

For soft tactics, the recommendations are:

5. ***Develop a system for tracking air travel and set targets***
6. ***Explore the use of offsets, quotas, or credits to incentivize reduced air travel***

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Appendix A: Intercampus Air Travel Survey

Survey Eligibility

1. Are you a faculty or staff member at UBC?

- O Yes
- O No

2. Have you ever taken a flight between the two campuses (UBCV-UBCO) for university related purposes?

- O Yes
- O No

More About You

3. Do you identify as staff, faculty or other?

- O Staff
- O Faculty
- O Other: _____

4. Would you also identify as an administrator? (i.e. having management responsibilities)?

- O Yes
- O No

5. Which campus are you based at?

- O UBCV
- O UBCO

Your Level of Commitment

6. How often do you think about levels of greenhouse gas emissions when making **personal travel decisions**?

- O 0
- O 1
- O 2
- O 3
- O 4
- O 5
- O 6
- O 7
- O 8
- O 9
- O 10

7. How often do you think about levels of greenhouse gas emissions when making **work-related travel decisions**?

- O 0
- O 1
- O 2
- O 3
- O 4
- O 5
- O 6
- O 7
- O 8
- O 9
- O 10

Flight Booking

8. When booking any university-related flights in the UBCV-UBCO corridor, how often did you use the following services since January, 2019? These are flights taken between Vancouver and Kelowna (not necessarily to the campuses themselves) for the purpose of intercampus collaboration.

	Never (1)	Sometimes (2)	About half the time (3)	Most of the time (4)	Always (5)
UBC Travel Office (i.e. through Concur, or through Direct or North-South travel agencies)	o	o	o	o	o
Private (online booking service like Expedia, Air Canada, etc)	o	o	o	o	o

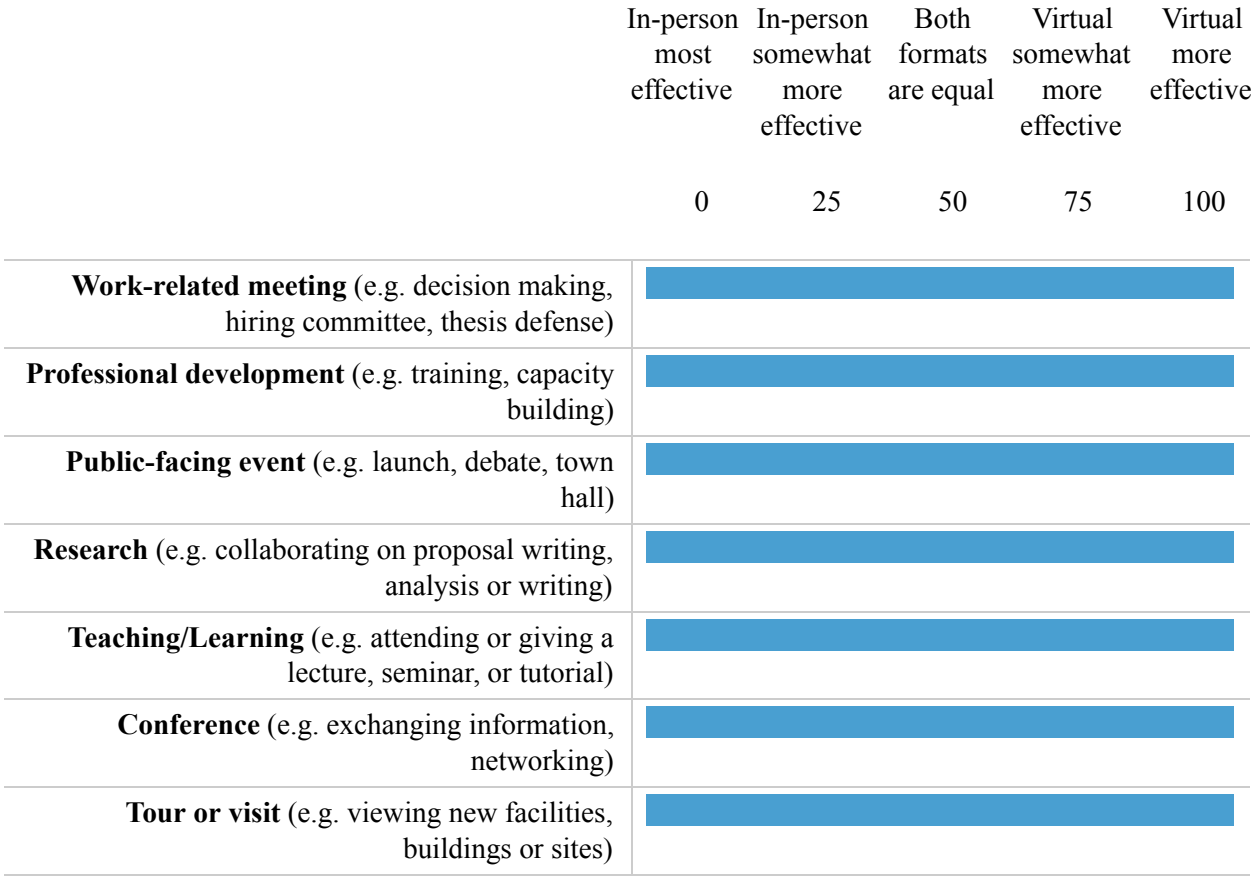
9. Does your faculty, department, or administrative unit have a policy requiring flights to be booked through UBC Travel Services (ie. through Concur, or through Direct or North-South travel agencies)?

- o Yes
- o No
- o I do not know

***Alternatives** to Flying: Virtual Format*

For the sake of this survey, the term 'virtual format' will be used to refer to an activity where all participants are attending via an online platform, such as Zoom, Microsoft Teams, Collaborate Ultra, etc.

10. How effective do you find using a virtual format **as opposed to in-person**, for the purposes listed below? Please drag and drop the marker along the sliding scale.



Alternatives to Flying: Hybrid Format

For the sake of this survey, the term 'hybrid format' will be used to refer to an activity format that combines a virtual format with in-person attendance. This format attempts to replicate the experience of being together in one room. Hybrid room set-up currently involves the installation of a USB camera and microphone to enable individuals on one campus to join a room of people on another campus via Zoom or other virtual formats. The camera tracks the speakers in the room by following their faces when they speak, and the Zoom images of the virtual attendees are projected on a front screen so the room attendees can see their faces.

11. Have you ever attended an activity involving collaboration between the two campuses that used a hybrid format?

- O Yes
- O No

12. How effective do you find using a hybrid format **as opposed to either all in-person or all virtual attendance** for the university-related activities listed below? Please drag and drop the marker along the sliding scale.

	Alternatives most effective	Alternatives somewhat more effective	All formats equal	Hybrid somewhat more effective	Hybrid most effective
	0	25	50	75	100
Work-related meeting (e.g. decision making, hiring committee, thesis defense) (4)					
Professional development (e.g. training, capacity building) (8)					
Public-facing event (e.g. launch, debate, town hall) (9)					
Research (e.g. collaborating on proposal writing, analysis or writing) (10)					
Teaching/Learning (e.g. attending or giving a lecture, seminar or tutorial) (11)					
Conference (e.g. exchanging information, networking) (12)					
Tour or visit (e.g. viewing new facilities, buildings or sites) (13)					

Pre-Covid-19 ***Flight*** Behaviors

13. **For one full year before Covid-19 restrictions were imposed,** please fill out how often you used the following formats for each type of intercampus collaborative activity listed below. When filling this out, it is fine to approximate; if you cannot remember the exact number of times you participated in each activity during this time frame, you can estimate based off work patterns. In other words, if you believe you traveled the intercampus route about once a month before Covid-19 for work-related meetings, then you would enter 12 into the box under the in-person column for the row referring to that type of activity.

	In-Person	Virtual	Hybrid

Work-related meeting (e.g. decision making, hiring committee, thesis defense) (1)			
Professional development (e.g. training, capacity building) (2)			
Public-facing event (e.g. launch, debate, town hall) (3)			
Research (e.g. collaborating on proposal writing, analysis or writing) (4)			
Teaching/Learning (e.g. attending or giving a lecture, seminar or tutorial) (5)			
Conference (e.g. exchanging information, networking) (6)			
Tour or visit (e.g. viewing new facilities, buildings or sites) (7)			

Covid-19 Flight Behaviors

14. **For one full year of Covid-19 restrictions,** please fill out how often you used the following formats for each type of intercampus activity listed below. When filling this out, it is fine to approximate; if you cannot remember the exact number of times you participated in each activity during this time frame, you can estimate based off work patterns.

	In-Person	Virtual	Hybrid
Work-related meeting (e.g. decision making, hiring committee, thesis defense) (1)			
Professional development (e.g. training, capacity building) (2)			
Public-facing event (e.g. launch, debate, town hall) (3)			

Research (e.g. collaborating on proposal writing, analysis or writing) (4)			
Teaching/Learning (e.g. attending or giving a lecture, seminar or tutorial) (5)			
Conference (e.g. exchanging information, networking) (6)			
Tour or visit (e.g. viewing new facilities, buildings or sites) (7)			

Post-Covid-19 Flight Behaviors

15. **For one full year after all Covid-19 restrictions have been lifted,** please fill out your preference for how often you would like to use the following formats for each type of intercampus activity listed below. Please keep the same total numbers for each type of activity that you filled out for your pre-Covid-19 year in Question 13, but indicate how you would prefer to see the numbers distributed across the three formats in the future.

For example, if in Question 13 you indicated that you flew the intercampus corridor 12 times for in-person work-related meetings, then indicate if in the future you would prefer to continue to be in-person for all work-related meetings, or if you would prefer these meetings to be some other combination of the three formats, such as half in-person (6 times), half virtual (6 times), and no hybrid (0 times).

	In-person	Virtual	Hybrid
Work-related meeting (e.g. decision making, hiring committee, thesis defense) (1)			
Professional development activity (e.g. training, capacity building) (2)			
Public-facing event (e.g. a launch, debate, town hall, etc) (3)			
Research (e.g. collaborating on			

proposal writing, analysis or writing) (4)			
Teaching (e.g. attending or giving a lecture, seminar or tutorial) (5)			
Conference (e.g. exchanging information, networking) (6)			
Tour or visit e (e.g. viewing new facilities, buildings or sites) (7)			

Barriers and Solutions

16. What do you feel is the biggest barrier standing in the way for organizers of intercampus activities in choosing alternatives like virtual and hybrid formats over in-person? Please drag and drop the barriers listed below to rank them in order of importance.

_____ Lack of knowledge of the alternatives available and how to use them (e.g. virtual/hybrid formats, carpooling/busing transportation options)

_____ Lack of access to the alternatives (e.g. free subscriptions to virtual software)

_____ Lack of knowledge of the climate impact of flying

_____ Lower quality of the alternatives (e.g. technical and/or social issues associated with virtual/hybrid formats)

_____ Policies and regulations of the workplace, whether department, faculty or administrative units

_____ Culture and/or norms of the workplace, whether department, faculty or administrative units

_____ Personal preference (e.g. organizers prefer activities to be in person and will continue to select that format)

_____ I do not feel there are any barriers

_____ Other (optional: please type in any additional barriers)

17. How helpful do you think each of the following solutions will be for reducing overall air travel levels in the UBCV-UBCO corridor? Please drag and drop the solutions listed below to rank them in order of helpfulness.

_____ Education and awareness raising on the significant impact of flying on climate change

_____ Capacity building enabling the use of alternatives to flying such as virtual/hybrid formats or more climate-friendly travel options (e.g. promotion of options, free training classes, personalized IT support).

_____ Increased access to the alternatives (e.g. free access to virtual tools, installation of hybrid meeting rooms / classroom technologies).

_____ Decision-making tree / air travel justification tool enabling organizers / participants to decide on activity format and/or travel option based on type and importance of activity.

_____ Communications or engagement strategy aimed at shifting the workplace culture or norms with respect to flying the intercampus corridor.

_____ Carbon tax or carbon offset program to incentivize the selection of alternatives to flying by requiring flyers to pay a set amount per tonne of CO_2 emitted.

_____ Equitable flight quotas or credits at the individual or administrative unit level with penalties applied when quota is exceeded, or credits run out.

_____ Other (optional: please type any additional recommendation you believe would be effective).

18. Is there anything else you would like to tell us? Please type any additional comments into the box below.

_____

Follow-up Interview

The next step in this project is conducting semi-structured interviews with UBC faculty and staff that have flown the corridor. We are asking all survey participants if they would be interested in a 20-30 minute follow-up interview diving deeper into motivations behind flight behaviour, the barriers to choosing alternatives to flying and the solutions for reducing flights. If you are interested, please write your name and email in the text boxes below, and we will contact you to schedule an interview. Thank you for your potential interest, we appreciate your cooperation.

19. Please type in your name and email address:

- Name: _____
- Email Address: _____

Appendix B: Interview Questions

Welcome:

- Quick intro from me and Mary
- Explanation of the project
- What to expect from this interview (what kind of questions, format (semi-structured), time (20-30 minutes))

Hi, I firstly just wanted to thank you for your participation in this project through the survey and interviews. My name is Grace Kyle and I am a 4th year EESC student at UBCO. I am currently doing a SEEDS project, under the supervision of Dr. Mary Stockdale, that aims to reduce the amount of intercampus flying that occurs within UBC faculty and staff, and particularly the administrators. Your input from both the survey and this interview will help generate recommendations for UBC to reduce the emissions from the intercampus flying without compromising the quality of intercampus collaborations. These recommendations will also help inform and guide UBC's CAP2030 and ultimately help UBC reach their climate targets in the future.

Now, I'll just walk you through the interview process real quick so there's no surprises. This interview will be between 20-30 minutes and I will ask you to discuss your intercampus air travel pre-covid, during covid, and in the future. The questions ask about the same topics as the survey, but just more in-depth.

Pre-Covid:

<u>Initial Question:</u>

- Can you tell me what your job/position within UBC is? What is your administrative unit?

<u>Questions about nature of air travel:</u>

- Describe the main types of intercampus activities that you are part of: what are they, who, how often, why?

For Faculty/Staff-

- Can you describe the different activities that you are a part of?
    - meetings, research collabs, thesis defenses, others

For Deans/Bosses-

- What kind of reasons were you flying for?
    - hiring, firings, quality assurance checks, others

If they are also an administrator-
-As an administrator, can you describe a few different reasons that you fly?

- What are the types of activities that you **need to fly the intercampus route for**? (breaking it down, what kinds of things do you do that are intercampus collaborations)
    - Could you give me an example of what an important activity is for you?

- From your survey responses, I can see you do not choose to book your flights with the UBC Travel Services, why is that?
    - You indicated that most of the time you choose to book privately, what about the other times? Would you book through the UBC Travel services then?

Questions regarding motivations behind intercampus travel-

- Why did you choose to fly over the alternatives (virtual/hybrid format) in the past?
- I saw that you indicated you flew twice before Covid for professional development and teaching/learning, can you describe these activities a little more for me?
    - Why did you choose to fly to these events?
    - Did you feel there was an option to choose a virtual format for these activities?

- Have you ever felt expected to fly for university-related activities? And if so, why?
    - Did you want to choose flying, or was it against your personal prefs?

Questions about intercampus specific travel-

- For your intercampus activities, do you feel you fly more to the other campus, or do they fly more to your campus?
    - In your observations of intercampus activities, who is mostly flying where, and why is that the case?
- As someone based out of the Vancouver campus, do you feel that your UBCO colleagues fly more to Vancouver, or do you fly to the Okanagan more?

Covid-19:

- I noticed that you did not indicate that you did any university-related activities using a virtual format during a full year of Covid-19 restrictions. This is quite unique compared to most survey participants, do you know why you didn't partake in any virtual activities?

- What was the biggest change you noticed from the transition to virtual with covid-19? What were some of the pros and cons with this transition? Has it made intercampus activities harder for you? In what ways?

- In what ways has Covid-19 changed the way you view in-person, virtual, or hybrid formats? Especially virtual versus in-person!

Post-Covid-19: pluses and minus of each for the future, in future for these activities, important to ask even if they have never done hybrid if they have opinions, get people to discuss why it's better sometimes to be in-person versus why virtual

Question about future preferences-

-talk about new technology in hybrid ('new hybrid')

- Are you familiar with the new hybrid system?
- In the future, hybrid is going to be an option at ubc, are you familiar with it?

- Once all Covid-19 restrictions are lifted, would you prefer to travel the same way you did pre-Covid, or would you prefer to use more virtual/hybrid formats when applicable?

- Within each specific activity type, are there times when certain formats are better and other times when a different format is preferable? Is there any specific event/activity you can think of where in-person is the only option/by-far the best option?

- When would you want to meet in-person versus when would you want to fly?
    - Why would you prefer to have public-facing events and tours and visits in person in the future? Convenience?

Questions about barriers-

- Do you feel there are any side benefits to flying over the alternatives that attract you to flying?
    - Are there side benefits/perks to flying? Status with flying? Seeing family/friends, fun experiences, etc.? Air miles?

- In what ways would it inconvenience you if you could never fly for university related purposes?
- What would be the biggest barrier to choosing hybrid or virtual format when organizing an intercampus activity? Convenience, technology problems, etc.?
- Which types of activities do you feel is easiest to use virtual/hybrid format for? Which types of activities are hardest to use virtual/hybrid format for?

Questions about solutions-

- Under the solutions ranking question in the survey, you said that 'education and awareness of the climate impact flying has' would be most helpful to reducing air travel in the intercampus route, why do you think this is?

- What are your main motivations for changing formats in the future?
- What would motivate you to fly less in the future?
    - Cost, convenience, CAP2030, other?
    - Are you motivated by emissions/reducing them?
- How do you think we can get people to reduce their flights on the two campuses?
- What do you think is the best way to reduce flights in the corridor?

- How do you feel about the following list of suggestions/solutions that UBC could implement to curb intercampus flying?:

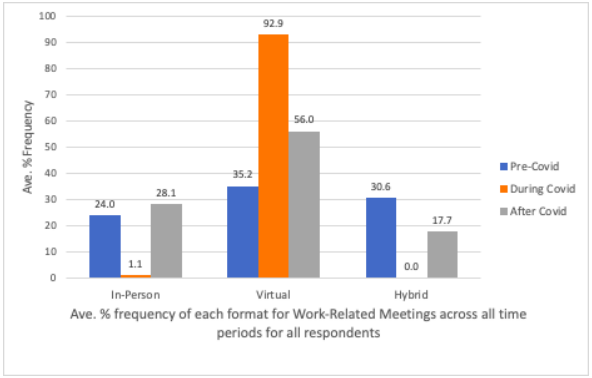
- Do you have any idea on how UBC should track and report their emissions? Do you think it would encourage UBC faculty and staff to use less emissions?
- Would you use an Air Travel Justification Tool? Are you aware of what these are and how they work?
- Do you have any opinions on the effectiveness of widespread usage of an Air Travel Justification Tool for organizers of intercampus collaborations?

If time allows:

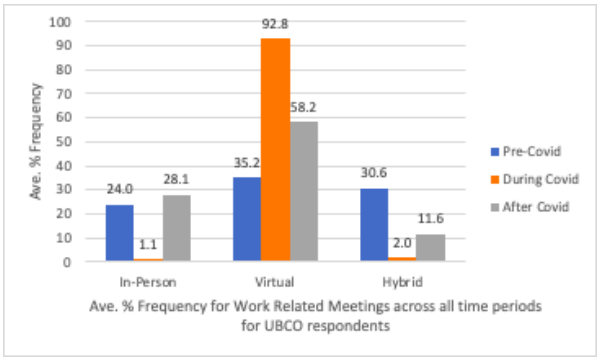
- Some institutions and organizations, such as Greenpeace, have suggested a frequent flyer levy, a tax that increases the more you fly each year. Do you have any opinions on this idea, its effectiveness and how would you feel about this for yourself or your administrative unit? Do you have any opinions on this being implemented on an institutional level to your specific administrative unit, as a way to compare unit-by- unit.
- As well as a frequent flyer levy, an end to air miles has also been suggested as a way to disincentivize frequent air travel. How would you feel about this?

Appendix C: Matrix Table Graphs

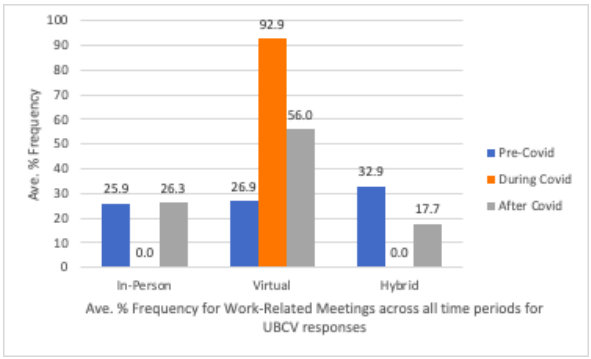
Work-Related Meetings:



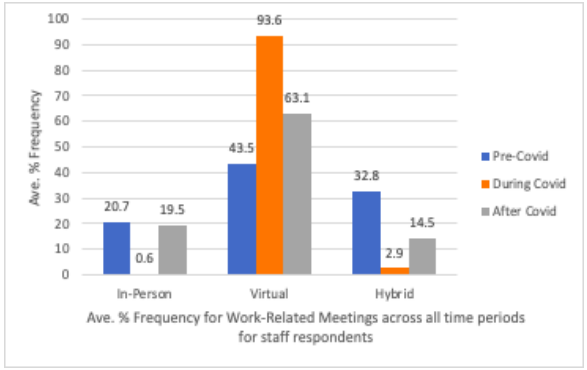
Ave. % frequency of each format for Work-Related Meetings across all time periods for all respondents



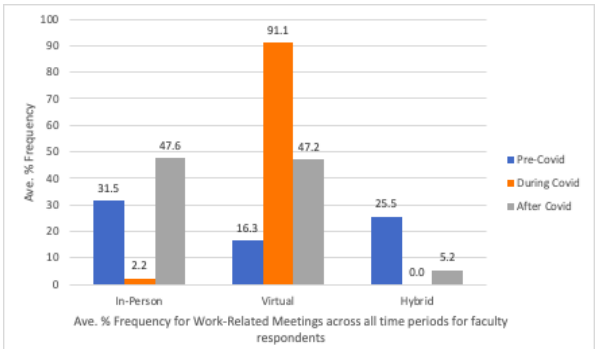
Ave. % Frequency for Work Related Meetings across all time periods for UBCO respondents



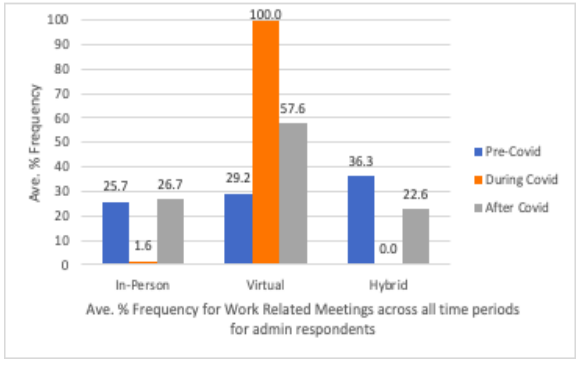
Ave. % Frequency for Work-Related Meetings across all time periods for UBCV responses



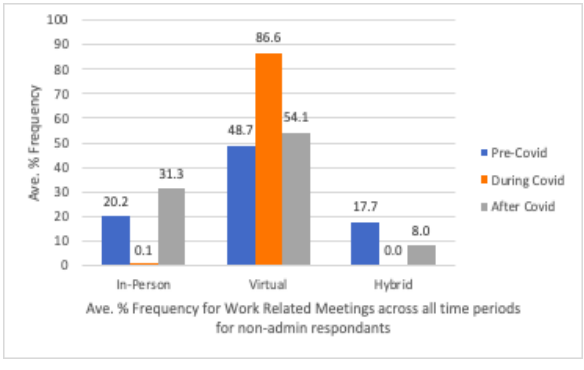
Ave. % Frequency for Work-Related Meetings across all time periods for staff respondents



Ave. % Frequency for Work-Related Meetings across all time periods for faculty respondents

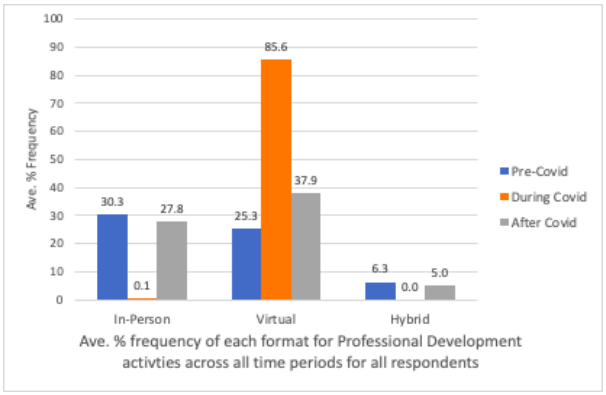


Ave. % Frequency for Work Related Meetings across all time periods for admin respondents

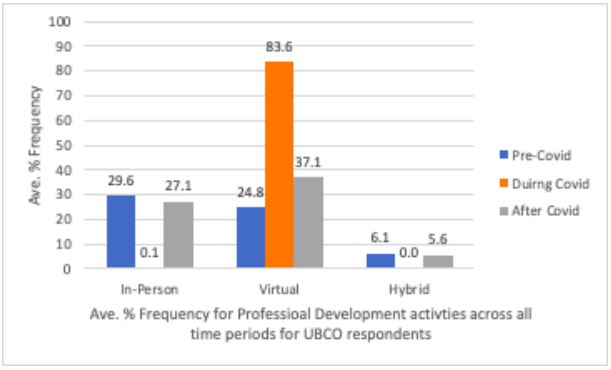


Ave. % Frequency for Work Related Meetings across all time periods for non-admin respondants

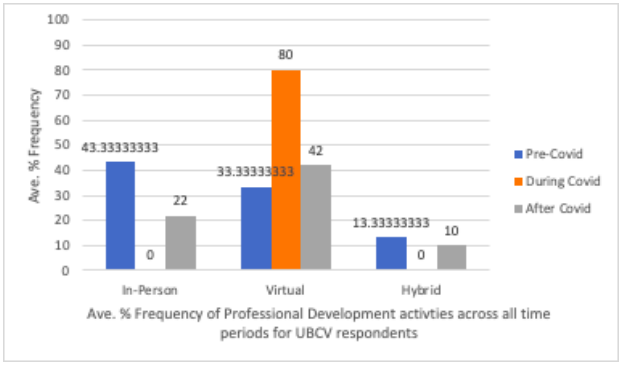
Professional Development:



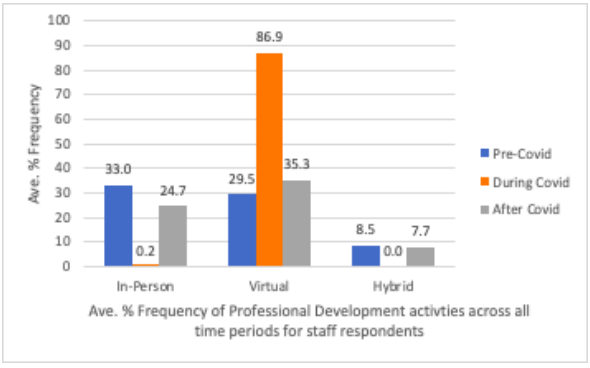
Ave. % frequency of each format for Professional Development activties across all time periods for all respondents



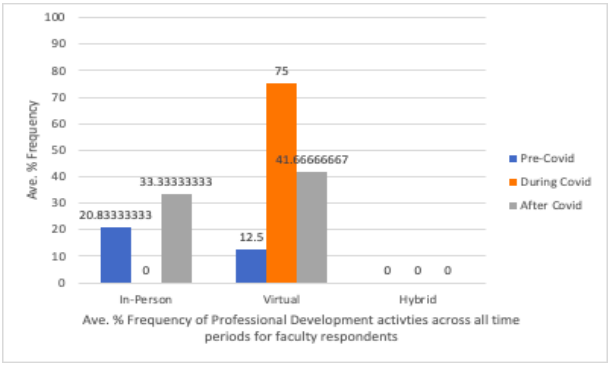
Ave. % Frequency for Professioal Development activties across all time periods for UBCO respondents



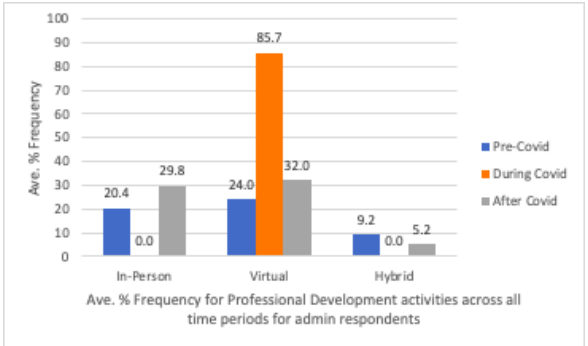
Ave. % Frequency of Professional Development activties across all time periods for UBCV respondents



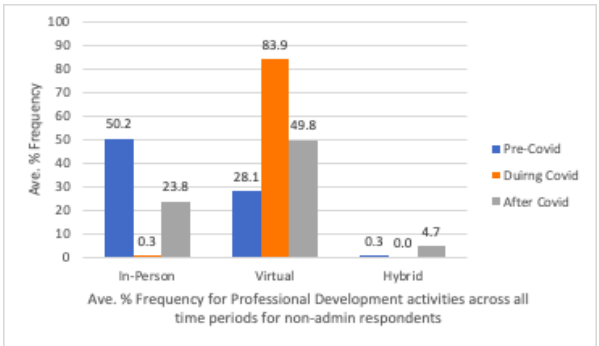
Ave. % Frequency of Professional Development activties across all time periods for staff respondents



Ave. % Frequency of Professional Development activties across all time periods for faculty respondents

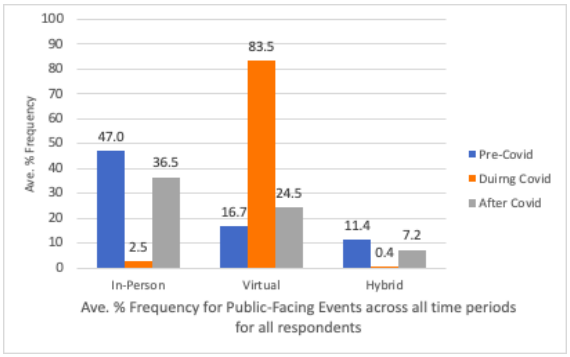


Ave. % Frequency for Professional Development activities across all time periods for admin respondents

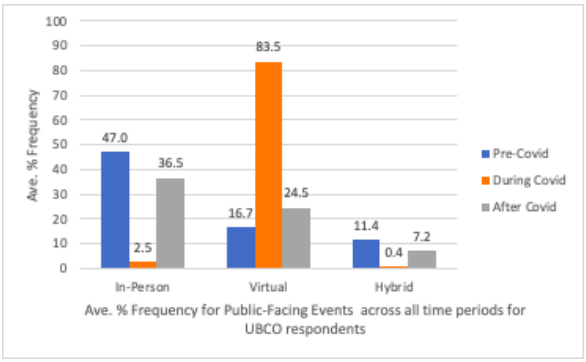


Ave. % Frequency for Professional Development activities across all time periods for non-admin respondents

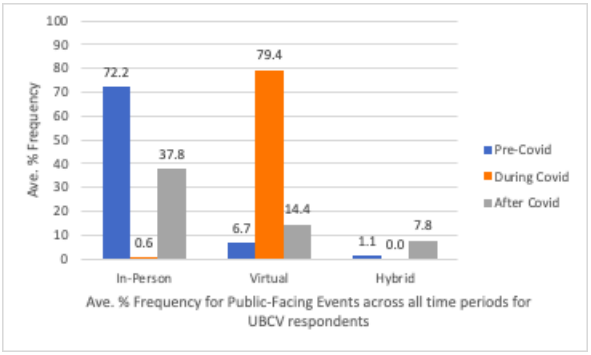
Public-Facing Events:



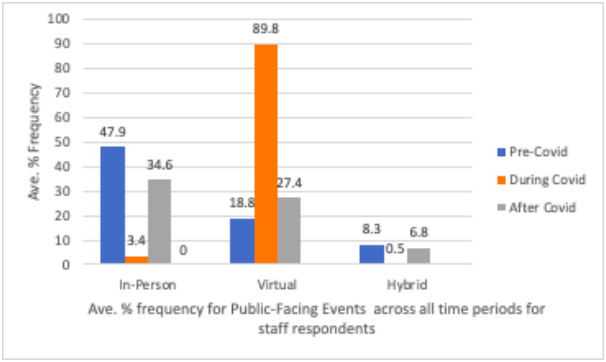
Ave. % Frequency for Public-Facing Events across all time periods for all respondents



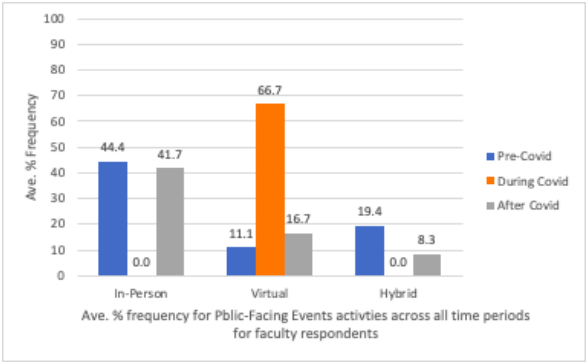
Ave. % Frequency for Public-Facing Events across all time periods for UBCO respondents



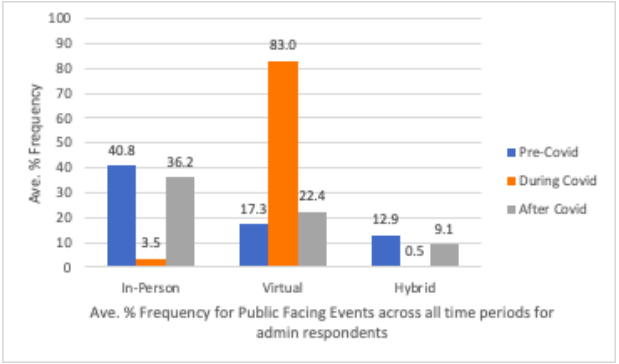
Ave. % Frequency for Public-Facing Events across all time periods for UBCV respondents



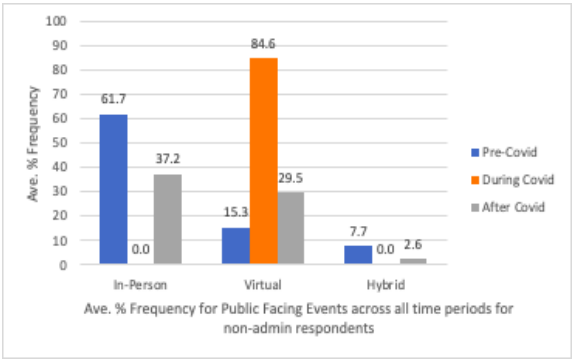
Ave. % frequency for Public-Facing Events across all time periods for staff respondents



Ave. % frequency for Pblic-Facing Events activties across all time periods for faculty respondents

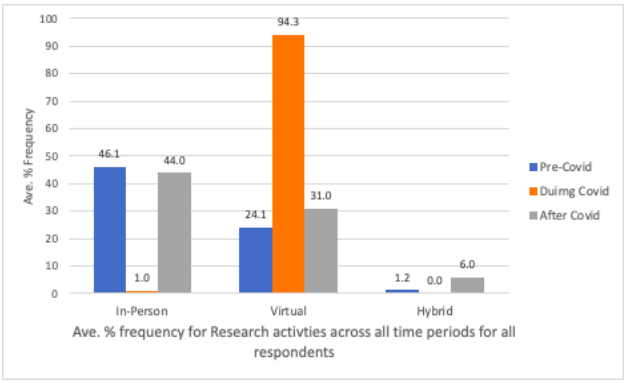


Ave. % Frequency for Public Facing Events across all time periods for admin respondents

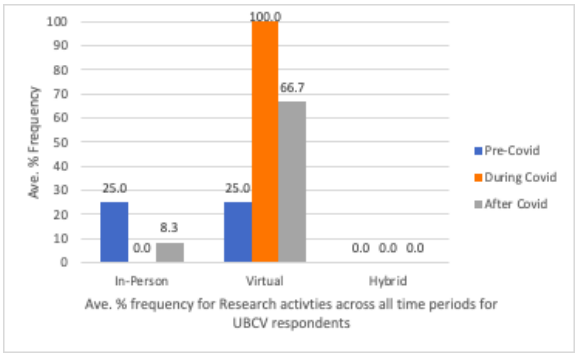


Ave. % Frequency for Public Facing Events across all time periods for non-admin respondents

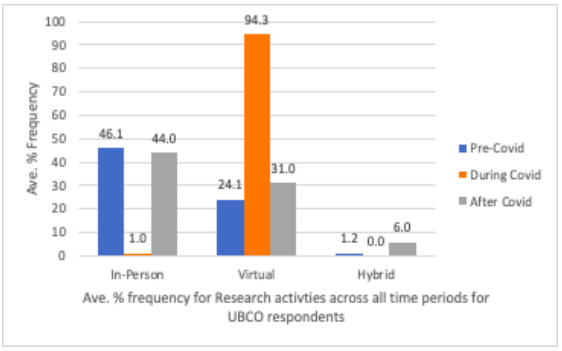
Research:



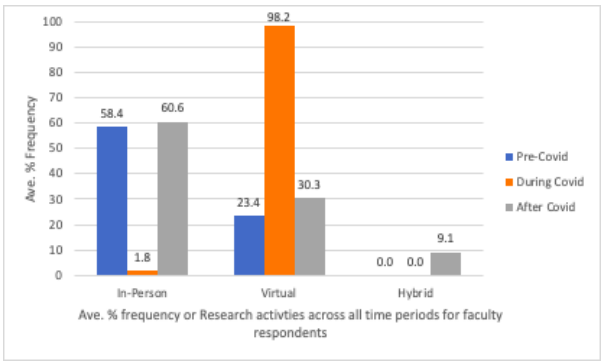
Ave. % frequency for Research activties across all time periods for all respondents



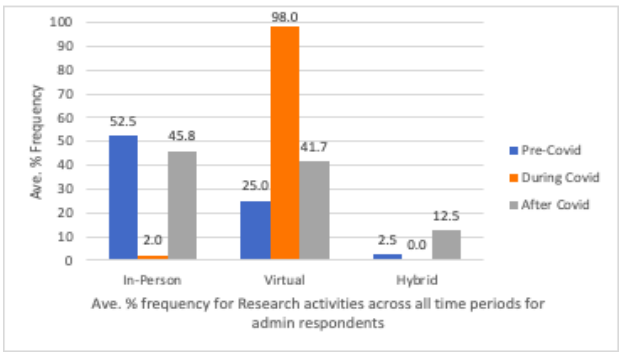
Ave. % frequency for Research activties across all time periods for UBCV respondents



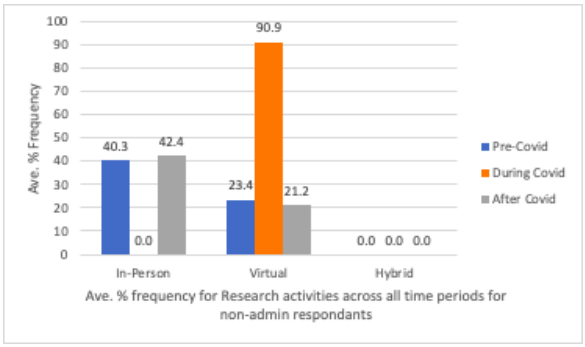
Ave. % frequency for Research activties across all time periods for UBCO respondents



Ave. % frequency or Research activties across all time periods for faculty respondents

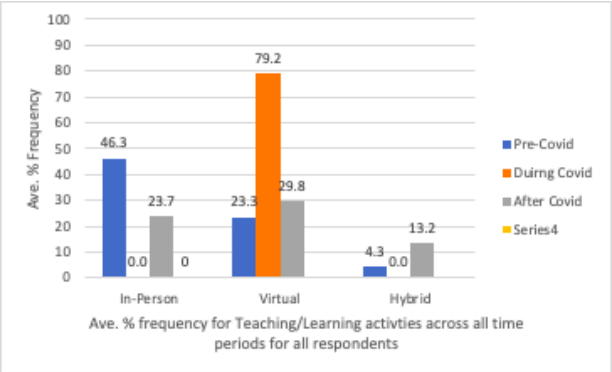


Ave. % frequency for Research activities across all time periods for admin respondents

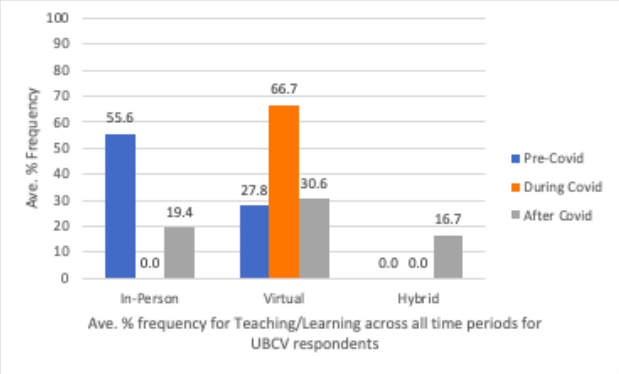


Ave. % frequency for Research activities across all time periods for non-admin respondants

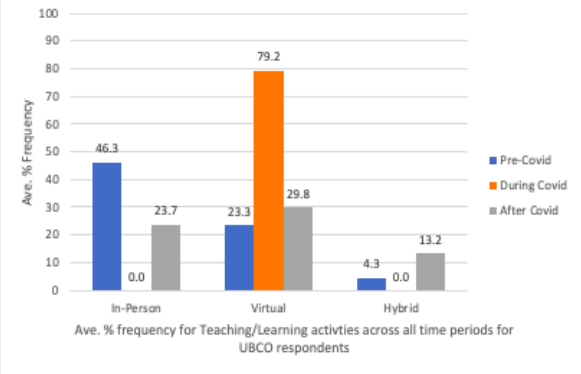
Teaching/Learning:



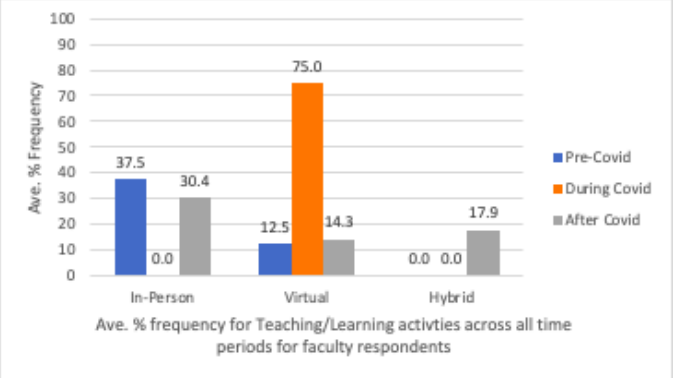
Ave. % frequency for Teaching/Learning activties across all time periods for all respondents



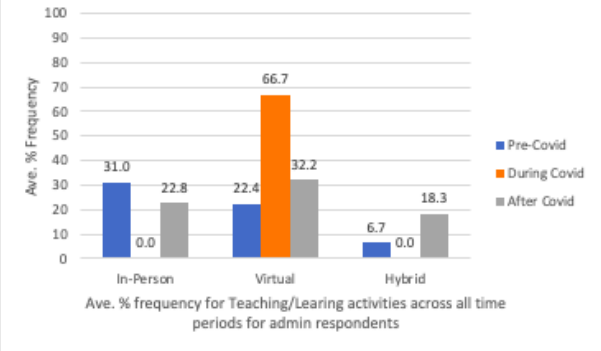
Ave. % frequency for Teaching/Learning across all time periods for UBCV respondents



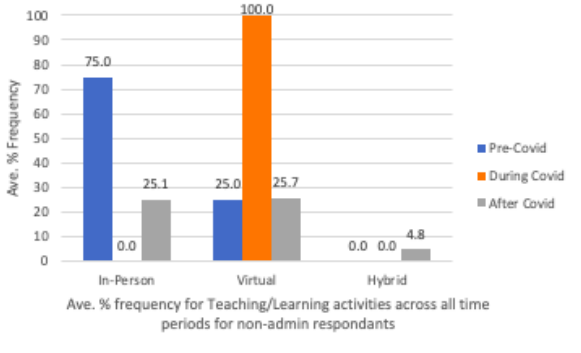
Ave. % frequency for Teaching/Learning activties across all time periods for UBCO respondents



Ave. % frequency for Teaching/Learning activties across all time periods for faculty respondents

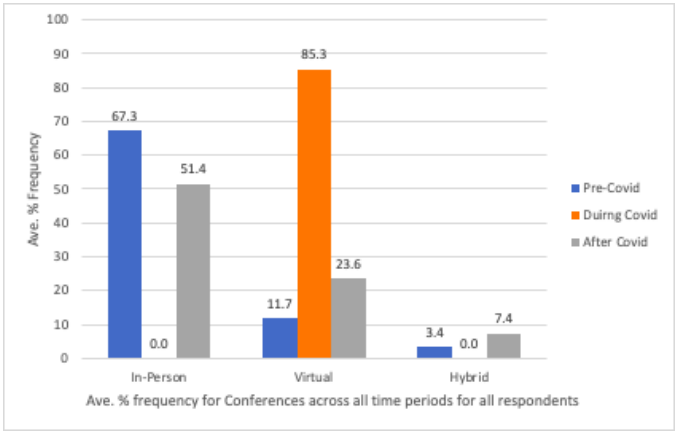


Ave. % frequency for Teaching/Learing activities across all time periods for admin respondents

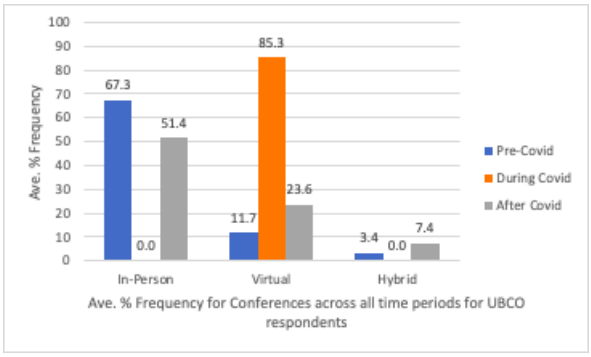


Ave. % frequency for Teaching/Learning activities across all time periods for non-admin respondants

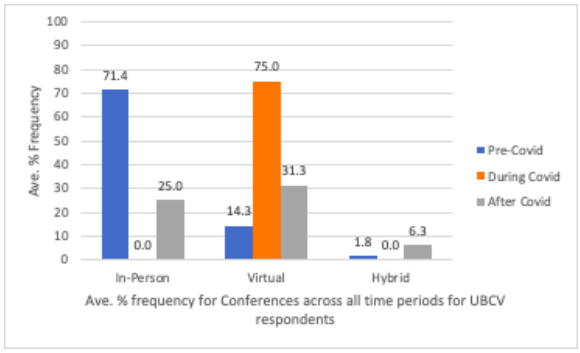
Conferences:



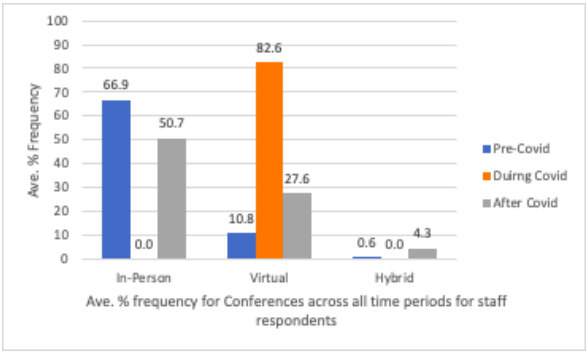
Ave. % frequency for Conferences across all time periods for all respondents



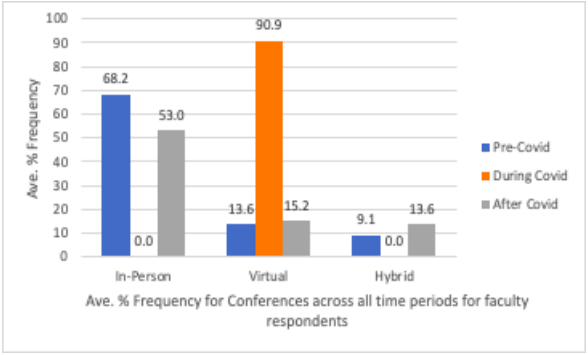
Ave. % Frequency for Conferences across all time periods for UBCO respondents



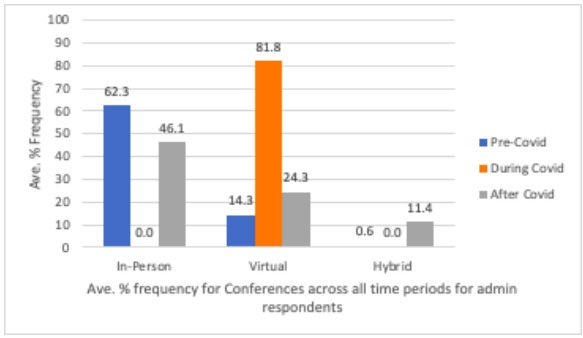
Ave. % frequency for Conferences across all time periods for UBCV respondents



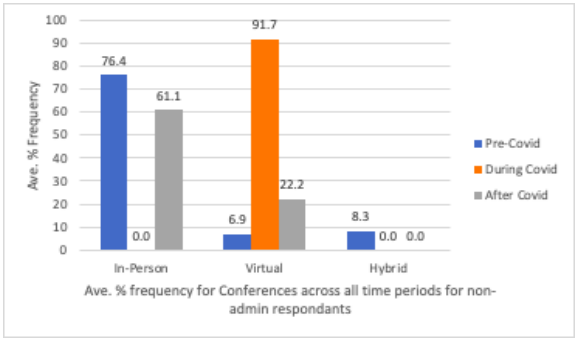
Ave. % frequency for Conferences across all time periods for staff respondents



Ave. % Frequency for Conferences across all time periods for faculty respondents

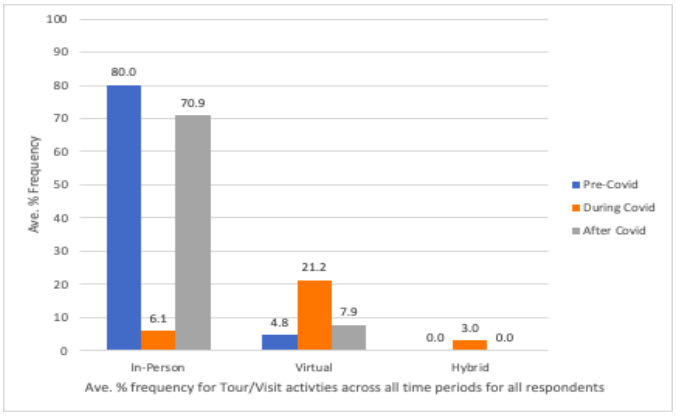


Ave. % frequency for Conferences across all time periods for admin respondents

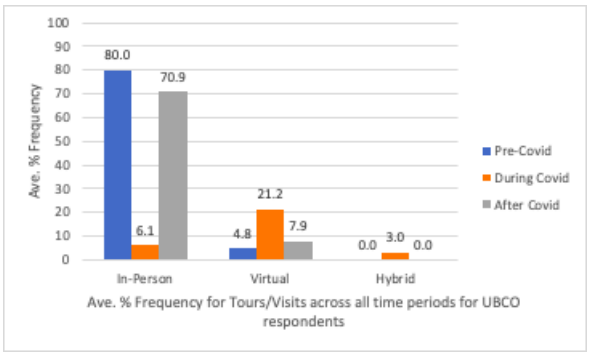


Ave. % frequency for Conferences across all time periods for non-admin respondants

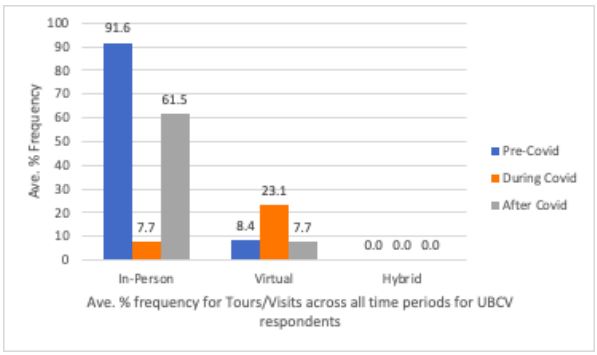
Tours/Visits:



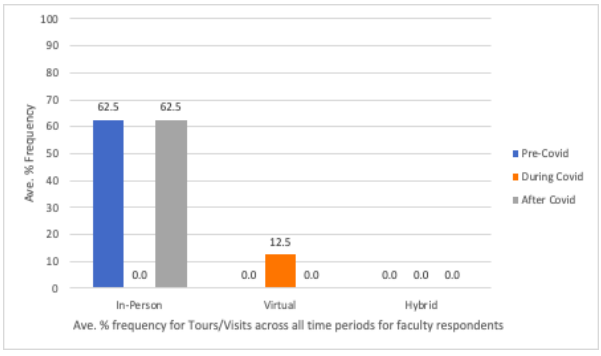
Ave. % frequency for Tour/Visit activties across all time periods for all respondents



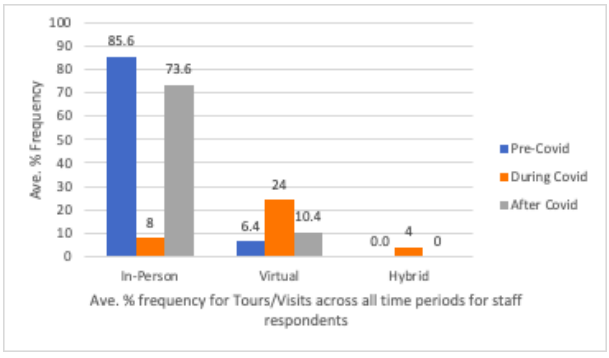
Ave. % Frequency for Tours/Visits across all time periods for UBCO respondents



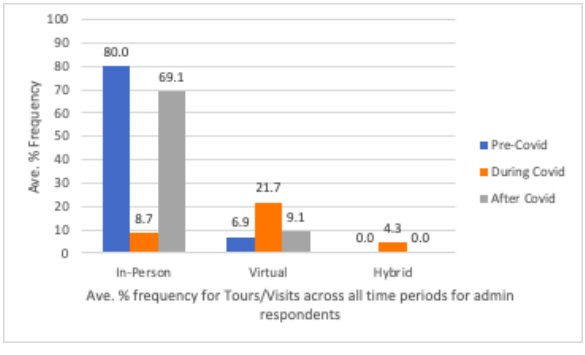
Ave. % frequency for Tours/Visits across all time periods for UBCV respondents



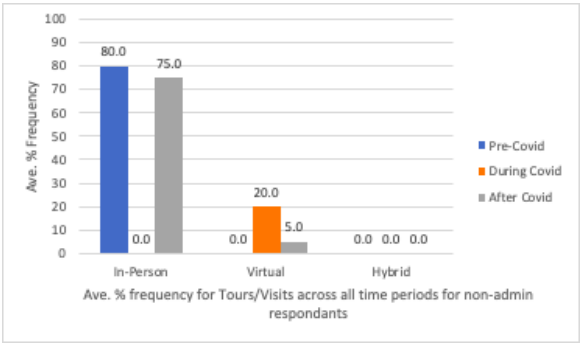
Ave. % frequency for Tours/Visits across all time periods for faculty respondents



Ave. % frequency for Tours/Visits across all time periods for staff respondents



Ave. % frequency for Tours/Visits across all time periods for admin respondents



Ave. % frequency for Tours/Visits across all time periods for non-admin respondants