

Graduate Student Society 2023 Survey Analysis

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Abstract

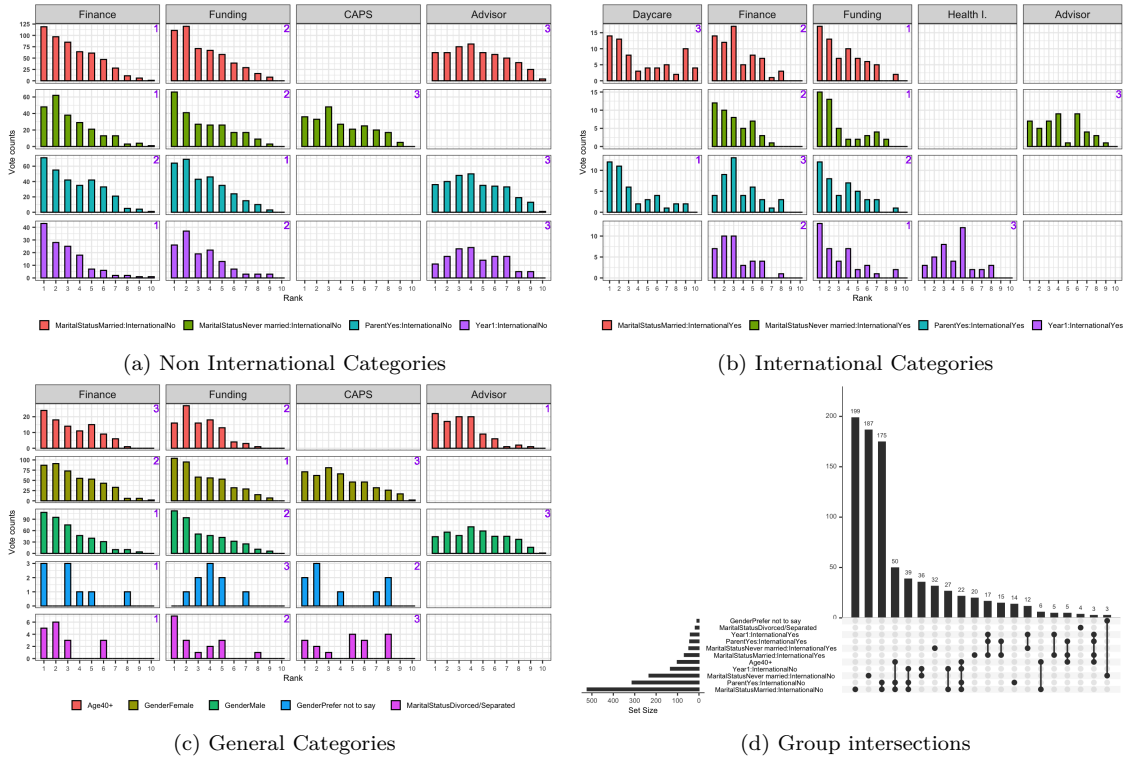


Figure 1: a-c) Top three concerns across graduate student demographics. Summary concern ranking given in the top right corner. d) Upset plot of 20 intersections between studied demographic groups.

1 Introduction

The BYU graduate student society (GSS) conducted a survey during the 2023 Winter semester to identify the “top concerns” of BYU graduate students. Concerns were ranked on a scale of 1-10, and examined the following areas of concern: childcare/daycare, finance, food insecurity, funding, mental health, mentoring/advisor, housing, healthcare insurance, parking, and “other” concerns. Data were stratified based on age, gender, international status, marital status, parental status, and year in school.

2 Results

2.1 Demographics

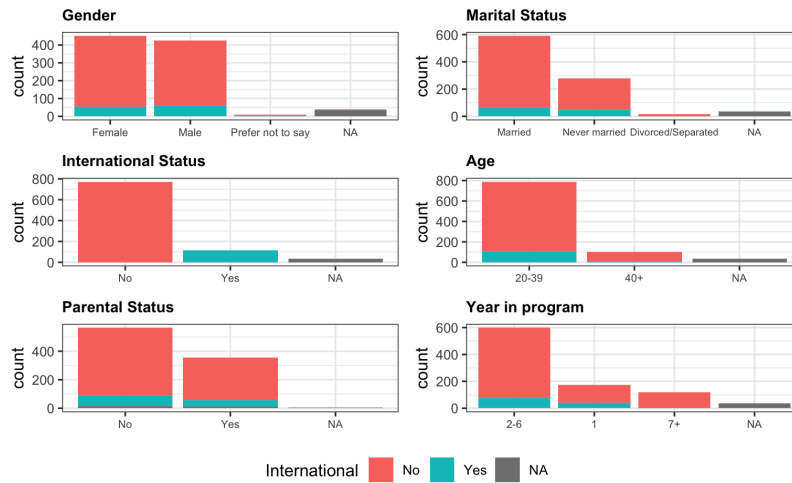


Figure 2: BYU graduate students survey demographics.

913 BYU graduate students (115 internationals) ranked their top concerns in the 2023 survey. 449 reported being female (53 internationals), 420 male (59 internationals), 35 did not respond (1 international), and 9 chose the “Prefer not to say” gender bin (2 internationals). 586 reported being married (67 internationals), 278 reported never being married (46 internationals), 17 reported being divorced or separated (1 international) and 32 did not respond (1 international). Additionally, 784 reported being in the 20-39 age group (104 internationals), 98 in the 40+ age group (11 internationals) and 31 did not respond (0 internationals). 352 reported having children (43 internationals) and 559 reported not having children (72 internationals), and 2 did not respond (0 internationals). With respect to year, 172 reported being in their first year (39 internationals), 593 reported being in their second year up to their sixth year (75 internationals), 117 reported being in their seventh year or above (1 international), and 31 did not respond (0 internationals). Fig 2.

2.2 Top 3 Rank results

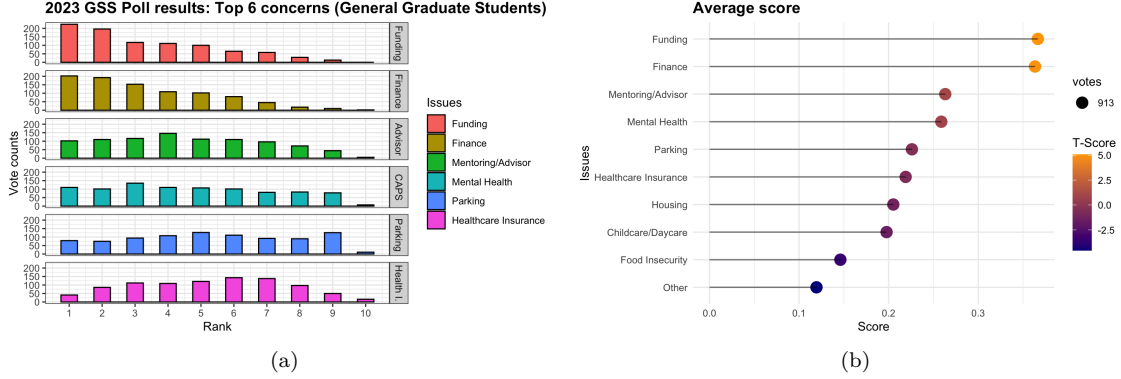
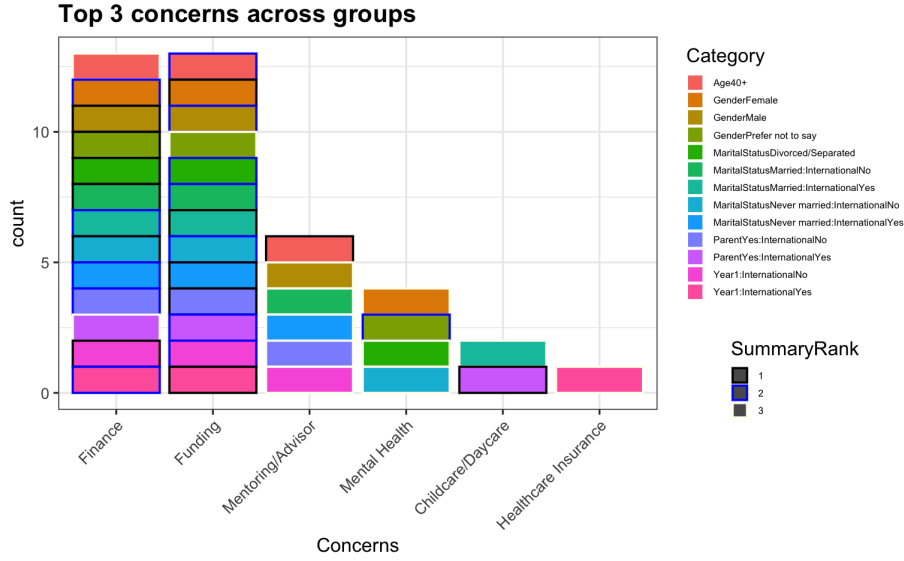


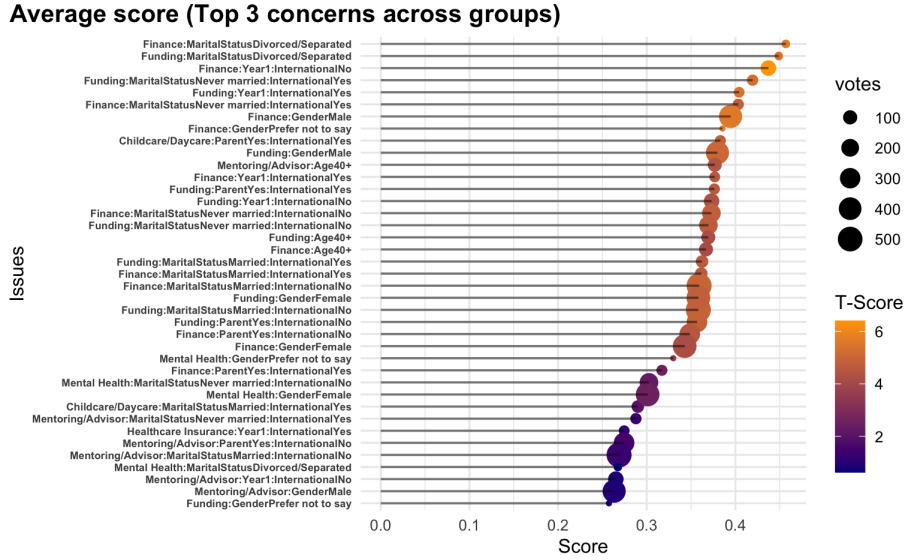
Figure 3: Rank results for general graduate students.

Overall, BYU graduate students ranked “Funding,” “Finance” and “Mentoring/Advisor” as their three main concerns, and these were closely followed by “Mental Health” (Fig 3). Stratification of the data by age, gender, international status, marital status, parental status, and school year showed that, in general, the top two concerns were concentrated in the areas of “Funding” and “Finance,” whereas the top third concern varied across demographic group and focused around “Mentoring/Advisor,” and “Mental Health” (Fig 4a). In contrast to the general trend, “*Parent: Internationals*” and the “*Age: 40+*” demographics reported “Childcare/Daycare” and “Mentoring/Advisor” as their respective main concern. Additionally, the “*Gender: Prefer not to say*” and the “*First Year: Internationals*” demographics ranked “Mental Health” and “Healthcare Insurance” as their top second and third concern, respectively (Fig 4a).

Furthermore, to assess the relative “emphasis” placed on each area of concern by a given demographic, a rank score that approaches 1 for issues that tend to have a high priority ranking was calculated across areas of concern for each demographic group, see Average mean-reciprocal score in methods section 3.2. The highest Average mean-reciprocal scores were achieved by the “*Divorced/Separated*” group in the “Finance” and “Funding” concerns, with scores of ~ 0.46 and ~ 0.45 , respectively. Similarly, “Funding” or “Finance” were the main concerns for all demographic strata except for “*Parent: Internationals*” and the “*Age: 40+*” groups, and spanned scores between ~ 0.44 to ~ 0.30 . The main concerns for “*Parent: Internationals*” and the “*Age: 40+*” groups were “Childcare/Daycare,” and “Mentoring/Advisor,” respectively, and both reached an Average mean-reciprocal score of ~ 0.38 . The “*Gender: Prefer not to say*” group also ranked “Mental Health” in this range with an average mean-reciprocal score of ~ 0.33 . Scores between ~ 0.30 to ~ 0.26 included varied issues, but those with scores close to 0.30 corresponded to “Mental Health” for the “*Never married: International No*”, and “*Gender: Female*” groups. And interspersed throughout this interval was “Mentoring/Advisor” for various groups, with the exception of “Healthcare Insurance” and “Mental Health” corresponding to the “*First Year: Internationals*” and the “*Divorced/Separated*” groups, respectively, both with average mean-reciprocal scores of ~ 0.27 . Lastly, there was “Funding” for the “*Gender: Prefer not to say*” group with an Average mean-reciprocal score of 0.26 (Fig 4b).



(a) Bar contours colors is the rank ordering assigned with the Average mean-reciprocal score



(b) T-Score with respect to the mean of each respective demographic level across concerns

Figure 4: Summary rank results stratified based on demographic information.

2.3 Concerns with top scores in lower priority ranks (not in top 3)

Some concerns achieved relatively high average mean-reciprocal scores, i.e., in the score range of the top three concerns across demographics, but had lower priority ranks than their respective demographic's top three concerns. These corresponded to "Mentoring/Advisor," "Childcare/Daycare," "Healthcare insurance," and "Mental Health." The group with highest Average mean-reciprocal score in this group corresponded to "Healthcare Insurance" for the "Married: Internationals" group with an Average mean-reciprocal score of ~ 0.29 . This was followed by "Childcare/Daycare" for the "Parents: International No", "Mental Health" for the "Never married: Internationals," and "Men-

toring/Advisor” for the “*Gender: Female*” groups, all these with an Average mean-reciprocal score of ~ 0.27 . These were closely followed by “Mentoring/Advisor” for the “*Divorced/Separated*” and “*Never married: International No*” groups, both with an Average mean-reciprocal score of ~ 0.26 (Fig 5).

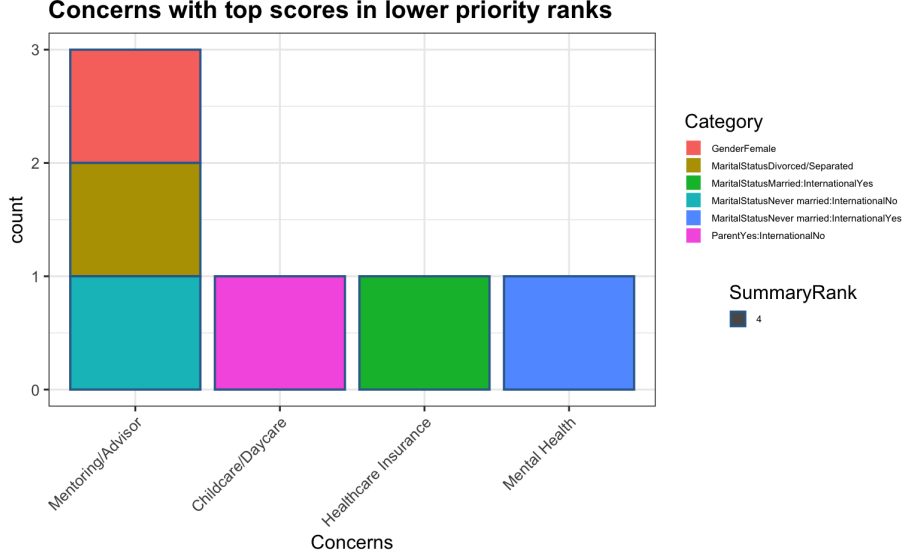


Figure 5: Concerns with an Average mean-reciprocal score within the range of top 3 concerns with lower priority rank.

2.4 Top concerns across demographics

To examine ranking trends across demographics for the subset of issues identified across the top 3 concerns, T-scores of the Average mean-reciprocal score with respect to the mean of each respective issue were compared across demographic level. The “Funding” category was in the top 3 concerns for all demographic groups, and those that tended to place a higher rank emphasis were the “*Divorced/Separated*” (T-Score ≈ 6.3) whereas the “*Gender: Prefer not to say*” group tended to place a relatively lower rank emphasis (T-Score ≈ -9.4) in comparison to other demographics. Similarly, the “Finance” category was in the top 3 concerns for all demographic groups, and those that tended to place a higher rank emphasis were the “*Divorced/Separated*” (T-Score ≈ 7.4) and the “*First Year: International No*” (T-Score ≈ 5.6), whereas the “*Parent: Internationals*” (T-Score ≈ -5.8) tended to place a lower rank emphasis on Finance relative to other demographics, despite it being among their three main concerns.

Outside of Funding and Finance, other concerns were not necessarily included in the top 3 concerns for all demographic groups. Average mean-reciprocal scores for the “Mentoring/Advisor” category generally did not deviate across demographic groups, (Avg T-Score ≈ -0.85), with the stark exception of the “*Age: 40+*” group which placed a much higher rank emphasis relative to the rest of demographics (T-Score ≈ 10.2). For the “Mental Health” category, the groups that tended to place a higher rank emphasis were the “*Gender: Prefer not to say*” (T-Score ≈ 6.5), the “*Never married: Internationals No*” (T-Score ≈ 4.3), and “*Gender: Female*” (T-Score ≈ 4.2), and those who tended to place a lower rank score relative to other demographics were the “*Parent: Internationals*” (T-Score ≈ -4.6) and the “*First Year: Internationals*” (T-Score ≈ -5.4). For the “Childcare/Daycare” category, the group that placed the highest rank emphasis was the “*Parent: Internationals*” (T-Score ≈ 8.7), whereas the “*Never married: International No*” (T-Score ≈ -4.1)

and the “*Never married: Internationals*” (T-Score ≈ -4.9) groups tended to place this issue with lower rank emphasis relative to other demographics. Lastly, for the “Healthcare Insurance” category, the groups that tended to place a higher rank emphasis were the “*Married: Internationals*” (T-Score ≈ 6.8), “*First Year: Internationals*” (T-Score ≈ 5.5), whereas the “*Age: 40+*” (T-Score ≈ -5.0) group tended to place this issue with lower rank emphasis relative to other demographics (Fig 6).

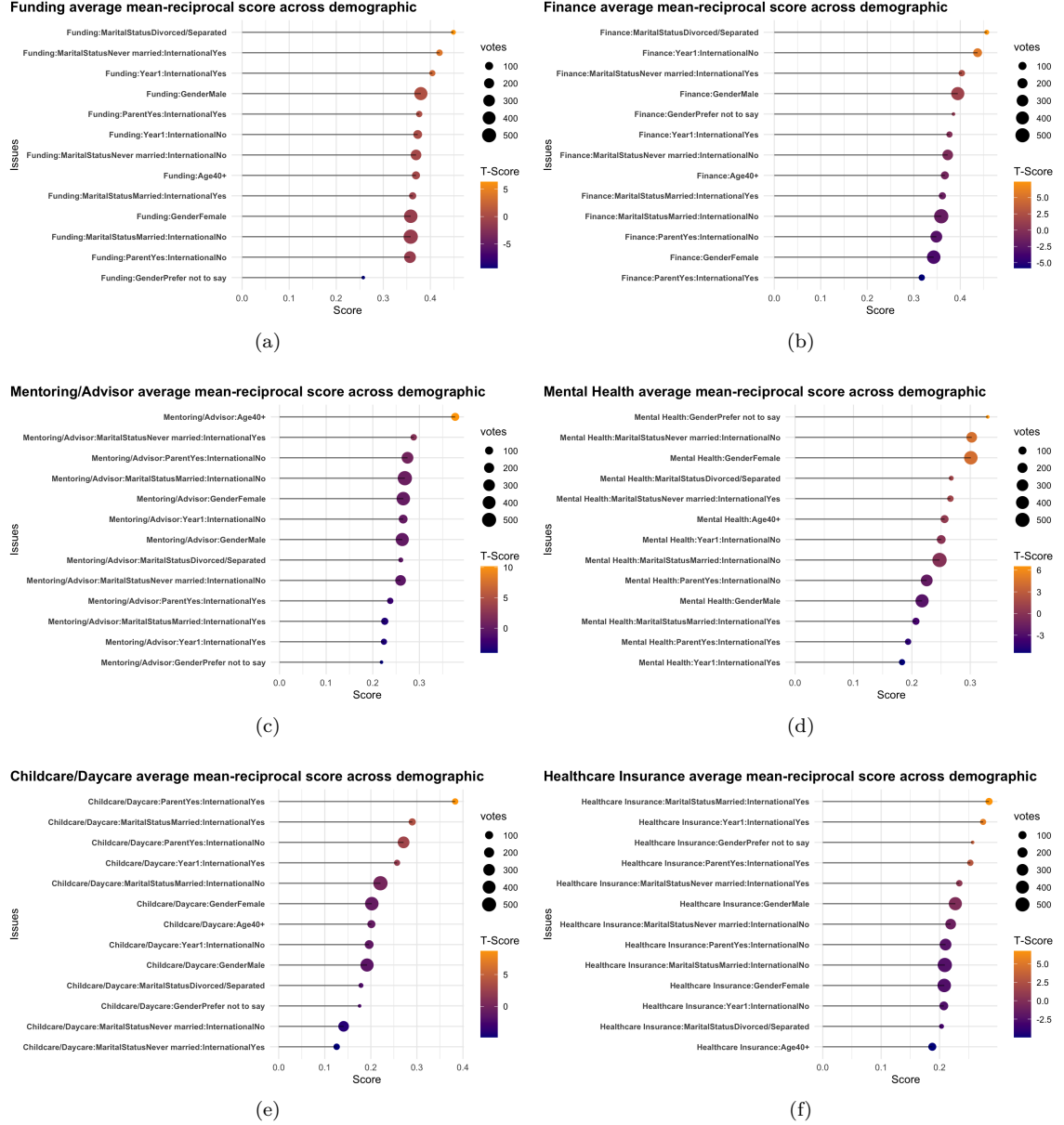


Figure 6: Comparison of top concerns across demographic groups

2.5 Borda count, mean rank, and reciprocal rank scores

In addition to scoring and ranking votes with the Average mean-reciprocal score, vote ranks were tallied and ranked using the Borda count, the mean rank, and the reciprocal value of each rank for

all issues grouped by demographic level of interest. Not all vote counting methods agreed on the overall ranking of issues as shown by the union of the categories that span the top three ranks across scoring method (Fig 8).

Empirically, the reciprocal of the rank value was more sensitive to the vote frequency of the first rank value, regardless of the vote frequency of votes towards the end of the ranking scale; and as such, bimodal ranking distributions tended to be more highly scored over unimodal ranking distributions that have a mean closer to the centroid of the ranking scale, i.e., in this scenario ~5-6. On the other hand, the Borda count ranking ordering corresponded exactly to the ranking ordering of the mean ranks for all ranking values (data not shown), and so these counting methods were more aware of the vote frequency at either end of the ranking scale, in contrast to the reciprocal ranking score. Consequently, to balance both aspects of vote counting, a score that prioritizes top ranks and accounts for the frequency of votes at the end of the ranking scale, the average mean-reciprocal score was chosen as the method of vote counting (Fig 9, methods 3.2).

Despite the ranking differences, the Borda count, mean rank, reciprocal rank and the Average mean-reciprocal score overlapped in the top 3 rank orderings of various issues across demographic group (Fig 7,8). Among these, the top two ranks were concentrated in “Funding” or “Finance” for the “*Gender: Female*,” “*Gender: Male*,” “*Gender: Prefer not to say*,” “*Married: International No*,” “*Never Married*,” and “*Year 1*” graduate student groups. “Childcare/Daycare” was the consensus main concern of the “*Parent: Internationals*,” and “Mental Health” was the consensus second main concern for the “*Gender: Prefer not to say*” group. The top third consensus rank varied between “Mentoring/Advisor,” “Mental Health” and “Finance” across different demographics (Fig 7).

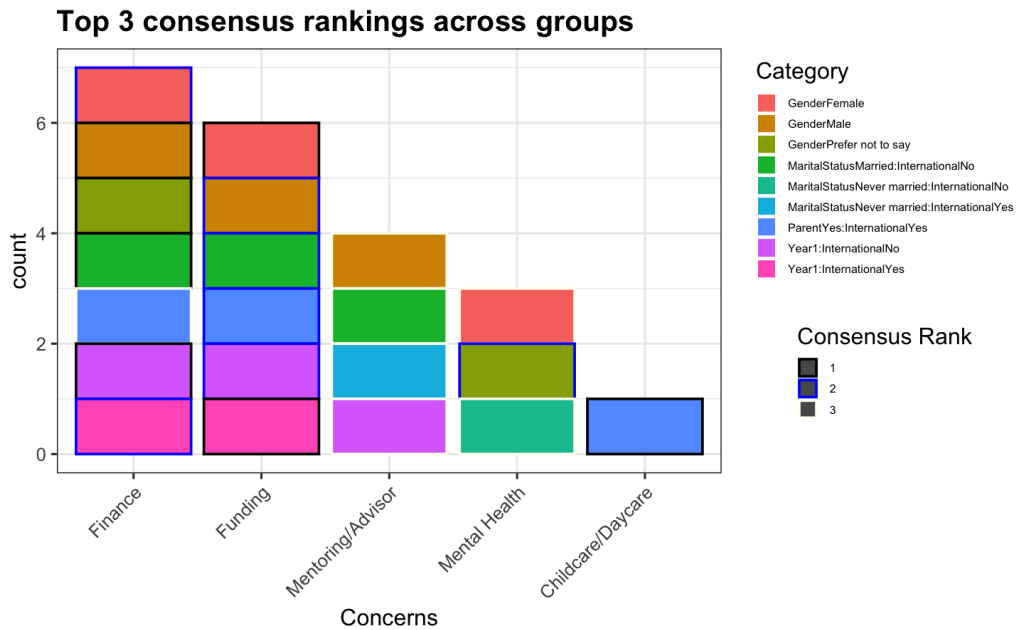


Figure 7: Consensus ranking across different vote counting methods.

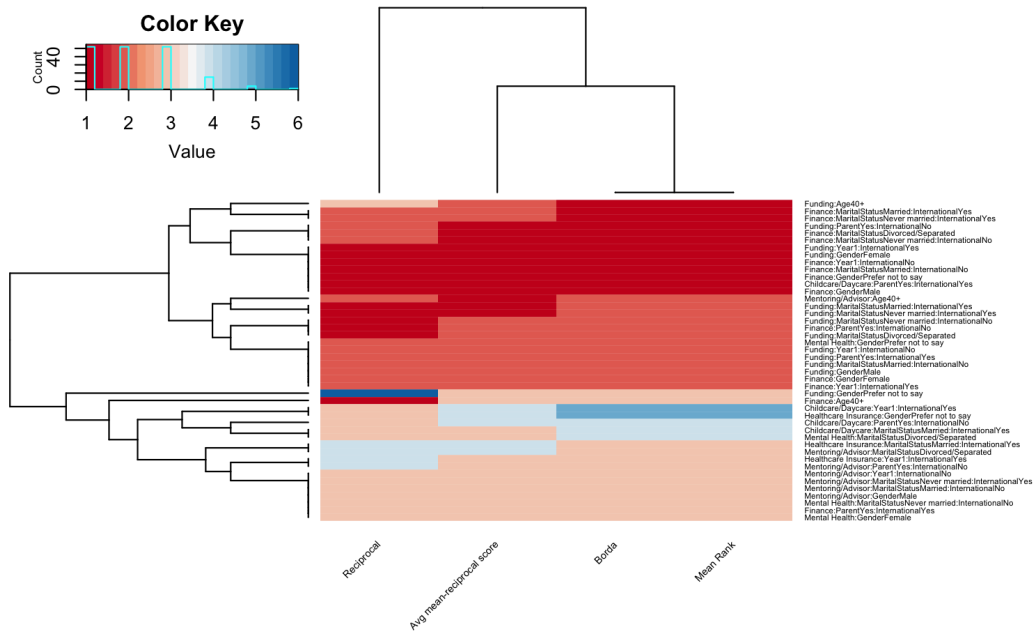


Figure 8: Heatmap for the top issues as scored with the reciprocal rank value, the average mean-reciprocal score, the Borda count, and the mean rank across demographics of interest. Top priority ranks are illustrated by warmer colors.

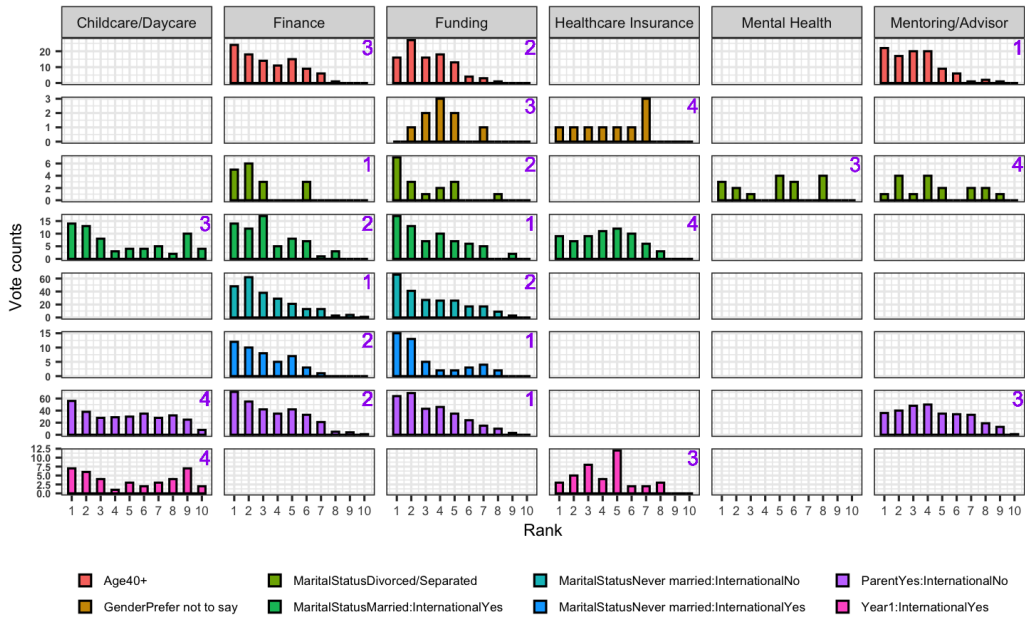


Figure 9: Ranking distributions for ambiguous ranking ordering across different vote counting methods. Average mean-reciprocal score rank ordering on the top right corner.

2.6 Childcare

2.6.1 Satisfaction

In total, 125 parents (18 internationals) reported their childcare satisfaction level. This accounted for ~ 0.35 of the non international, and ~ 0.42 of the international parent respondents proportion, and an overall of ~ 0.36 of the total survey parent respondents proportion. Satisfaction was reported on the scale: “Extremely satisfied,” “Somewhat satisfied,” “Neither satisfied nor dissatisfied,” “Somewhat dissatisfied,” and “Extremely dissatisfied.” In summary, parents who responded to the Childcare satisfaction prompt tended to have a mostly positive sentiment towards their Childcare, with 71 (~ 0.66) of “*Parents: International No*,” and 10 (~ 0.55) of the “*Parents: Internationals*,” expressing they were either “Extremely satisfied” or “Somewhat satisfied” with their childcare. Within this subset of respondents, those expressing a negative sentiment accounted for 18 (~ 0.17) of “*Parents: International No*,” and 3 (~ 0.17) of the “*Parents: Internationals*,” expressing they were either “Extremely dissatisfied” or “Somewhat dissatisfied” with their childcare. 18 (~ 0.17) of “*Parents: International No*,” and 5 (~ 0.28) of the “*Parents: Internationals*,” expressed they were “Neither satisfied nor dissatisfied.” Worth noting is that among the “*Parents: Internationals*” all those with a negative sentiment, i.e., “Extremely dissatisfied” or “Somewhat dissatisfied”, were parents in their first academic year of graduate studies (Fig 10).

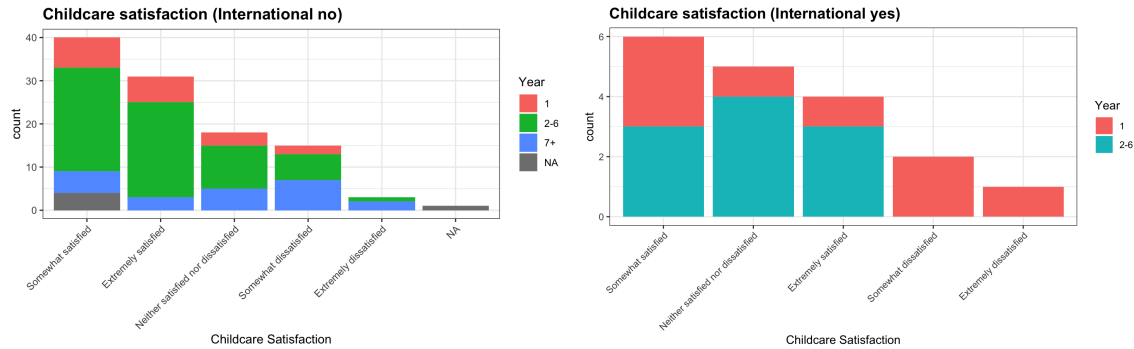


Figure 10: Childcare satisfaction responses

2.6.2 Childcare Comments

239 graduate students (35 international students, 137 parents, and 22 international parents) commented on childcare. Most comments emphasized the need for childcare near or at BYU “Availability (+)” and the need for affordable options “Financial Barrier.” Moreover, additional comments described childcare needs in relation to the parents’ academic progress, their decision to start a family “Family Encouragement,” the need for information, among others (Fig 11). Of interest, the group of people commenting on childcare tended to rank “Childcare/Daycare” with high priority, being their overall second main concern, after “Funding,” as ranked with the average mean-reciprocal score (Data not shown).

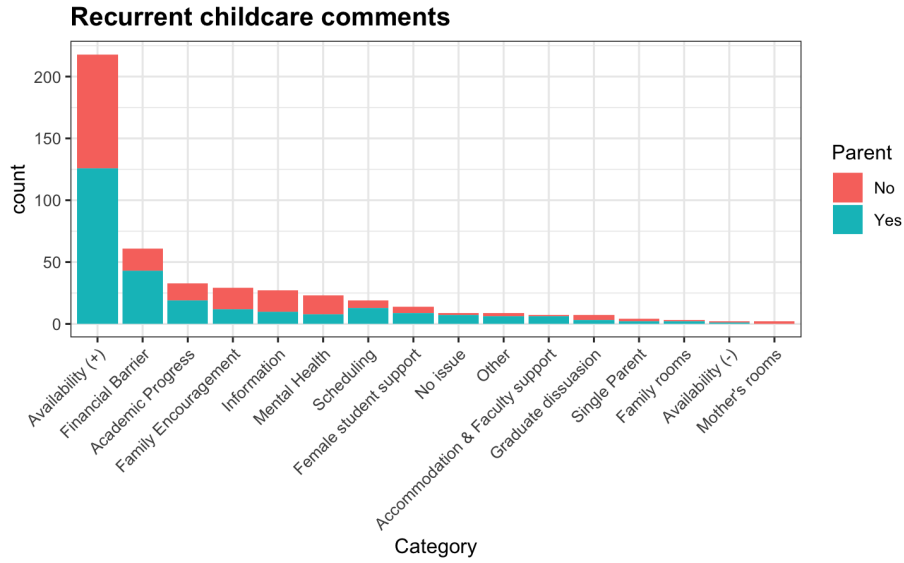


Figure 11: Recurrent topics for childcare comments

2.6.3 Childcare Details

102 graduate students reported the hourly rate they paid for childcare. On average, the hourly rate for childcare was ~\$14, but the most common hourly rate values were \$10, \$15, \$20 (Fig 12a). Similarly, 133 graduate students reported the weekly hours spent on childcare. On average, respondents used childcare services ~21 hours per week, but the most commonly reported weekly childcare services were 10 and 40 hours (Fig 12b).

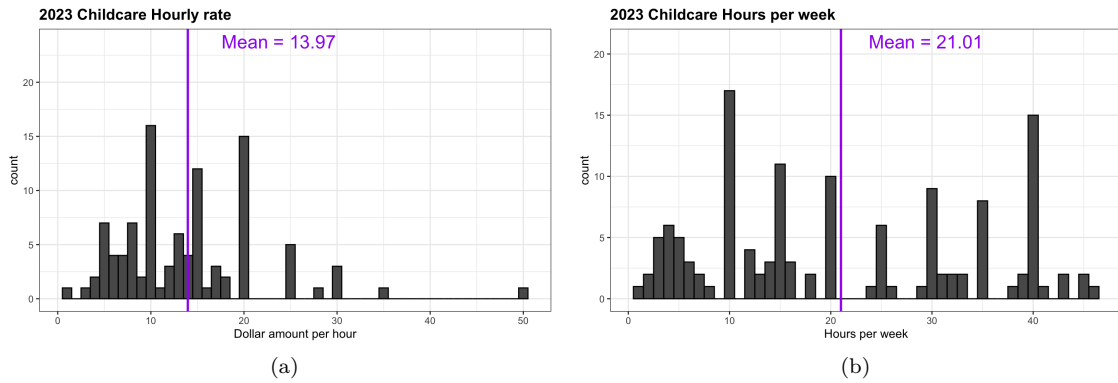


Figure 12: Childcare cost and weekly use.

2.7 Support Groups

889 graduate students responded to the prompt, “Are you interested in grad student support groups?”. Of these, 310 (71 internationals) students indicated interest in support groups whereas 579 (45 internationals) indicated a lack of interest in support groups. Moreover, in response to the prompt “Are you currently involved with any support groups at BYU?,” only 63 graduate students reported being currently involved in a support group; and from this group, the majority (48) indicated a lack of interest in graduate student support groups (Fig 13a). Lastly, those who indicated

an interest in graduate student support groups tended to be more interested in the areas of Mental Health and General Graduate students (Fig 13b). Furthermore, as expected, international graduate students who indicated interest in support groups were interested in an international graduate student support group (69 internationals).

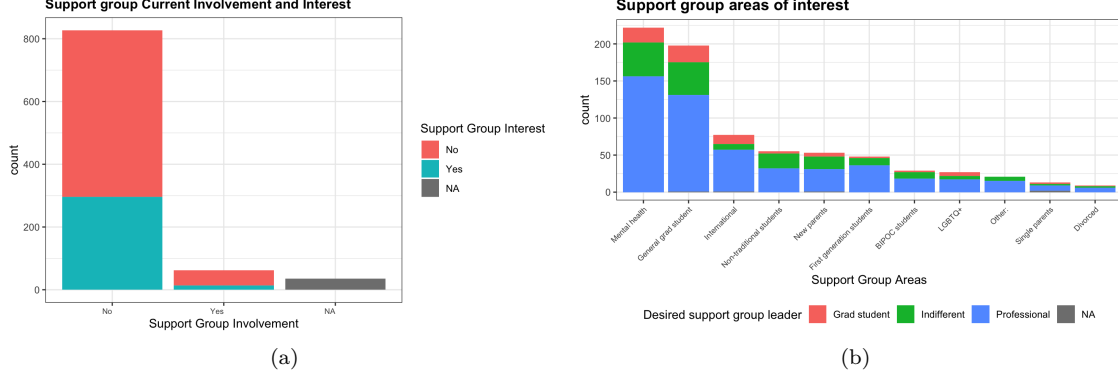


Figure 13: Support Group involvement and interest details.

3 Methods

Data analysis was performed with the R software v4.4.0 using the car, dplyr, ggplot2, gplots, lmPerm, MASS, purrr, RColorBrewer, readr, stringr, tibble, tidyr, and UpSetR libraries.

3.1 Data processing

NA responses to the question, “Do you have any children?” or “Are you an international student?” were binned with their respective “No” response groups. NA responses to the “Gender” prompt (35) were not considered in any Gender demographic group. Childcare comments were placed in the following categories: “Availability (+)” (encompasses a positive need for BYU childcare services), “Financial Barrier” (the need for affordable options), “Academic Progress” (the need for childcare to further graduate studies), “Family encouragement” (decision on childbearing during graduate school and family support), “Information” (the need for more information regarding childcare options), “Mental Health” (the need to alleviate stress), “Scheduling” (the need to find childcare during class or for emergency reasons), “Female student support,” “No issue,” “Other,” “Accommodation & Faculty support,” “Graduate dissuasion” (dissuasion from furthering graduate studies at BYU), “Single Parent,” “Family rooms,” “Availability (-)” (the notion that BYU should not provide childcare), and “Mother’s rooms” (Fig 11).

3.2 Average mean-reciprocal score

Let r_{ij} be the ranking given for issue i by participant j , $n_i = \sum_{j \in K} H(r_{ij})$, where $H(x)$ is the Heaviside function and K is the subset of participants that belong to a given demographic group of interest. The Average mean-reciprocal score consists of three parts, the demographic mean rank for issue i , $\bar{r}_i = \frac{1}{n_i} \sum_{j \in K} r_{ij}$, the demographic reciprocal mean ranking, $\bar{p}_i = (\frac{1}{n_i} \sum_{j \in K} \frac{1}{r_{ij}})^{-1}$, which places a greater weight on issues that tend to be more highly ranked, and a weight term, $(\frac{n_i}{n_{max}})^\beta$, that favors issues with more votes for a given demographic.

The Average mean-reciprocal score is defined as $\bar{s}_i = (\frac{n_i}{n_{max}})^\beta (\frac{\bar{r}_i + \bar{p}_i}{2})^{-1}$, where $n_{max} = \max_i n_i$, $\beta \geq 1$, and $\bar{s}_i = 0$ if $\bar{r}_i = \bar{p}_i = 0$. It can be shown that since $1 \leq r_{ij} \leq b$ for some $b \in \mathbb{N}^+$, $\bar{s}_i \in [\frac{1}{b}, 1]$.

For this dataset $n_i = n_{max}$ for all i , i.e., for all participants, no ranks were missing, and so the β weight was irrelevant, but may be more useful in situations with unequal vote counts across issues. Comparison of different scoring methods (Fig 8) was performed with the hierarchical clustering using the average linkage method.

3.3 T-Score comparison

T-scores were calculated in relation to a chosen demographic mean scores across concerns (Fig 3b, 4b), or in relation to the mean score of a chosen concern across demographic levels (Fig 6). $|T\text{-Score}| \geq 4$ were reported when comparing ranking trends across demographic levels.

3.4 Data stratification

Autocorrelation was assessed using the Durbin Watson test on Generalized Gaussian, ordinal logistic, permutation or Negative binomial linear models of the rank values as a function of demographic groups. There was no significant autocorrelation in either of the assessed models for the following demographic groups: “Age: 40+,” “Gender: Prefer not to say,” “Divorced/Separated,” “Never married: International No,” “Never married: Internationals,” “Parents: International No,” “Parents: Internationals,” “Year 1: International No,” and “Year 1: Internationals.” The addition of “Gender: Female,” “Gender: Male,” and “Married” demographics do result in a significant autocorrelation, but were included in the report out of completeness. Generalized linear model results not included.

4 Conclusion

Taken together, the 2023 BYU graduate student rank survey analysis showed that “Funding” or “Finance” are the main concerns for all graduate student demographic groups evaluated except for international parents and graduate students in the 40+ age group. “Childcare/Daycare” was the main concern of international parents and “Mentoring/Advisor” was the main concern for graduate students in the 40+ age group. Moreover, different from the general trend, “Mental Health” was the second main concern of students who selected Prefer not to say in the Gender prompt. And the third main concern varied between “Mental Health,” “Mentoring/Advisor,” “Childcare/Daycare,” and “Healthcare Insurance” among different demographics.

Furthermore, comparison of the average mean-reciprocal scores across demographics for all issues among the three main demographic concerns, showed that the divorced/separated group tended to place a higher rank priority in Funding and Finance relative to other demographic groups. The 40+ age group tended to place a much higher rank priority in “Mentoring/Advisor” relative to other groups. Students who selected Prefer not to say for the Gender prompt tended to place a higher rank priority in “Mental Health” relative to other demographics. International parents tended to place a much higher rank priority in “Childcare/Daycare” relative to other demographics. Lastly, the international married group tended to place a higher rank priority in “Healthcare Insurance” relative to other demographics.

Additionally, rank ordering was dependent on the vote scoring method. In this analysis, four methods were analyzed in the counting and ranking of votes: the Borda count, the Mean rank of an issue, the Reciprocal rank value, and the average mean-reciprocal score. Among the union of the top three concerns across counting and ranking method, 21 concerns were ranked the same across counting and ranking method, and 23 had different rankings. Consensus rankings included the main concerns being in “Finance” and “Funding” for several groups and “Childcare/Daycare” for international parents, and “Mental Health” being the second main concern for students who selected Prefer not to say for the Gender prompt.

Some important limitations of the survey include: 1) Wording ambiguity; the survey asked respondents to rank top concerns, but the word “concern,” can be interpreted as “personal priority” or “personal challenge.” Similarly, the survey had a lack of clarification between the areas of finance and funding. Future surveys should make a distinction such as finance as “money designated for personal use” and funding as “money designated for graduate related expenses such as: research, conferences, or creative presentations.” Moreover, Childcare/Daycare was defined as “An official daycare or help by a family member;” and consequently, childcare satisfaction may have been rated relative to the care provided by a close family member such as a spouse; 2) The lack of a “bin” allowing respondents to designate an issue as “not a concern/challenge”; and 3) the omission of relevant areas of concern expressed by some students such as “Community and belonging,” “Program Communication and Information Clarity,” “Career Preparation and Networking,” “Class Availability and Scheduling,” etc.

5 Acknowledgments

Sidney Sithole for sharing ideas and helpful discussion during the analysis of the data, and the graduate student society (GSS) for data availability.