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This paper presents an interesting exploration of COVID-19 outbreaks and cases recorded at Colorado ski resorts and nearby restaurants. Exploratory and preliminary analyses provide an important piece of the puzzle when mitigating against novel diseases, so well done. The paper is well written but the paper would benefit from a few edits and additions as outlined below.

Comment 1: Line 71: contributed

> **Reply 1:** We appreciate the reviewer's comment and have made the change in the text (see p. 4, line 71).
> **Changes in the text:** We have added "contributed" to the following line: "…the "high-risk" categorization of ski resorts across the globe, several factors likely contributed to..."

Comment 2: Line 82: Do you have examples of the inconsistent guidance? I suspect its true but the statement would benefit from an example or reference.

> **Reply 2:** We agree that a reference would benefit this statement. We have added references regarding various ski resorts' plans (e.g., Winter Park, Monarch Mountain, Vail, Granby Ranch, Copper Mountain, Aspen, and Arapahoe Basin) that are included in the counties which are the focus of this study to provide citations related to the variation in resort guidance during the time period of the study (November 1, 2020 to May 1, 2021) (see p. 4, lines 80-81).
> **Changes in the text:** We added references to the following statement: "General guidance was released during the COVID-19 pandemic for ski resorts; however, this guidance was often broad and inconsistent (5,9-15)."

Comment 3: Line 106: Can you please further clarify why you are also looking at restaurant data? What is the link and why is it important?

> **Reply 3:** We agree that our manuscript would benefit from clarification regarding why we are also looking at restaurant data and its importance and we have modified text and added a statement to the manuscript to provide additional clarity (see p. 5-6, lines 106-112).
> **Changes in the text:** The following changes were made to the text: "This study also reviews COVID-19 restaurant outbreak data occurring within a 10-mile radius of each ski resort to demonstrate the multidirectional influence of COVID-19 within the local communities. Restaurant outbreaks within this radius can indicate local community spread of SARS-CoV-2, particularly if cases occur among restaurant workers. Restaurant visitors likely may also be guests or workers from nearby ski resorts or reside in the local community, thereby highlighting the

influence of multidirectional transmission at ski-resorts."

Comment 4: Line 136: Can you please clarify how outbreaks were determined to be ski-resort OR restaurant related? This Inclusion section could benefit from a flow chart/figure to see how different categories/search parameters fed into the two outbreak categories. I have just seen that below (up to line 152) you have all this info which is great - but it is recommended to provide a flow chart or similar to visually represent this process.

Reply 4: We appreciate the reviewer's suggestion. A flowchart has been generated to visually represent the process in which outbreaks were categorized as related to ski resorts or restaurants. (See Figure 1; see p. 7, lines 139-141; see p. 8, lines 169-170.) Additionally, a Table 1 citation was added to p. 8, line 175 to provide clarity.

Further, the addition of the new figure affected the total number of figures and tables count on p. 1, line 24 as well as the numbering of the subsequent figures on p. 9, line 186; p. 10, lines 213, 217, & 218; p. 16, lines 335 & 337-338, p. 17, and line 377).

Changes in the text: At the end of the last sentence of the second paragraph of the methods we inserted the following: **"**All outbreaks were categorized into two main categories: 1) Ski Resort-Related; and 2) Restaurant-Related (see Figure 1)."

We also referenced this figure again in the first sentence of the first paragraph of the "Ski Resort-Related Outbreaks" section: "A total of 57 COVID-19 outbreaks and 429 COVID-19 cases were reported in ski resort-related locations during Colorado's 2020 to 2021 ski season (Figure 1; Table 1)."

For clarity, Table 1 was also referenced in the subsequent sentence: "Grand County had three outbreaks, accounting for 5.3% of the total outbreaks, but almost half (45.7%) of all cases were seen in Grand County, primarily because of one large outbreak in February, 2021 (Table 1)."

Methods section:

Comment 5: Are there any available data on the number of visitors/staff at each location (or Colorado ski season overall) over the time period? Your study would benefit from understanding the population exposure - i.e. were the sites experiencing higher caseloads/outbreaks also receiving more guests, and therefore spreading the virus faster or more extensively to the staff/resort workers? If you have this data then you could conduct some more robust analyses that explore the relative risk (of both infection and then an outbreak) to the two exposed populations. If reanalysed or added the abstract, methods and results sections would require to be updated.

Reply 5: We appreciate the reviewer's comment and we agree that obtaining data

on visitors and staff at both resorts and restaurants would provide further insight into the population's overall exposure profile. Toward this goal, we contacted the following resorts to determine the number of staff employed and visitor numbers: Vail, Winter Park, Arapahoe Basin, Breckenridge, Copper Mountain, Steamboat, Monarch, Granby, Aspen, Telluride. We also contacted the restaurants which had data included in our study that fell within a 10-mile radius of these resorts. Unfortunately, neither the resorts, nor the restaurants were willing to share their information on the number of visitors or staff employed during the time period of interest. For example, a couple of the resorts we contacted noted that the information was proprietary business information while others simply did not respond to our requests for the data.

Changes in the text: No changes were made to the text.

Comment 6: Line 153. Need to add your statistical analyses here (Welch's t-test etc). Also, you could compare restaurant outbreaks vs ski-resorts outbreaks, i.e. were restaurants or ski resorts more severe (number of cases) or more frequent (number of outbreaks). Potentially a chi-square or Odds ratio analysis could explore this?

Even though this paper is primarily descriptive - some statistical analyses of categories (chi square, relative risk, odds ratio, etc where appropriate) should be considered and would increase the quality of the paper.

Reply 6: We thank the reviewer for noting the absence of the statistical method used for our descriptive analyses (i.e., Welch's t-test), and we have included a statement in the manuscript to note this as suggested.

We appreciate the reviewer's suggestion to provide an odds ratio to explore the magnitude of the difference of severity and/or frequency between restaurants and ski resorts. Although we contacted all ski resorts and restaurants within 10 miles of the resorts that were located in the counties which are the focus of our manuscript, none of the resorts were willing to share their information, and we were unable to obtain the total number of staff or visitors at restaurants or ski resorts between November 1, 2020 to May 1, 2021. As a result, without the total number of staff at the ski resorts and restaurants of interest, calculating an OR is not possible.

However, we were able to use a Welch's Two Sample T-test to compare ski resort- and restaurant-related outbreaks and cases within each county. When comparing ski resort- and restaurant-related outbreaks and cases the p-value remained greater than 0.05, respectively. Given that the p-value was greater than 0.05, it indicates that there was not a significant relationship between the setting of the outbreak (i.e., ski resort or restaurant) and the mean number of outbreaks or cases at the county level. We have added statements in the text to reflect these changes to the methods (see p. 8, lines 161-165) and results (see p. 11, lines 231-235).

During this additional data exploration, we noticed two values in Table 2 were incorrectly recorded in the table. As a result, we modified the values for the "Duration (in days) Mean (SD)" for the "Winter Sports Related" Setting Type and for the "Cases per Outbreak Mean (SD)" for the "Maintenance & Operations" Setting Type. We also noted that the in-text description of the Table 2 results for these values on p. 9-10 (lines 198-200) also required modification to reflect the correct values.

Changes in the text: To describe the t-tests used in our analyses, we included the following statements to the methods section: "Welch's Two Sample T-test was used to compare the mean cases per outbreak among ski resort related settings and separately among restaurant related settings. Welch's Two Sample T-test was also used to compare ski-related and restaurant-related outbreaks and cases within each county. Descriptive statistics were calculated in RStudio and Stata."

We also added additional comparisons between ski resort-related and restaurant-related to the results section of our manuscript:

"*Comparison of Ski Resort-Related and Restaurant-Related Outbreaks and Cases"*

No significant difference between total number of outbreaks at the county-level was found between ski resort- and restaurant-related outbreaks ($p>0.05$). Additionally, no significant difference was found between total number of cases at the county-level when comparing ski resort- and restaurant-related cases ($p>0.05$)."

Table 2 changes for the "Duration (in days) Mean (SD)" under the "Winter Sports Related" Setting Type included modifying the mean duration to 30.28. For the "Cases per Outbreak Mean (SD)" under the "Maintenance & Operations" Setting Type, the mean cases per outbreak was changed to 3.95.

In-text changes that described Table 2 included modifying the following statement: "The average number of cases per outbreak ranged from 3.95 (SD = 3.72) to 15.65 (SD = 43.09), and the average outbreak duration ranged from 22.10 days (SD = 11.04) to 30.28 days (SD = 14.16)."

Results

Comment 7: This section is a little confusing when you switch from describing out breaks to cases (around line 203). Are the cases as a result of the outbreak or are they the number of cases at a location? if they are separate maybe add another sub-heading and reorganise the text accordingly. e.g. Ski-related-Covid cases?

Consider adding in the extra analyses discussed in the Methods section comment.

Reply 7: We thank the reviewer for the comment. To aid in clarity we separated the discussion of monthly COVID-19 statistics by outbreaks and outbreak-related cases. (see p. 10, lines 212-217).

Additionally, as noted above in **Comment 6** (i.e., the Methods section comment), we provided extra analyses to compare ski resort- and restaurant-related outbreaks and cases, respectively, using a Welch's t-test. (See p. 8, lines 161-164; see "changes in text" for **Comment 6** above.)

Changes in the text: We have made the following changes to provide clarity: **"**As noted in Figure 2, November had the largest number of COVID-19 restaurant outbreaks (n = 18; 27.3%), and March had the second largest number of restaurant outbreaks (n = 14; 21.2%). November also had the largest number of recorded COVID-19 outbreak-related cases (n=56; 21.1%), while January had the second most outbreak-related cases (n = 53; 19.9%) (March had 52 cases; see Figure 3). The remaining months had between 7 and 10 outbreaks and between 27 and 48 outbreak-related cases (Figures 2 and 3, respectively)."

Discussion

Comment 8: Line 265: Suggest changing to "a highly transmissible respiratory virus responsible for developing COVID-19" if you want to keep this and SARS-Cov-2 you may also want to add an introductory sentence or two into the introduction about how SARS-Cov-2 is the virus responsible for COVID-19 disease, as opposed to the discussion.

Reply 8: We agree with the reviewer's suggestion and have included additional text to provide clarification explaining that SARS-Cov-2 is the virus responsible for COVID-19 disease (see p. 13, line 281). Similarly, text was also added to the Introduction to the same effect (see p. 4, lines 64-65).

Changes in the text: As per the reviewer's suggestion, text to explain the relationship between SARS-Cov-2 and COVID-19 was added to the Discussion: "a highly transmissible respiratory virus responsible for causing COVID-19, and the activity of skiing outdoors itself." Clarification was also provided in the introduction: "…the spread of SARS-CoV-2, a highly transmissible respiratory virus responsible for causing COVID-19, among guests and the local communities in which the resorts operate."

Comment 9: Line 281: This could be shown with exposure analysis and results suggested above, especially if there was overall employee data since they appear to be the main high-risk population in these settings (line 283).

Reply 9: We appreciate the reviewer's comment. Unfortunately, as aforementioned, this data is not publicly available and as a result, we are not able to accommodate this suggestion.

Changes in the text: No changes were made to the text.

Comment 10: Line 342: In this paragraph (or around it) could you develop a simple template/example risk mitigation plan and actions for some of the main risks (Top 5?) that could be relevant across ski-resort sites? This may be an effective way to demonstrate what actions/plans could be adopted as a minimum consistently at all ski resorts?

Reply 10: We appreciate the reviewer's comment. To address the requested changes, we included additional text which outlines the main components of risk mitigation plans, as well as categories to incorporate in such plans, with some specific examples relevant to ski resorts. To support the additional text, we have included the following citations as well: Boles et al. 2020 (reference #31) and Parker et al. 2020 (reference #32). This text can be found on p. 17, lines 360 to 380.
Changes in the text: Based on the reviewer's suggestion, the following modifications were made "There are several vital components that should be taken into consideration when developing a robust risk mitigation plan, including problem formulation, risk assessment, controls and prevention measures, communication, and recovery (28, 31). As such, the problem must first be identified and summarized in the context of the workplace concern (i.e., transmission at a ski resort). By formulating the problem, a risk assessment of the hazard will be better focused in scope, which aids in determination of appropriate and effective control measures for incorporation into the risk mitigation plan. While local, state, and federal guidance may be used as a starting place for building such plans, industry-specific strategies should also be incorporated (32). Additional categories and considerations relevant to risk mitigation plans for ski resorts may include leadership and management (e.g., defining roles and responsibilities, implementing trainings for staff); worker behavior and hygiene (e.g., PPE, reducing number of staff per shift, vaccinations); facility operations (e.g., reducing hours of operation, limiting number of guests); administrative controls (e.g., staggering shifts); public interactions (e.g., self-service in cafeterias and restaurants, limiting use of commons areas); as well as communications (e.g., creating accessible resources for staff that account for linguistic and cultural barriers) (32). As previously noted, multiple levels of control measures should be implemented according to the hierarchy of controls, and the effectiveness of control measures should be evaluated and updated as necessary (Figure 4). Further, ski resorts may consider developing a staged response to risk mitigation. A framework for this type of response was proposed by Parker et al. (2020) and outlines how businesses can "step up" or "step down" the levels of protective controls in a controlled manner, based on the circumstances and current state of the science."

Limitations:
Comment 11: It would be prudent to mention that this is a short-term case study - patterns may have changed this season.

Reply 11: We appreciate the reviewer's comment and we have provided additional limitations related to the short period of the study and SARS-CoV-2 seasonal trends on p. 18, lines 395-400.
Changes in the text: To provide additional clarity related to the limitations of the study, the following text was added to the limitations section: "Further, the current study only included data over one ski-season (i.e., November 1, 2020 to May 1, 2021) and may not capture varying patterns that occurred in subsequent seasons. For example, the Delta and Omicron variants may have created shifts in disease patterns not captured in the current study. Given the potential for a change in disease patterns over time, this highlights the importance of monitoring future trends in SARS-CoV-2 transmission within this population as well as other infectious diseases."

Comment 12: Figures 1 and 2. Legend should say Ski resort for consistency.

Reply 12: We thank the reviewer for providing feedback on consistency and we have made the requested modifications to what are now Figures 2 and 3 (i.e., the previous Figures 1 and 2).
Changes in the text: The legend was changed in both Figures 2 and 3 to state "Ski resort".