Perceptions of the Campus Diversity and Inclusion Climate at the University of Ottawa: Marketing Segmentation Analysis Results

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Summary

Using ten campus climate attitudinal scales drawn from the 2017 Diversity and inclusion survey of the University of Ottawa, the market audiences comprising students, administration and academic members are identified. Using k-means clustering, four clusters were identified: "optimists", "conformists", "soft critics" and "hard critics" according to the way they perceived the campus climate in terms of diversity and inclusion levels. Cluster analysis is a useful tool for helping university decision makers to categorize university members and by doing so, program activities, design messages and implement changes that can promote more efficient ways to deal with diversity on campus.

Introduction

Campus climate refers to the current attitudes, behaviors and standards, and practices of employees and students of an institution (Rankin and Reason, 2008). Campus climate impacts not only academic development but also on social cohesion and the participation of gender, ethnic, racial, religious and sexual minorities in institutional life. To better understand the campus climate of diversity and inclusion, the University of Ottawa conducted an internet survey March-April 2017. More than 6,800 students, academic and administrative staff participated in this survey. About 36 questions of the DINC 2017 survey modules collected information on a variety of attitudes towards University of Ottawa's campus climate, direct and indirect experiences on exclusionary acts, identity markers and relevant socio-demographic backgrounds.

Market segments are groups of individuals who are similar in their reaction to one or more marketing mix or environmental elements (Grover and Briens, 2006). This analysis is aimed at segmenting the University of Ottawa's population into meaningful clusters of individuals (homogeneous) in terms of their perceptions of the campus climate. The clustering method used was k-means clustering analysis. This algorithm was developed to sort data units (survey respondents in this case) into k number of clusters through assignments and re-assignments on the basis of the shortest distance between the data unit and the centroid of the cluster (Saldkin and Ransmussen,2010) . The distance measure chosen for this purpose was Euclidean distance squared. For this analysis k=3, k=4 and k=5 solutions were tested where the k=4 solution proving to be the most valid and informative for the DINC 2017 data.

Attitudinal Scales

For the segmentation analysis, the following questions were used to create ten scales and measure its pertinent constructs:

1. Satisfaction with University Experience (1 item): How satisfied or dissatisfied are you with your overall experience at the University of Ottawa? [1] Very satisfied, [2] Satisfied, [3] Dissatisfied, [4] Very dissatisfied

2. Overall Climate (4 items): Overall, how comfortable are you with the campus climate for diversity and inclusion? [1] Very Comfortable [2] Comfortable, [3] Neither, [4]Comfortable Nor Uncomfortable [4] Uncomfortable, [5] Very Uncomfortable: a) At uOttawa, b)In your faculty, c)In your department, d) In the classroom

3. Welcoming Climate (5 items): Please rate the overall campus climate on the following dimensions, with a rating of 1 being the most positive. (For example, for the "friendly—hostile" dimension, 1=very friendly, 2=somewhat friendly, 3=neither friendly nor hostile, 4=somewhat hostile, and 5=very hostile): a) Friendly, b) Cooperative ,c) Improving ,d) Welcoming, e) Respectful

4.Biases present (10 items): I believe that uOttawa is biased based on...[1] Strongly Agree [2] Agree [3] Neither [4] Disagree, [5] Strongly Disagree: a) Race or ethnicity, b) Gender, c) Sexual orientation, d) Age, e) Position of professor, administrator, staff student, f) Disability, g) Citizenship and immigration status, h) Preferred language of use, i) Socioeconomic status , j) Religion

5.Inclusiveness for Groups (12 items): Rate the campus climate for people who are... [1] Very Respectful, [2] Moderately, Respectful, [3] Neither, [4] Moderately, [5] Very Disrespectful: a) From racial or ethnic minorities, b) Affected by physical or psychological health issues,c) Physically, d) Learning, e) Indigenous, f) LGBTQ, g) New Canadians, h) International students, staff or professors, i)From non-Christian religious affiliations, j) Non-English speakers k) Non-French speakers, l) Females

6. Infrastructure Climate (8 items): How would you rate PHYSICAL ACCESSIBILITY on campus for people with physical, learning, psychological or medical disabilities? [1] Very accomodating [2] Accommodating [3] Somewhat Accommodating, [4] Not Very Accommodating: a) Buildings and athletic facilities, b) Classrooms and labs, c) Washrooms, d) Elevators, e) University housing, f) Cafeteria/Dining Hall, g) Campus transportation and parking h) pedestrian areas

7. Resources Climate (12 items): How would you rate the accessibility on campus of COURSE INSTRUCTION AND MATERIALS for people with learning, psychological or medical disabilities? [1] Very accomodating [2] Accommodating, [3] Somewhat Accommodating, [4] Not Very Accommodating: a) Information in alternative formats, (e.g., audio-books, braille), b) Instructors ,c) Instructional materials, d) uOttawa websites, e) Test-taking services ,f) Scribe services, g) Sensory impairments, h) Oral interpreters, i) Sign language interpreters j) Reader Auxiliary aids ,l) Referral to appropriate support services (tutorial services, academic advising, counselling centres, health centres, m) Use of adaptive equipment

8.Opinions Valued (4 items): Please indicate your level of agreement to the following statements: [1] Strongly Agree [2] Agree [3] Neither [4] Disagree [5] Strongly disagree: a) I feel valued by professors and staff in the classroom, b) I feel valued by other students in the classroom, c) I feel valued by students in the classroom, d) I believe the campus climate encourages free and open discussion of difficult topics.

9.Perceived tensions &identity reluctancies (6 items): Please indicate your level of agreement to the following statements: [1] Strongly Agree [2] Agree [3] Neither [4] Disagree [5] Strongly disagree: a) I perceive ethnic or racial tensions on campus, b) I am reluctant to disclose my religious identity on campus, c) I am reluctant to, disclose my religious identity, on campus, d) I am reluctant to disclose my gender identity on campus, e) I am reluctant to disclose my sexual orientation on campus, f) I am reluctant to disclose my ethnic/cultural identity on campus.

10. Trusting and Knowledge (3 items): Please rate your agreement with the following statements: [1] Strongly Agree [2] Agree [3] Neither [4] Disagree, [5] Strongly Disagree: a) If I or a friend were harassed at uOttawa I would know where to go for help ,b) I understand uOttawa's formal procedures for complaints of harassment, c) I have confidence that uOttawa fairly administers the formal procedures to address complaints

of harassment.

The coding for the questions was sometimes reversed in several cases to ensure a similar order of magnitude for the constructs. Cronbach's alpha was used to assess the internal consistency reliability of the ten scales. This tool ensured that the facets of campus climate measures were statistically reliable and measured appropriately with the items on each scale. Each scale achieved a strong level of internal consistency reliability (all higher than α= or >.75). Additive scales were constructed to measure the underlying constructs. To move towards the segmentation analysis phase of the data, scales were standardized and converted to a t-score metric. T Scales have a Mean (M) of 50 and a standard deviation (SD) of 10. This common metric made possible to compare constructs to each other.

Means (M), Standard Deviations (SDs) and other descriptive statistics pertaining the original scales are presented in tables 2 and 3. The correlation matrix between scales suggests predominant positive and statistically significant correlations (moderate to strong) between all scales except to those related to perceived tensions&reluctancies and biases present ones (negative). The only non statistically significant correlation found was that between the trust&awareness scale and the opinions valued one (r=-.02)

Table 1: Descriptive Statistics of Campus Climate Scales

Scales	M	SD	Min	Max	N	Average Item Correlation	Cronbach's Alpha
Overall Climate	15.4	3.7	4	20	4,788	0.74	0.92
Welcoming climate	18.7	4.2	5	25	5,748	0.66	0.91
Biases present	30.1	10.4	10	50	3,477	0.63	0.95
Inclusiveness for Groups	46.1	10.0	12	60	2,620	0.62	0.95
Infrastructure climate	22.0	6.5	8	32	2,608	0.70	0.95
Resources climate	37.1	11.8	12	52	3,573	0.84	0.98
Opinions valued	6.4	4.5	4	15	6,303	0.53	0.75
Perceived Tensions& Reluctancies	10.5	4.4	6	25	4,240	0.54	0.85
Trust&Awareness	8.7	3.3	3	15	4,034	0.55	0.78
Satisfaction with Experience	2.9	0.7	1	4	4,105	1.00	1.00

Table 2: Correlation Matrix of Campus Climate Scales

Scales	Overall Climate	Welcoming climate	Biases present	Inclusiveness for Groups	Infrastructure climate	Resources climate	Opinions valued	Perceived Tensions& Reluctancies	Trust& Awareness	Satisfaction with Experience
Overall Climate	1.00	.59**	-.23**	.53**	.33**	.40**	.24**	-.35**	.35**	.49**
Welcoming climate		1.00	-.19**	.55**	.40**	.46**	.20**	-.33**	.38**	.55**
Biases present			1.00	-.17**	-.08**	-.09*	-.09**	.19**	-.10**	-.11**
Inclusiveness for Groups				1.00	.59**	.69**	.19**	-.35**	.39**	.34**
Infrastructure climate					1.00	.79**	.19**	-.13**	.43**	.30**
Resources climate						1.00	.39**	-.11*	.46**	.41**
Opinions valued							1.00	-.07**	-0.02	.26**
Perceived Tensions& Reluctancies								1.00	-.10**	-.20**
Trust& Awareness									1.00	.30**
Satisfaction with Experience										1.00

*-significant coefficient p <.05. **-significant coefficient p<.01

Clustering Solution

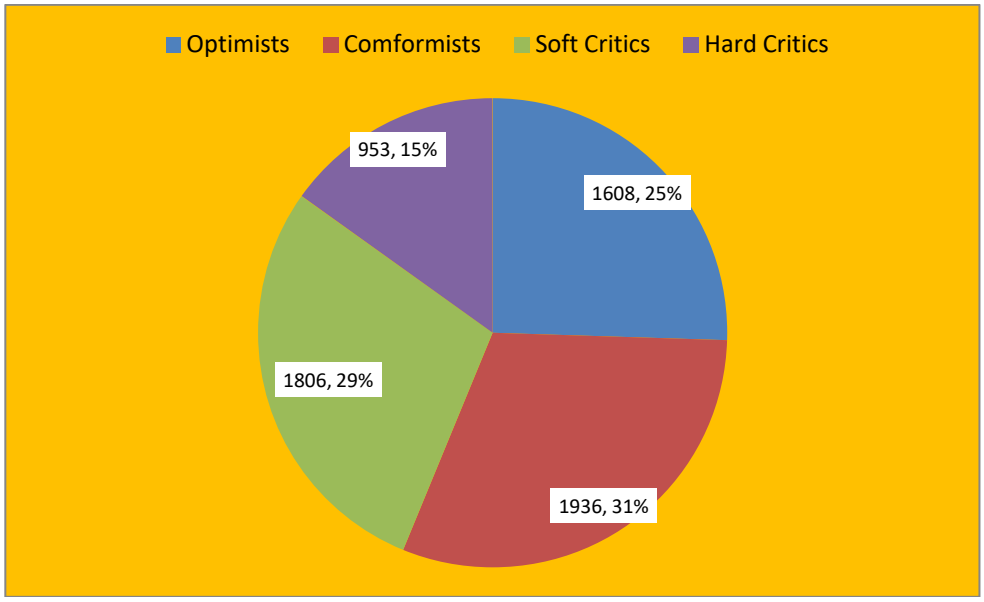
Three cluster solutions were carried out: k=3,k=4 and k=5. The Wilk's lambda statistic (proportion of within to between variance) for these solutions after 10 iterations were as follows: .117, .078 and .045. A lower lambda (λ<.10) is always preferred. As the k=3 solution was the more parsimonious, this one was chosen. The relative contribution of the variables to the cluster partition using the CRT, Neural Networks and CR5.0 algorithms also suggested that the welcoming climate and the trust&awareness scales were the most significant scales in the differentiation of the clusters (importance indices higher than .10). To validate the k=4 solution discriminant analysis was also undertaken (following Punj and Stewart,1983). All of the three discriminant functions were found significant according to the X^2 statistic (522.5, p <.01) with a canonical correlation between functions 1 and 2 equal to .90.

Demographic Profiles of Clusters

The cluster analysis of DINC 2017 survey yielded four uniquely profiled groups of respondents, with membership distributed as follows: 25% in cluster 1, 31% in cluster 2, 29% in cluster 3 and 15% in cluster 4.

Based on the profiles drawn from the 10 attitudinal scales the clusters were labeled as follows: Cluster 1 – O*ptimists*, Cluster 2 – C*onformists*, Cluster 3 -S*oft Critics* and Cluster 4- H*ard Critics*. The demographics of these clusters are presented in table 4 and a visual representation through correspondence analysis bi-plot[1] is displayed in chart 2. Female respondents represented the majority across all segments.

Chart 1: Cluster Distribution of DINC 2017 survey respondents



Cluster 1 – Optimists (25%)

Members of the first cluster are significantly differentiated by their overall positive views of the campus climate environment in terms of diversity and inclusion. Over-representation of males and older individuals are observable in this segment.

Cluster 2 – Conformists (31%)

This group is the most numerous of survey respondents and comprises individuals who are less positive compared to the first cluster and have learned to adapt to the campus climate environment. Over-representation of young females (under 25) and underrepresentation of academic personnel are observable in this segment.

[1] Both MCA (multiple correspondence analysis) and PCA (principal components analyses) produce bi-plots which provide visualizations of the correlational patterns present in the data.

Cluster 3 – Soft Critics (29%)

Though having a favourable view of the campus climate environment, these individuals have some reservations about the present organizational environment at the University of Ottawa . They have "not-so-soft views" with respect to tensions and biases present in university life. Over-representation of older individuals (40-59 years old), French administrative language and support staff members as well as management are observable in this segment.

Cluster 3 – Hard Critics (15%)

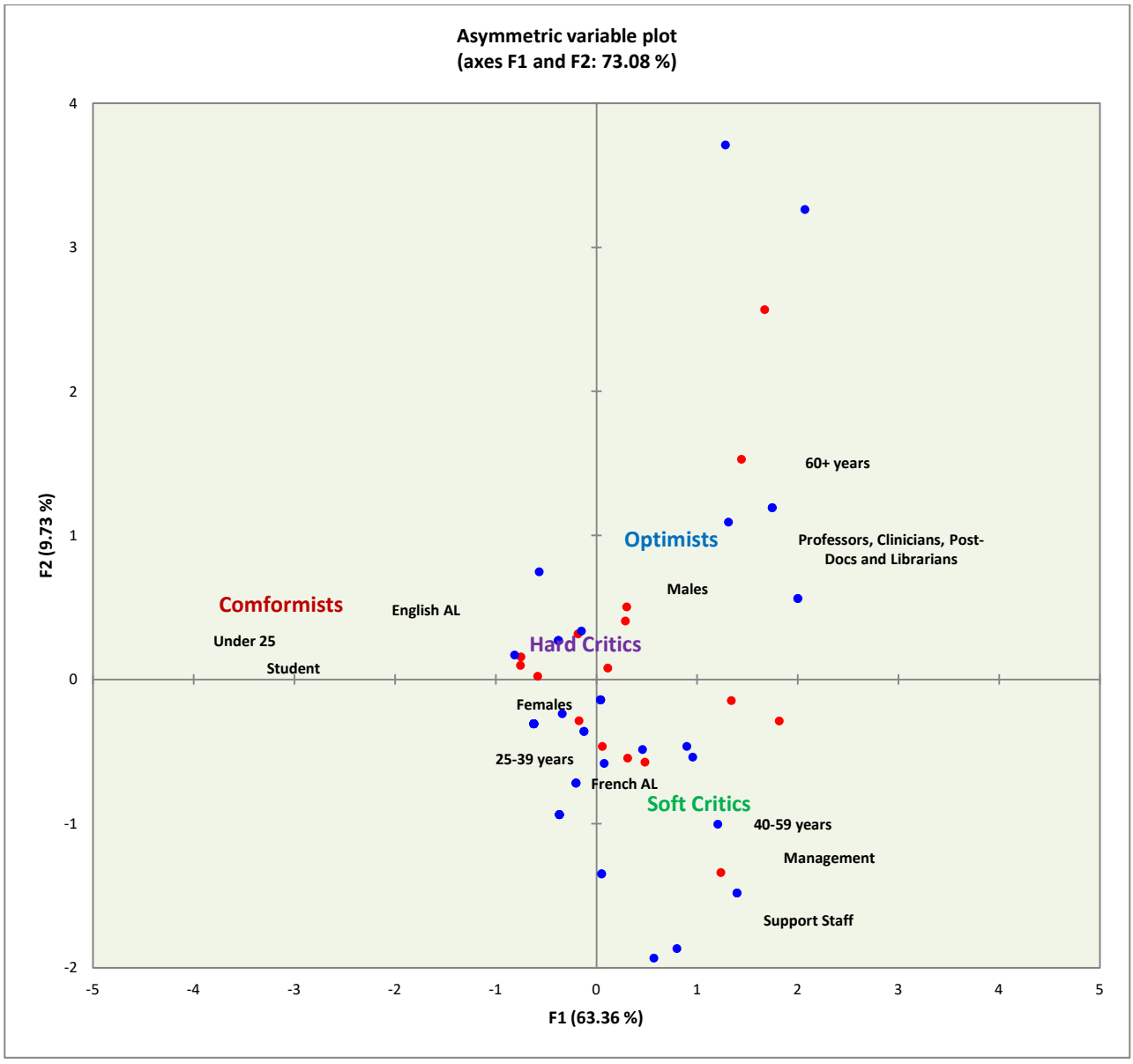
This is the most adversarial and/or concerned segment of respondents. They are unhappy with the climate of diversity and inclusion and think changes are needed to correct this situation. They have been witnesses and victims of exclusionary acts to a greater extent than other segments. It is mostly constituted by female students although it has a relatively fair distribution across a variety of demographic groups.

Table 3: Demographic Characteristics of Cluster Members

Demographics	Optimists	Conformists	Soft Critics	Hard Critics	Total
N (%)	1,608 (25%)	1,936 (31%)	1,806 (29%)	953 (15%)	6,303 (100%)
Gender					
Females	56%	71%	62%	68%	64%
Males	44%	29%	38%	32%	36%
Age Groups					
Under 25	43%	63%	41%	43%	49%
25-39 years	26%	25%	27%	29%	26%
40-59 years	24%	10%	28%	24%	21%
60+ years	7%	2%	5%	4%	4%
University Groups					
Student	66%	89%	57%	65%	70%
Support Staff	15%	3%	27%	18%	15%
Academic	17%	8%	12%	15%	13%
Management	2%	0%	4%	2%	2%
Admin. Language					
English	60%	66%	58%	74%	60%
French	40%	34%	42%	26%	40%
Total	100%	100%	100%	100%	100%

Chart 2 presents a multiple correspondence analysis bi-plot representing the coordinate positions of groups and demographic traits in the same X,Y plane. The major factors (F1,F2) which were extracted approximately represented 73% of the variance of the variation (inertia) of the contingency tables. Proximity of traits to groups suggests over-representation of these traits with respect to the composition of groups while greater distances suggests its converse. The bi-plot also presents the preferred administrative language of use at the university (English AL and French AL) relative to the clusters' positions.

Chart 2: MCA Analysis Bi-plot: Position of Groups and Cluster Coordinates



Attitudinal Profiles of Clusters

Table 3 presents the average (mean) t-scores of the scales for cluster members (centroids in cluster analysis jargon). On average optimists scored highly on all scales except the perceived tensions&reluctancies and the biases present ones (38 points each). Conformists scored lower than average particularly on the trust&awareness one (38 points). They, however, gave higher scores the opinions are valued dimension (63 points). It is precisely on this particular dimension that hard critics differed from conformists. Soft critics perceive that, at the University of Ottawa, their opinions are less valued (30 points on average). Finally, hard critics had a mostly negative view of the campus climate in all dimensions and their satisfaction, overall climate and welcoming atmosphere (23 points or lower). They are more likely to perceive tensions, are reluctant to divulge their identities and assert that there are significant biases in terms of diversity and inclusion at the University of Ottawa.

Table 4: Mean t-Scale Scores by Cluster*

Scales	Optimists	Conformists	Soft Critics	Hard Critics
Satisfaction with Experience	64	50	53	22
Overall Climate	67	49	51	22
Welcoming climate	68	47	51	23
Inclusiveness for Groups	67	44	52	26
Infrastructure climate	64	43	55	32
Resources climate	67	44	55	30
Opinions are valued	62	63	30	43
Trust&Awareness	63	38	67	36
Perceived Tensions&Reluctancies	38	50	59	66
Biases present	38	52	57	58

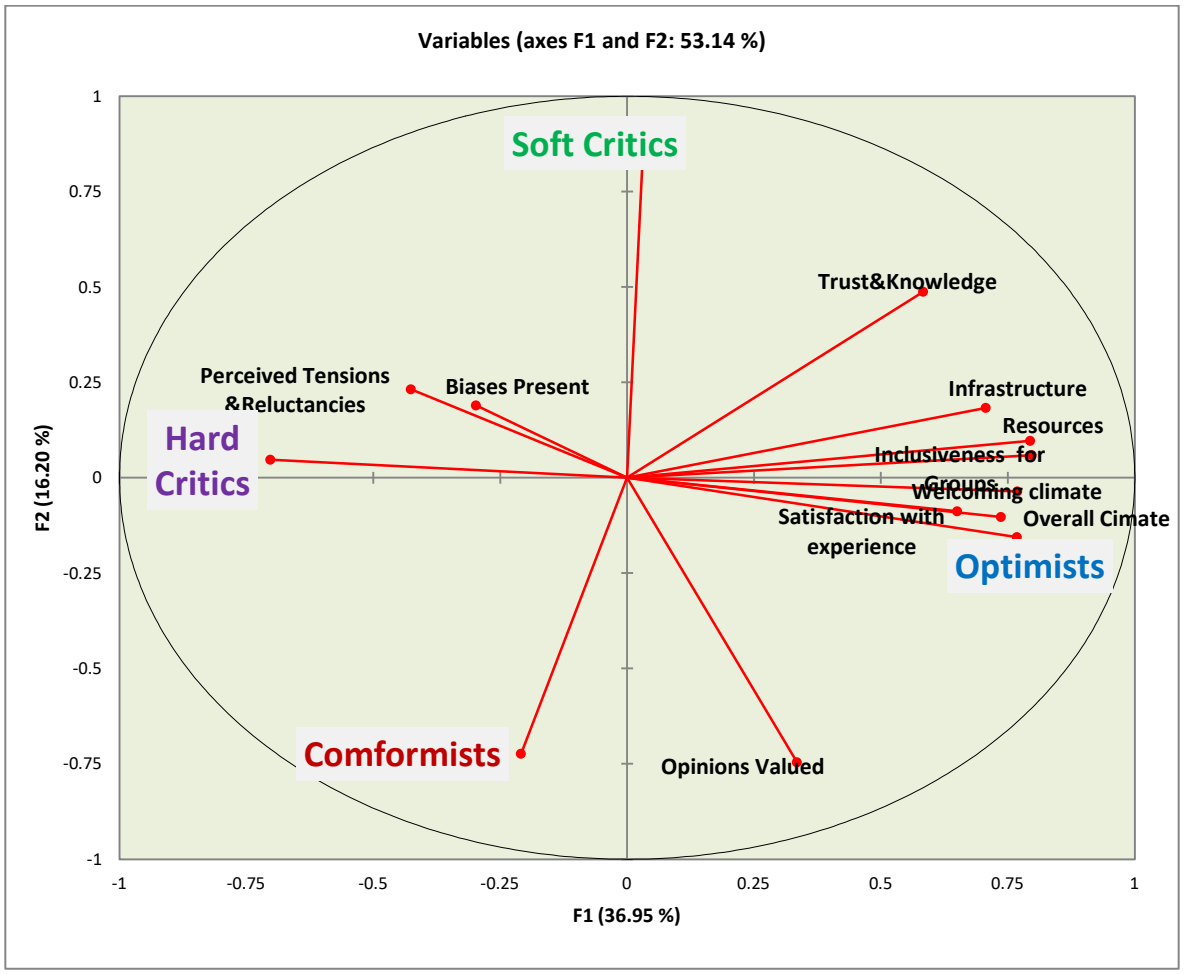
***- Expected Mean of t scale scores=50 points.**

Chart 4 presents a principal components analysis (PCA) bi-plot representing the coordinate positions of groups and attitudinal traits in the same X,Y plane. Essentially, PCA bi-plots are graphs where vectors representing indicators are presented as points in principal component space. The bi-plot of the second component on the first component (which represent the major sources of variation in the data) is particularly useful as it displays the correlations of variables in terms of various indicator vectors of different magnitudes, directions and positions. Correlations between two indicator variables in component space are equal to the cosines of the angles between the indicator vectors (θ), or $r = \cos(\theta)$.

Highly correlated variables are located at sharp angles from each other (θ =90 degrees or less) while those zero correlated are "orthogonal" to each other (θ =90 degrees). If variables are perfectly negatively correlated, then θ=360 degrees (vector in opposite direction).

First two factors extracted accounted for 53% of the variance of the t-score scales and a dummies tapping cluster membership. In the bi-plot, Optimists were located close and at sharp angles from the various measures of a positive campus climate. On the other side of the spectrum, hard critics were close and at sharp angles of the biases present and tensions&reluctancies vectors. Hard Critics were situated at obtuse angles to the opinions valued vector in contrast to conformists who, as previously discussed, gave higher scores to this particular dimension.

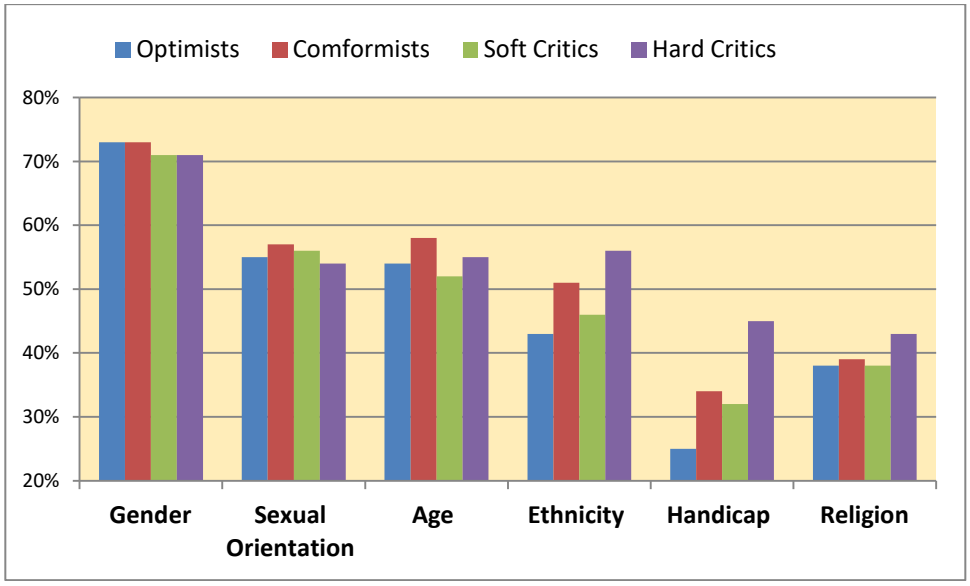
Chart 3: PCA Analysis Bi-plot: Position of Scales and Cluster Vectors



Identity Markers

Gender identity was a strong marker for personal identity for all cluster members (see chart 5). About 70% or more of all cluster member signaled this as an important marker. However, there were some differences with respect to other identity markers. For instance, for hard critics, ethnicity, handicap and religion markers were more prominent compared to other clusters. The age marker was relatively more frequently reported as important for conformists than for optimists, hard and soft critics.

Chart 4: % of Cluster Members reporting marker of identity as important



Selected Group Profiles

Charts 6 to 10 show the cluster composition of different university groups represented in the survey. X^2 s test statistics are also presented in these charts.

Chart 5: Cluster memberships by Reported Sexual Orientation (X^2=522.1, p<.01)

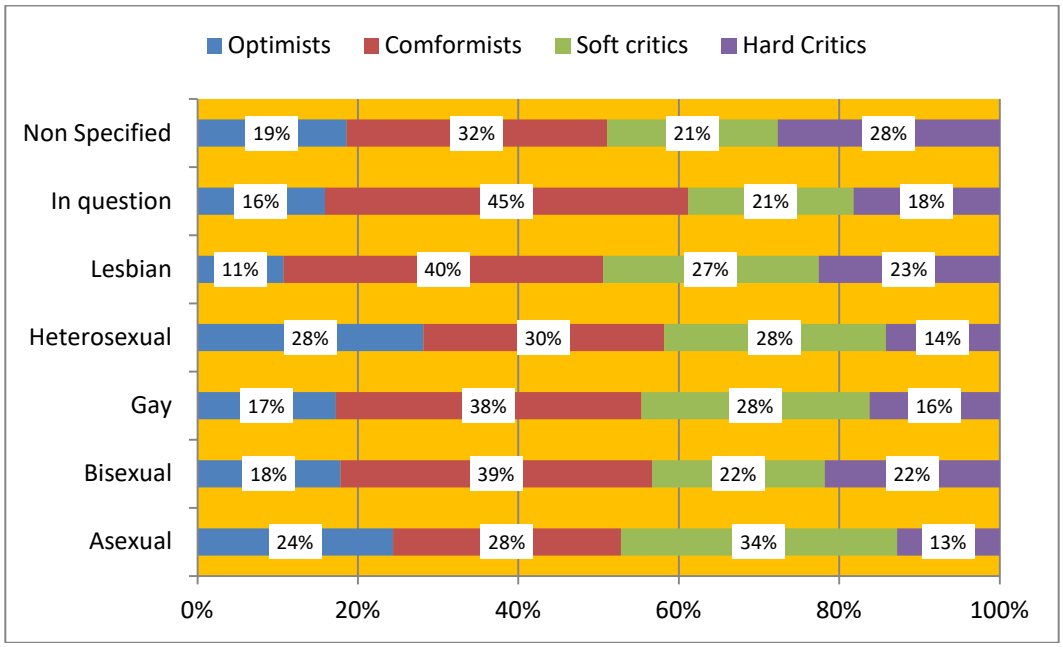


Chart 6: Cluster memberships by Reported Disability (X^2=553.7, p<.01)

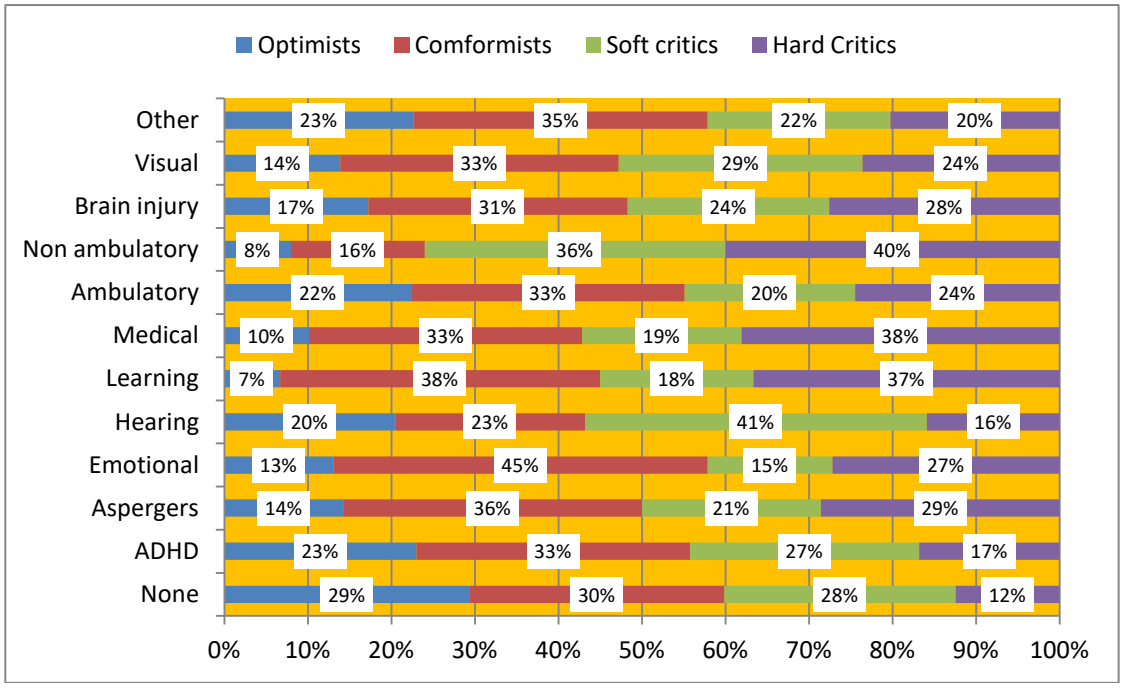


Chart 7: Cluster memberships by Reported Ethnicity (X^2=500.1, p<.01)

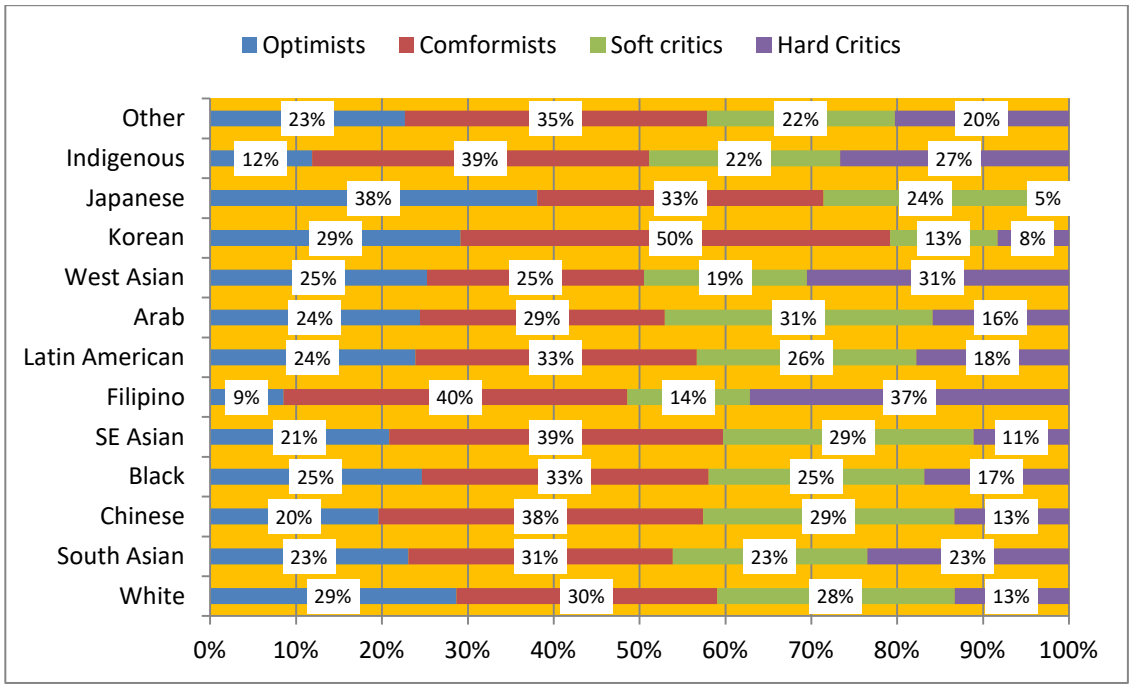


Chart 8: Cluster memberships by Reported Religion (X^2=135.5, p<.01)

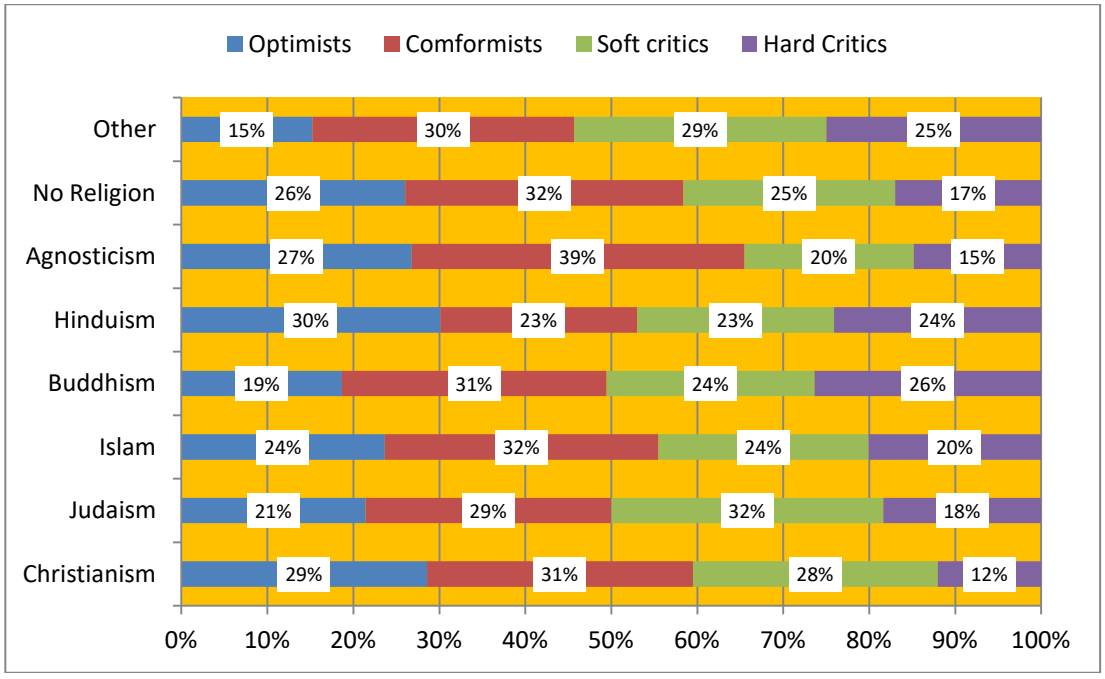
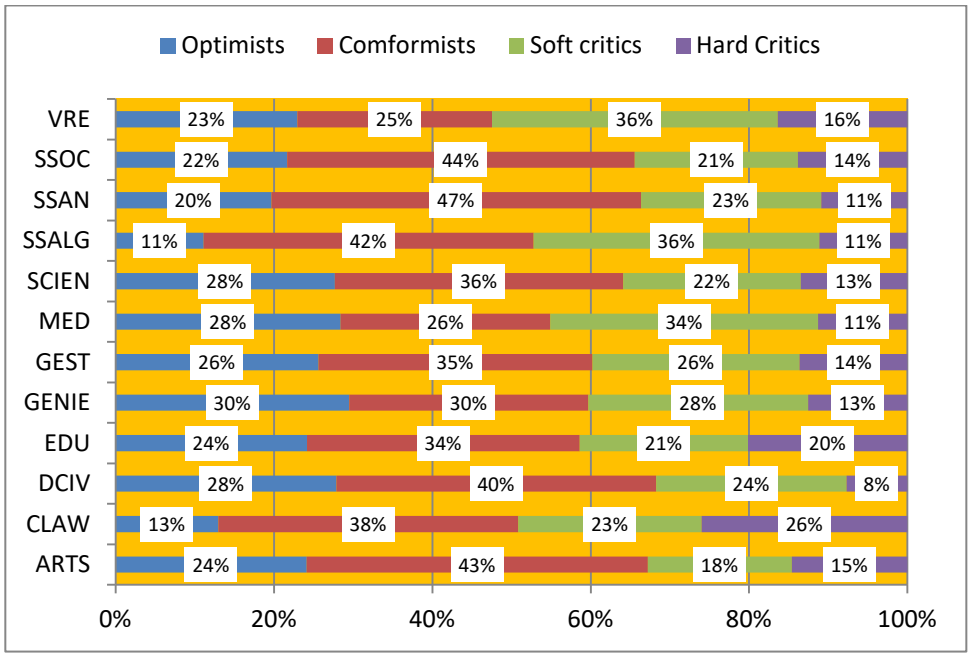


Chart 9: Cluster memberships by Students' Administrative Codes, students only (X^2=621.9, p<.01)



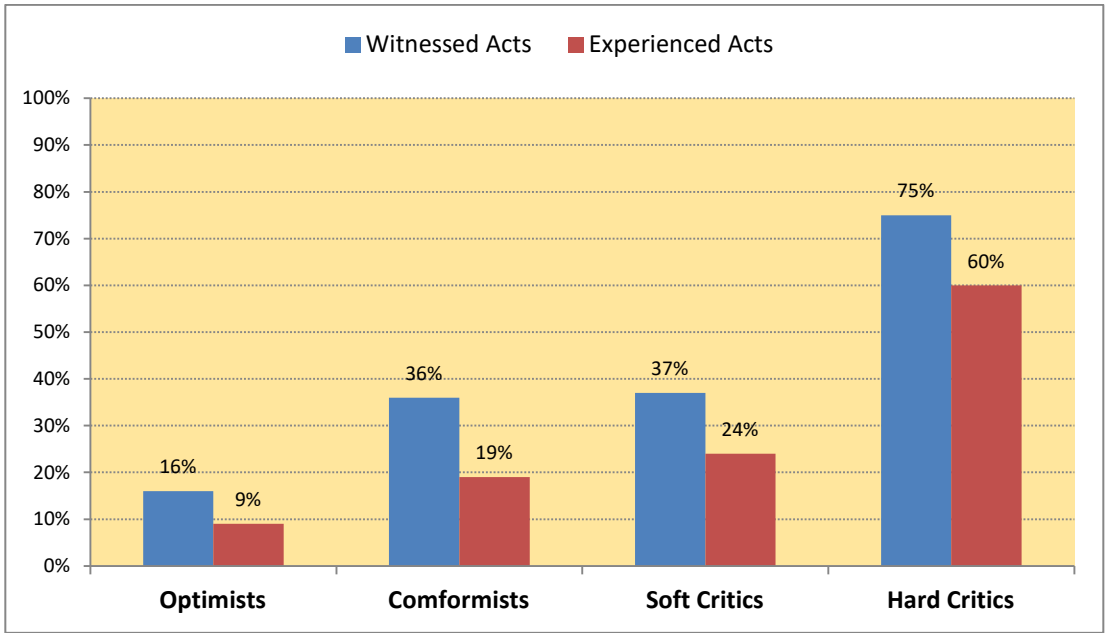
Witnessing and Experiencing of Exclusionary Acts

A final profile of the attitudinal traits of DINC 2017 clusters of respondents refers to the witnessing and experiencing of exclusionary acts on campus. These have a significant influence on their outlooks on the inclusion and diversity climate at the university of Ottawa. Witnessing and direct experience were captured by the following questions:

- **Witnessing:** During your time at uOttawa, have you observed any conduct directed toward a person or group of people on campus that you believe has created an exclusionary (e.g., shunned, ignored), intimidating, offensive and/or hostile (harassing) working or learning environment? (Yes/No).

- **Experience:** During your time at uOttawa, have you personally ever been excluded, (e.g., shunned, ignored), intimidated or subjected to offensive and/or hostile conduct (harassing behaviour) on campus that has interfered with your ability to work or learn here? (Yes/No)

Chart 10: Witnessing and Experiencing Exclusionary Acts on Campus by Cluster Segments



All cluster members were not except from witnessing and/or experiencing exclusionary acts on campus (see chart 10). However, there were marked differences in the prevalence of these events among groups. While optimists either reported to have witnessed or experienced less those who belonged to the hard critics cluster reported witnessing or experienced more of these acts (5 or 6 times as greater). Rates for conformists and hard critics were fairly similar with the exception of the latter reported directly experiencing these acts.

Table 5: Top two mentions of exclusionary acts related characteristics witnessed and/or experienced by cluster members

Exclusionary Acts (Top Two Reported)	Optimists	Conformists	Soft Critics	Hard Critics
Witnessed Acts				
Target	Student 34% Co-worker 23%	Student 49% Classmate 25%	Co-worker 39% Support Staff 32%	Student 50% Classmate 28%
Source (offender)	Student 34% Professor 21%	Student 48% Professor 34%	Student 33% Co-worker 28%	Student 44% Professor 43%
Basis	Ethnicity 24% Race 22%	Ethnicity 30% Race 26%	Ethnicity 24% University Position 23%	Ethnicity 39% Country of Origin 33%
Forms	Derogatory Remarks 51% Bullying 31%	Derogatory Remarks 52% Bullying 34%	Derogatory Remarks 47% Bullying 38%	Derogatory Remarks 58% Ignored/Excluded 55%
Place	Public Space 29% In Class 28%	In Class 44 % Public Space 40%	Administration Office 30% Campus job office 30%	In Class 44 % Public Space 35%
Reactions	Anger 56% Embarrassment 39%	Anger 68% Embarrassment 46%	Anger 56% Embarrassment 42%	Anger 72% Embarrassment 48%
Handling	Told Friend 28% Froze, said nothing 19%	Told Friend 39% Froze, said nothing 27%	Told Friend 24% Confronted harasser 20%	Told Friend 39 % Did not report, because not taken seriously 28%
Experienced Acts				
Basis	Position in University 26% Country of Origin 14%	Position in University 19% Gender 18%	Position in University 32% French Prof. /Accent 22%	Position in University 27% French Prof. /Accent 22%
Source (offender)	Student 29% Professor 29%	Student 40% Professor 39%	Co-worker 31% Supervisor 24%	Professor 39% Student 36%
Experience	Felt bullied 43% Felt Isolated 43%	Felt isolated 49% Felt ignored/excluded 49%	Felt bullied 55% Felt Isolated 46%	Felt ignored/excluded 61% Felt Isolated 60%
Place	In class 29% Campus administration office 20%	In Class 45 % Public Space 23%	Campus Administration Office 33% Campus job office 35%	Meeting group of people 35% Campus administration office 28%

Table 4 presents some dimensions related to the witnessing and/ or experiencing of exclusionary acts on campus by cluster segments. There are also differences in the reported context of exclusionary acts and the individual reactions from respondents to these events:

- In terms of targets and sources(offenders) of *witnessing* acts, while students and professors seem to be the most frequently mentioned among optimists, conformists ad hard critics, soft critics identified co-workers and supervisors as the typical actors surrounding the witnessing of exclusionary acts. The place or work (e.g. campus offices) rather than classes or public spaces was the typical place of witnessing for soft critics. Ethnicity was the most frequently mentioned perceived bias in the exclusionary acts for all cluster members. About 72% of hard critics experienced anger during the witnessing of these acts. Telling friends was the most typical way of coping with the witnessing aftermath for all cluster members. One of five of the soft critics segment confronted the harasser while, among cluster members, less than 30% did not reported these incidents for a variety of reasons.

- In terms of targets and sources (offenders) of *experiencing* acts, again, similar actors were mentioned as the witnessing experience. Aside from classes and public spaces, campus administration offices were the most frequently mentioned places of directly experiencing exclusionary acts which also included optimists. For hard critics, these experiences were significant in the development of their perceptions of the campus climate. More than 60% of them felt deliberately ignored/excluded and isolated particularly during meeting with groups of people and/or dealing with campus administrators.

Conclusion

The DINC 2017 survey is an internet non-probability sample which has limitations typical to these kind of surveys. It may not be appropriate to generalize the current findings to a larger university population. A second limitation of the survey are related to the self-selection and self-reporting nature of the inventory used to gather data. Well documented challenges exist regarding these type of survey instruments (Donaldson & Grant-Vallone, 2002).

A major contribution of the market segmentation analysis undertaken here, however, refers to the discovery of attitudinal patterns is its ability to link statistical methods to the monitoring and change of campus climate environments. The approach presented here can help university decision makers to better identify the university market segments and tailor cluster-suited interventions. Rather than “one size fits all” results, programs and activities can be developed for each cluster and provide tools that can change perceptions and develop more effective responses to tackle exclusion and

discriminatory acts on campus. A *longitudinal approach* may also be required to validate the present portrait of university life. Yearly diversity and inclusion surveys at the University of Ottawa could yield important information on common transitions from one cluster to another and the perceptions and behaviors of cluster members surrounding the transition.

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