The Canadian Journal for the Scholarship of Teaching and Learning

Volume 15 | Issue 2 Article 11

Summer 08-31-2024

Awareness, Use, and Value of Student Support Programs Through the Lens of Science Students, Professors, and Staff

A. Dana Ménard
University of Windsor, admenard@uwindsor.ca
Sira Jaffri
University of Windsor, jaffris@uwindsor.ca
Kendall Soucie
University of Windsor, ksoucie@uwindsor.ca
Dora Cavallo-Medved
University of Windsor, dcavallo@uwindsor.ca
Chris Houser
University of Waterloo, chouser@uwaterloo.ca

https://doi.org/10.5206/cjsotlrcacea.2024.2.14211

Recommended Citation
Ménard, A. D., Jaffri, S., Soucie, K., Cavallo-Medved, D., & Houser, C. (2024). Awareness, use, and value of student support programs through the lens of science students, professors, and staff. *The Canadian Journal for the Scholarship of Teaching and Learning, 15*(2). https://doi.org/10.5206/cjsotlrcacea.2024.2.14211

Awareness, Use, and Value of Student Support Programs Through the Lens of Science Students, Professors, and Staff

Abstract
Science students face specific challenges associated with their field of study. The purpose of this study was to assess science students' use of support services and programs, identify barriers to use and group differences, determine professors' and staff's familiarity with programs and solicit ideas from all participants about what programming changes should be made. Survey questions were completed by 308 students and 40 staff and professors in our institution's Faculty of Science. Students' participation rates and professors' and staff's familiarity with programs ranged significantly but most services were rated as helpful by both groups. Few demographic group differences emerged in program use. Participants recommended a number of improvements to the Faculty of Science including strengthening mental health awareness and support services, fostering student engagement in science, building students' relationships with professors and cultivating a healthy learning environment. Implications for program development in science faculties are considered.

Les étudiants et les étudiantes en sciences sont confrontés à des défis spécifiques liés à leur domaine d'études. L'objectif de cette étude était d'évaluer l'utilisation des services et des programmes de soutien par les étudiants et les étudiantes en sciences, d'identifier les obstacles à l'utilisation et les différences entre les groupes, de déterminer la connaissance des programmes par les professeurs, les professeures et le personnel et de solliciter les idées de tous les participants et de toutes les participantes sur les changements qui devraient être apportés aux programmes. Trois-cent huit étudiants et étudiantes et 40 professeurs, professeures et membres du personnel de la Faculté des sciences de notre établissement ont répondu aux questions. Les taux de participation des étudiants et des étudiantes et la familiarité des professeurs, des professeures et du personnel avec les programmes variaient considérablement, mais la plupart des services ont été jugés utiles par les deux groupes. Peu de différences démographiques sont apparues dans l'utilisation des programmes. Les participants et les participantes ont recommandé un certain nombre d'améliorations à la Faculté des sciences, notamment le renforcement de la sensibilisation à la santé mentale et des services de soutien, la promotion de l'engagement des étudiants et des étudiantes dans les sciences, l'établissement de relations entre les étudiants, les étudiantes, les professeurs et les professeures et la création d'un environnement d'apprentissage sain. Les implications pour le développement de programmes dans les facultés des sciences sont examinées.

Keywords
higher education, qualitative research, science policy; enseignement supérieur, recherche qualitative, politique scientifique

This research paper/Rapport de recherche is available in The Canadian Journal for the Scholarship of Teaching and Learning: https://doi.org/10.5206/cjsotlrcacea.2024.2.14211

Science students face specific and distinct challenges compared to students in other programs. This includes stress associated with introductory "weed-out classes", the time commitment associated with labs, participation in undergraduate research, post-undergraduate educational aspirations (e.g., professional or graduate school) and career-related anxieties (Kardash & Wallace, 2001; May & Casazza, 2012; Sanabria & Penner, 2017; Smith & Cooke, 2011). Graduate students in science face special difficulties associated with data collection and fieldwork (Tucker & Horton, 2019), as well as pressure to publish and secure employment (Hyun et al., 2006). Unsurprisingly, several studies have found higher levels of stress in undergraduate (May & Casazza, 2012) and graduate (Toews et al., 1997) students in science compared to other disciplines. Women, LGBTQ2S+ individuals, and members of certain racialized groups are disproportionately likely to leave STEM programs before completion (Harsh et al., 2012; Hughes, 2018; Linnenbrink-Garcia et al., 2018); the impact of this loss is significant for representation of these groups at higher levels of study as well as in science-related jobs.

The purpose of this investigation was to assess science students' use of our institution's Faculty of Science-specific and university-wide support programming, identify barriers to use and group differences, determine professors' and staff's familiarity with programs and solicit ideas from all participants about what programming changes should be made.

Students' Use of Counselling Services and Barriers to Use

Most of the existing research on students' use of campus resources and supports has focused on their use of student counselling centres. Several studies suggest that students have positive views about counselling (Dunbar et al., 2017; Eisenberg et al., 2012b; Giamos et al., 2017); however, many report low awareness of how to access counselling services (American College Health Association [ACHA], 2019) as well as uncertainty regarding what services are available or what types of problems might be appropriate for counselling (Giamos et al., 2017; Goodman, 2017; Miranda et al., 2015; Nash et al., 2017; Walther et al., 2014; Yorgason et al., 2008). Other barriers to accessing counselling may include feeling that issues are not severe enough to warrant treatment, a preference for self-management, stigma, lack of time and the normalisation of stress (Czyz et al., 2013; Eisenberg et al., 2012a; Goodman, 2017; Miranda et al., 2015; Nash et al., 2017; Pickles et al., 2012; Walther et al., 2014; Yorgason et al., 2008). Studies about tele-mental health services (e.g., mental health apps) show positive views about this support delivery mechanism (Levin et al., 2018) but low uptake (Dunbar et al., 2017).

Studies on which students are likely to access mental health services suggest a few demographic group differences. Students who are more likely to attend counselling may be domestic (Bertocci et al., 1992; Hyun et al., 2006, 2007), white (Eisenberg et al., 2011, 2012a), female (Eisenberg et al., 2011, 2012a; Hyun et al., 2006; Yorgason et al., 2008), continuing generation (i.e., one or both parents attended higher education) (Stebleton et al., 2011) and graduate students (Wyatt & Oswalt, 2013).

There has been less research about students' use of other types of campus supports (e.g., mentoring programs, orientation programs, special-interest groups). This is unfortunate given findings showing that students prefer different types of support depending on the nature and severity of their concerns (Bertocci et al., 1992). Existing studies confirm the benefits of participating in extracurriculars on student wellbeing, stress and depression (Billingsley & Hurd, 2019; Fischer, 2007) as well as dropout rates (Astin, 1999).

Students' Participation in Science-specific Programming

Several academic programs and institutions have developed and tested interventions specific to Faculties of Science in an effort to increase student retention and engagement. Gregg-Jolly and colleagues (2016) found that the most important components of programming for undergraduate science students were the willingness of professors to talk to students outside of class and the availability of peer mentors and academic advisors. Another study found that science students who completed a two-week summer enrichment program demonstrated increases in science motivation, intentions to pursue a science research career and subsequent course completion eight months after the program's conclusion (Linnenbrink-Garcia et al., 2018). Hedges and Mania-Farnell (2002) determined that science students who were mentored had higher exam scores compared with tutoring-only and no-treatment controls. Another study found improved retention rates and higher grades in a group of STEM students transferring from a community college to university for those who completed an orientation meeting and attended a series of monthly meetings (Scott et al., 2017). The generalisability of these programs is unclear given the heterogeneity in the support systems evaluated but these results do suggest the positive impact of program-level interventions with science students.

Professors' Knowledge of Campus Programs

Many studies have demonstrated the importance of the relationships between professors and students (Astin, 1999; Schertzer & Schertzer, 2004); this may be especially true in science (Daempfle, 2003/04; Ramirez, 2012). However, little research has been conducted on staff and professors' familiarity with campus support programs. This is unfortunate given that staff and professors are often the first point of contact for students seeking mental health support (Gulliver et al., 2019); some research has shown that professors and staff feel they do not have sufficient knowledge and training to work effectively with students reporting mental health issues or high levels of stress (Brockelman et al., 2006). In addition, staff and professors are often responsible for creating and supporting initiatives but their appraisals of student concerns may be inaccurate (Henggeler et al., 1980). The creation and maintenance of effective, Faculty-level programming targeted at student stress and wellbeing will require the inclusion of staff and professors' perspectives and needs.

Purpose of the Current Study and Research Questions

Science students may be particularly vulnerable to stress due to the demands of their studies (Smith & Cooke, 2011), and student stress is associated with a variety of adverse outcomes, including lower grades, incomplete courses, drop-outs or delays in graduation (ACHA, 2019; Goodman, 2017; Richardson et al., 2012; Shankar & Park, 2016). This is an issue of particular concern in Faculties of Science given the loss of students from marginalized groups (e.g., women, LGBTQ2S+). The goals of this study were to determine students', staff's and professors' familiarity with our institution's Faculty of Science-specific and university-wide programs, establish if there were group differences in students' program use, identify barriers to students' program use and solicit suggestions for change from all participants within the faculty.

No hypotheses were advanced for these research questions, for several reasons. Firstly, much of the data gathered in this survey was specific to programs at this university and there were

no baseline rates of program familiarity or use with which to make comparisons. Although there has been some research about program use, group differences and barriers to access with regards to student counselling, there has been a lack of research on students' use of other types of campus programs. In addition, few studies have included the perspectives of staff and professors on programming. Finally, it is not expected that hypotheses be generated for qualitative research questions, as this approach is normally focused on discovery.

Method

This study was completed as part of a larger needs assessment conducted in the spring of 2019 to better understand students' mental health and wellness in advance of introducing new, targeted programming and making changes to existing services within our institution's Faculty of Science. The questions for this survey were created by the authors based on relevant findings from previous investigations as well as surveys developed by other universities for similar initiatives (Queen's University, 2012; University of Waterloo, 2012). Pre-existing measures were not used as the focus was on assessing participants' familiarity and use of in-house programming and to garner suggestions for change specific to our institution's Faculty of Science and to the university.

One survey was created for undergraduate and graduate students and a second, parallel survey was created for staff and professors. Pilot testing of the surveys was completed by a selection of graduate and undergraduate students as well as by professors and staff; modifications to the questions were made based on their feedback. Programs of interest listed on these surveys included several specific to our institution's Faculty of Science, i.e., a peer mentoring program, a two-day orientation for incoming students[1], group tutoring sessions, special interest groups within science (e.g., a career group, a "women in science" group, community outreach volunteer groups) and the student society, as well as university-wide programs, i.e., the student counselling centre and web- and phone-based wellness programs. Students were asked to indicate whether or not they had participated in these programs (e.g., "Have you used or participated in the following Faculty of Science programs?"); options included "yes", "no" or "unsure." If they indicated they had used the program, they were asked whether it was very helpful, somewhat helpful or not helpful. If a participant indicated that they had not taken part in a specific program, they were asked to identify the main barriers to use from a list developed based on literature in this area (e.g., "did not know about this program," "not enough time," "did not seem relevant to me," "not interested"), or to share their own explanations.

Professors and staff were asked if they were familiar with the programs listed and whether they perceived these programs to be helpful to students. It should be noted that some professors and staff serve as leaders/advisors in some of these programs (e.g., departmental academic advising program, science special-interest groups, the two-day orientation program) and thus have first-hand knowledge and experience. In other cases, professors and staff might only know about these programs from their conversations with participating students. At the end of the survey, all participants (i.e., students, professors and staff) were provided with open text boxes and asked what our institution's Faculty of Science should continue doing, what it should stop doing and what it should start doing to improve mental health and wellness for science students. Demographic questions were also asked of all participants including age, gender, primary departmental affiliation, generational status (i.e., first generation vs. continuing generation) and

[1] The orientation program was offered for the first time two years prior to the data collection for this survey and had therefore not been available to participants who were in 3rd or 4th year.

study status (i.e., international vs. domestic) (students only), and years of employment and highest educational attainment (professors and staff only).

Procedure

This study was approved by the Research Ethics Board (REB) of the university. Requests for participation were made in several large undergraduate science classes as well as at Faculty-wide and departmental meetings. Posters were displayed in science buildings across campus describing the survey and soliciting participation, and social media posts were shared on Twitter, Instagram, and Facebook. An e-mail that included the link to the survey was distributed to all undergraduate students, graduate students, professors, and staff within our institution's Faculty of Science, requesting their participation in the survey; reminder e-mails were sent every two weeks throughout the duration of the study. The surveys were available through Qualtrics and completion took approximately 15-20 minutes (based on reports from approximately 20 pilot participants).

Data Analysis

Students' use of programs, barriers to use, staff's and professors' familiarity with programs and ratings of their helpfulness are reported in percentages. Group differences in program use were determined using chi square comparisons.

Participants' open-ended responses to the questions about improvements that could be made within our institution's Faculty of Science were analysed using a content analysis (Neuendorf, 2017). The purpose of a content analysis is to identify meanings from textual data based on systematic analysis and describe patterns in the content (Hsieh & Shannon, 2005). Students' data was initially analysed separately from staff's and professors' in order to determine if there were significant differences in perspectives between those two groups. Preliminary analyses suggested that responses from both groups touched on many of the same ideas and so this data was grouped and analysed together. Likewise, initial coding was performed on the three questions separately but participants tended not to make clear distinctions between initiatives that our institution's Faculty of Science should stop, start or continue and so the responses were collapsed for subsequent analyses.

Two coders separately reviewed answers to the open-ended questions and generated codes reflecting recurring ideas; codes with conceptual similarity were grouped together to capture more abstract themes. Coders met several times to refine codes and themes before agreeing on a preliminary coding system. This system was reviewed by a third party, familiar with qualitative methodologies, but blind to the development of the initial coding system. Modifications were then made to the original coding system.

Results

Sample

The survey was completed by 301 students. Most of the participants (72%) were women and the remaining were men (28%). Students identifying as gender diverse were too few to analyse separately, both for statistical and ethical reasons; as such, the results are not reported specific to this group to preserve anonymity. The majority of participants were undergraduate students (81%),

most of whom were in first or second year (62% of undergraduate respondents); the rest were graduate students (19%). Participants tended to be domestic students (90%) and continuing generation (86%), i.e., one or both parents had postsecondary education. The majority of participants were 18-21 years old (66%), followed by 22-25 year-olds (22%). The highest participation in the survey came from students in the following programs: biological sciences (34%), followed by chemistry and biochemistry (18%), computer science (13%), earth and environmental science (7%), forensic science (5%), mathematics and statistics (4%), general science (3%), physics (3%), and other programs (7%) or double majors (7%). The distribution of the sample with respect to program, year of study and age was representative of the student population at the time data was collected; however, men and graduate students appear to be underrepresented.

Data was also collected from 40 staff[2] and professor participants (44% women, 56% men). Most were 40-60 years old (62%), with half of the sample having been employed by the university less than 15 years (50%) and the other half more than 15 years. The majority of professors and staff were affiliated with the department of chemistry & biochemistry (35%), followed by physics (16%), biological sciences (14%), earth and environmental sciences (14%), computer science (8%), mathematics and statistics (8%), and economics (5%). One quarter of participants had a high school diploma, a bachelor or Master's degree and the remaining three quarters had earned a doctoral degree.

Program Use and Helpfulness

Percentages of students reporting program use and their helpfulness ratings are given in Table 1. The majority of student respondents (89%) had accessed at least one program or support and 53% had used three or more. The program that generated the highest level of participation was group tutoring sessions (60%) while the lowest was for any one of the web- and phone-based support programs offered by the university (10%). (The survey asked about five different mental health websites, helplines and apps. Because so few participants endorsed familiarity with any of them, responses were dichotomised to indicate familiarity with any single program in that category.) Most programs were rated as somewhat or very helpful by over 75% of respondents; the exception was phone/web-based mental health programs, with only 57% of users rating them as helpful.

With regards to staff and professor' familiarity with programming, virtually all participants were familiar with departmental academic advising and the student counselling centre (Table 1). This was not surprising since professors and staff serve as departmental academic advisors. However, program familiarity was substantially lower for several programs, including those hosted outside our institution's Faculty of Science. Staff and professors generally rated the programs as helpful, with over 70% of respondents rating programs as somewhat or very helpful. Again, familiarity and helpfulness ratings for phone/web-based programs were low.

[2] Teaching assistants were not categorized as "staff" for the purpose of this survey but rather as undergraduate or graduate students. "Staff" was used for non-student employees of the university

Table 1

Percentages Reflecting Student Use, Faculty Familiarity and Helpfulness Ratings of Campus and Science-specific Programs

	Student Use	Student Helpfulness	Faculty Familiarity	Faculty Helpfulness
Undergraduate-only Science programs				
Science student group	33 (*n*=236)	76 (*n*=78)	72 (*n*=40)	72 (*n*=29)
Orientation program	20 (*n*=240)	86 (*n*=49)	62 (*n*=39)	83 (*n*=24)
Group tutoring	60 (*n*=244)	93 (*n*=146)	49 (*n*=39)	78 (*n*=19)
Peer mentoring	17 (*n*=232)	75 (*n*=40)	44 (*n*=39)	82 (*n*=17)
Undergraduate and graduate Science programs				
Departmental academic advisors	32 (*n*=296)	79 (*n*=96)	92 (*n*=39)	94 (*n*=36)
Science special interest groups	36 (*n*=292)	75 (*n*=101)	85 (*n*=34)	78 (*n*=32)
University-wide programs				
Student counselling	19 (*n*=290)	80 (*n*=55)	92 (*n*=40)	89 (*n*=37)
Web and phone-based programs	10 (*n*=298)	57 (*n*=28)	31 (*n*=39)	67 (*n*=12)

Group Differences and Barriers to Program Use

There were few group differences in program use related to demographic factors. For programs available only to undergraduate students, women and domestic students were both more likely to attend group tutoring sessions compared to male undergraduates and international students (Table 2).

Table 2

Percentages Reflecting Participation for Each Demographic Group in Undergraduate-only Science Programs

	Men	Women	FG	CG	D	I
Science student group	25 (*n*=64)	36 (*n*=169)	21 (*n*=28)	35 (*n*=205)	32 (*n*=228)	14 (*n*=7)
Orientation program	13 (*n*=62)	23 (*n*=175)	11 (*n*=28)	22 (*n*=209)	18 (*n*=232)	17 (*n*=6)
Group tutoring	**41 (*n*=66)**	**68* (*n*=175)**	60 (*n*=30)	60 (*n*=210)	**58 (*n*=234)**	**14* (*n*=7)**
Peer mentoring	9 (*n*=63)	20 (*n*=166)	12 (*n*=26)	18 (*n*=202)	17 (*n*=224)	0 (*n*=6)

Note. Group comparisons were conducted via chi-square tests with a Sidak-Bonferonni correction. FG = first generation, CG = continuing generation. D = domestic, I = international. *p< .016.

For programs available to both undergraduate and graduate students, women were more likely to participate in any science special interest groups compared to men (Table 3). However, there were no other group differences in program use related to demographic variables.

Table 3

Percentages Reflecting Participation for Each Demographic Group in Undergraduate/Graduate Programs

	Men	Women	FG	CG	D	I	U	G
Science-specific programs								
Academic advisors	36 (*n*=80)	32 (*n*=211)	36 (*n*=39)	31 (*n*=253)	31 (*n*=263)	47 (*n*=30)	33 (*n*=243)	28 (*n*=53)
Science special interest groups	**23 (*n*=77)**	**41* (*n*=210)**	30 (*n*=40)	38 (*n*=249)	34 (*n*=261)	57 (*n*=28)	37 (*n*=237)	33 (*n*=55)
University-wide programs								
Student counselling	17 (*n*=81)	20 (*n*=204)	15 (*n*=39)	19 (*n*=246)	20 (*n*=257)	10 (*n*=30)	20 (*n*=238)	14 (*n*=52)
Web and phone-based programs	4 (*n*=80)	12 (*n*=213)	7 (*n*=41)	10 (*n*=252)	9 (*n*=265)	21 (*n*=29)	9 (*n*=244)	11 (*n*=54)

Note. Group comparisons were conducted via chi-square tests with a Sidak-Bonferonni correction. FG = first generation, CG = continuing generation. D = domestic, I = international. U = undergraduate, G = graduate. *p< .01

Students who stated that they had not participated in a program were asked to indicate from a list of options the main reasons for not using the program, or to write in their response. These reasons varied considerably depending on the program (Table 4). A lack of familiarity with the program was the main reason for not participating in the orientation program, the peer mentoring service and the phone/web-based support services. “Not having enough time” was the primary barrier to participation in a science student group or one of the special-interest groups. A substantial proportion of students who said they had not seen an academic advisor cited irrelevancy as the main reason. Additional barriers were provided to capture reasons for not using the mental health services offered by the university; a very small percentage of respondents cited stigma as the main reason for not availing themselves of the service, whereas a much larger percentage cited a preference to handle their own problems.

Programming Suggestions

Four main themes were identified in participants’ written responses to questions about our institution’s Faculty of Science programming. These included strengthening mental health awareness and support services, fostering student engagement in science, building students’ relationships with professors and cultivating a healthy learning environment.

Table 4

Percentage Endorsing Reasons for Program Non-Use

	Did Not Know	Not Enough Time	Irrelevant	Not Interested	Stigma	Prefer to Handle Own Problems
Undergraduate-only Science Programs (*n*=245)						
Science student group	5	20	15	24	N/A	N/A
Orientation program	46	17	12	11	N/A	N/A
Group tutoring	5	16	12	13	N/A	N/A
Peer mentoring	38	13	15	22	N/A	N/A
Undergraduate and Graduate Science Programs (*n*=301)						
Academic advisors	22	13	23	13	N/A	N/A
Science special interest groups	20	24	17	16	N/A	N/A
University-wide Programs						
Campus student counselling	20	12	13	11	7	34
Web and phone-based programs	35	7	18	16	4	17

Strenthening mental health awareness and support services

Within the larger domain of strengthening mental health awareness and support services, two main ideas emerged: valuing and supporting mental health and student support services, and improving mental health training for staff, professors and students.

Many participants in both groups identified specific programs that they found helpful, both within science and across the university, including group tutoring sessions, peer-assisted learning, special interest groups, the student counselling centre, student accessibility services and various wellness initiatives. Students, staff and professors expressed appreciation for the variety of programming available, and suggested increasing support and funding to existing programs so as to strengthen and expand them. Several respondents had ideas or recommendations for specific events that they would find helpful, including pet days, yoga sessions or colouring[3]. Students, staff and professors described the importance of normalising mental health issues more generally so as to reduce stigma; staff and professors, in particular, cited the need for early intervention for students experiencing difficulty and advocated for preventative measures to ensure students not fall through the cracks. “Reminding students that mental health is very important and that being in a discipline as demanding as Science doesn’t mean that you have to sacrifice the way you feel,” explained one student. Participants in both groups advocated for promoting and modeling healthy lifestyles and approaches to coping.

Students, professors and staff all requested that additional training be provided in recognising and addressing mental health concerns. “Make days for suicide prevention, for eating

[3] Pet days were endorsed by a sizeable minority of student respondents

disorders, etc. Educate people on the problem," said one student. Some participants emphasised the importance of ensuring that programming be sensitive and inclusive, and that issues related to stigma, biases and diversity be addressed. A few graduate students suggested that such training could be offered to entire research groups. Quite a few respondents suggested that an embedded counsellor position be created with the specific mandate of supporting students in science and liasing with staff and professors. As one staff member explained: "Knowing there is someone available close by and on short notice could be of great benefit. I am staff, and find myself counselling undergrads and grads myself on a regular basis."

Fostering student engagement in science

The second major category of responses concerned fostering student engagement in science. This category included supporting student activities, providing more professional development opportunities and improving communication and outreach.

Students, staff and professors emphasised the need to foster team environments, increase inclusivity, promote engagement and build support networks. Many participants specifically cited the variety of undergraduate research opportunities available to students as being a major contributor to enhancing student engagement. One professor/staff member described the value of undergraduate research opportunities: "Despite adding to their workload, students love being part of a team." A few respondents recommended reducing and refining the availability of extraneous extracurricular activities; generally, no specific programs or opportunities were consistently identified as problematic.

Many students, especially graduate students, requested that more professional development opportunities be offered by our institution's Faculty of Science, citing tremendous stress and concerns related to the job market. Participants requested more information, support and concrete help be provided to prepare for jobs both within and outside of academia. Some specifically requested increased training in applied skills such as making presentations, writing, interview skills or CV development.

A recurring idea across responses from students, staff and professors was the need to improve communication and outreach, both between students and our institution's Faculty of Science and between students and professors. One student stated, "The work that goes on is hugely inspiring but the university communicates so little of what is happening." Students from some of the smaller departments within our institution's Faculty of Science often requested that greater efforts at outreach and inclusion be targeted towards them. Respondents were divided on the subject of e-mails: many reported receiving too many emails, describing them as a "nuisance" or "spammy," while others suggested that more emails would improve communication. Several students stated that existing programs and resources were not getting enough promotion, and a few said that completing the survey allowed them to learn about supports of which they had not been previously aware. "The resources that are put in place are already very valuable, I think the awareness is lacking," is how one student described the problem.

Building students' relationships with professors

Participants emphasised the importance of encouraging student engagement with professors. One professor explained:

> My opinion is that if they are not engaged in the learning process and discussing issues with their instructors then stress levels are bound to go up and success to go down…Students are extremely reluctant to talk to their professors and discuss issues.

Some requested that professors make themselves even more accessible and visible, possibly through attendance at events and programming. Others talked about the importance of academic advising and mentorship. Respondents from both groups stated that having easy access to upper administrators was helpful: "I have heard students advising other students to 'Go see [the dean]', when they had problems," wrote one professor/staff member. Several participants cited the beneficial aspects of a low student/professor ratio in our institution's Faculty of Science. A few students mentioned the need for professors to be more empathic and responsive and to take students' life circumstances into account; some of these respondents shared personal stories of feeling dismissed.

Cultivating a healthy learning environment

Students, staff and professors wrote about the need to cultivate a healthy learning environment. Some expressed concerns about competition among students and the heavy workload associated with science degrees. One student stated: "The science department is too heavily focused on quantity over quality. The workload is too heavy, the expectations are too high." A professor/staff member said, "Promoting competitiveness, emphasising excellence, success, etc., are what we are expected to do and we have to do, and yet the big part of students stress is from such a demand from academic work." A few advocated for finding alternative evaluation methods; for example, some students described the stress caused by having three or four midterms in each of five classes, leading to multiple exams almost every week of the semester. Many requested that less stressful approaches to evaluations be identified. A few respondents, particularly among staff/professors, expressed concerns for possible over-saturation of clubs and extra-curricular opportunities in our institution's Faculty of Science.

Discussion

The findings of this investigation shed light on science students' use of programs, as well as professors' and staff's knowledge about these supports. Written responses to questions about what our institution's Faculty of Science could stop, start or change to improve mental health and wellness for science students pointed to a number of areas for intervention.

Student Program Use and Barriers

Students' participation rates in programs ranged from a low of 10% (web and phone-based mental health programs) to 60% (group tutoring). Almost all programs included in the survey were rated as helpful by over 75% of users, suggesting that existing programs do not require significant overhauls or reinvention. This was confirmed by written responses expressing appreciation for existing supports. The vast majority of the participants had accessed at least one program or support and over 50% had accessed three or more. This finding suggests that 1) participants in this investigation may be those who were more engaged with the university in general and our institution's Faculty of Science and that 2) students who are connected to the community in one

area may find it easier to find and access other supports as needed. However, it does raise the concern that administrators may sometimes be "preaching to the choir," i.e., reaching only those students who are already engaged and not those who might need but be unaware of existing supports/programming. To ensure ongoing engagement and appropriate use of resources, administrators in Science may be encouraged to emphasize orientation programs: students who learn about resources and programs early in their university careers may be more inclined to get involved and stay involved. Indeed, our study demonstrated that the majority of students, faculty and staff rated the orientation program offered by the Faculty of Science as helpful.

Few demographic group differences emerged in students' use of programs. Women and domestic students were more likely to report having attended group tutoring sessions and women were also more likely to report being a member of a science special-interest group. This corroborates some previous research that found higher program use in women (Hyun et al., 2006; Yorgason et al., 2008) and domestic students (Bertocci et al., 1992; Hyun et al., 2006, 2007). The lack of difference in use rates related to demographic group membership is somewhat reassuring in that existing groups appear to be accessible to all students in our institution's Faculty of Science. However, it will be important to continue collecting data to ensure that this finding is consistent over time and that potentially marginalised groups find existing supports relevant to their needs.

The proportion of students reporting attendance at the counselling centre (19%) was consistent with other investigations (e.g., ACHA, 2019), as was the proportion of students (20%) who were not aware that a counselling centre was available (e.g., Pickles et al., 2012). Stigma was not cited by many participants as a barrier in this investigation, which confirms the findings of other investigations (Czyz et al., 2013; Eisenberg et al., 2012a). Low use and helpfulness ratings of web- and phone-based supports is consistent with several existing studies showing low interest and low uptake of these services (Cunningham et al., 2017; Dunbar et al., 2017; Levin et al., 2018). Universities across North America are increasingly focusing on these types of supports due to a combination of high prevalence rates of stress and mental health concerns in the student population and budgetary restrictions that prohibit hiring more counselling personnel. More research will be required on how to increase use among students and to address concerns, which in this study included lack of awareness, preference to handle own problems and perceived irrelevancy.

The range of supports and programs endorsed by participants in this investigation supports previous findings showing that students are not a homogenous group with regards to help-seeking but have preferences for supports directly related to their concerns (Cunningham et al., 2017). Science students may see themselves as having different experiences from other students (e.g., greater academic time commitments) and may therefore prefer to join groups with others who are likely to understand and share their experiences, even if such groups are not explicitly focused on wellbeing. Some students with mental health concerns may not wish to avail themselves of professional counselling services but will gladly join a special-interest group (to alleviate loneliness or depression), attend group tutoring (to address low grades and improve stress) or see an academic advisor (to manage program and career-related anxiety). Therefore, it is imperative that a variety of supports be made available.

Professors and Staff

A wide majority of professors and staff were familiar with the availability of the student counselling centre, academic advisors and at least one of the science special-interest groups. However, a much lower proportion of respondents were familiar with other types of supports

available to science students. It was not possible to investigate group differences in level of familiarity due to small sample size but future studies should consider differences in professors' knowledge of programs based on demographics or length of tenure with the organisation (Becker et al., 2002). Previous research has shown that professors and staff do not feel they have sufficient skills and knowledge to assist students with mental health concerns (Brockelman et al., 2006). Administrators must consider how best to share information about available supports without overwhelming already-busy staff and professors. A coordinated, multi-platform approach may be desirable in order to reach the greatest number (e.g., workshops, videos, emails, briefing notes, meetings).

Recommendations for Change

Students, staff and professors made a number of suggestions for how our institution's Faculty of Science could improve; these included strengthening mental health awareness and support services, fostering student engagement in science, building students' relationships with professors and cultivating a healthy learning environment. Many of these issues have been identified in previous studies (e.g., Fink, 2014; Giamo et al., 2017; Pickles et al., 2012; Swaner, 2007). In particular, the importance of developing supportive, healthy relationships between students and staff/professors has been well-established in the research literature (Astin, 1999; Daempfle, 2003/04; Fischer, 2007; Gasiewski et al., 2012; Gregg-Jolly et al., 2016; Pickles et al., 2012; Schertzer & Schertzer, 2004). These responses also serve to validate current efforts, as existing programs and supports are usually focused on one or more of these issues. A notable discrepancy emerged in the findings between students' reports regarding awareness and usefulness of academic advisors versus professors'/staff's reports and may be symbolic of a disconnect. Low use of academic advisors may be particularly problematic and impactful among certain student groups (e.g., first-generation students, marginalised students), and confusion with regards to program requirements may have long-lasting impacts if mistakes are made in students' early years. Improvements may require 1) early and ongoing orientation of students to the availability and purpose of academic advisors (e.g., through emails, through formal orientation programs, social media), 2) easy access to booking appointments with academic advisors, and 3) ongoing professional development for academic advisors to ensure that they are empowered to meet students' needs in this role. Prompted by this study's findings, changes and improvements within our institution's Faculty of Science going forward will include improving and refining communication (e.g., focusing on social media and peer champions, informational apps), supporting and encouraging student leadership of engagement programs, launching a long-term investigation of student-professor partnerships and hiring a specialist to research and implement systemic changes in the area of equity, diversity and inclusion.

Strengths and Limitations

Limitations of this study include the relatively small sample size, particularly with respect to staff and professors. These results must be interpreted with caution given the probability of volunteer bias, i.e., that only the most engaged students, staff and professors completed the survey and were already likely to be familiar with campus supports by virtue of their greater level of engagement. Some questions may have been difficult to answer for professors and staff; for example, though they might have been aware that a program or support was available, they might

not have known to what degree students find it helpful. However, these questions were included as 1) some professors and staff are directly involved as advisors to student-led groups and 2) some might have knowledge of these programs through word of mouth from students (i.e., through teaching or working with undergraduate research assistants). It is not clear to what degree these results might generalise outside of our institution's Faculty of Science to other areas of study. Finally, the measures used in this survey have not been published. However, given that the purpose of this investigation was to evaluate in-house programming, it is not clear that any published measures would have been appropriate under the circumstances.

Strengths of this research include the evaluation of a broad range of programs, as much of the existing research on student mental health and well-being has focused solely on the use of counselling centres. This study explored a variety of barriers to use in order to better tailor improvements to existing programs and to ensure that different groups of students were able to access programs as needed. This study also included the participation of staff and professors, who are often placed on the front lines when students are presenting with concerns or difficulties, but who are rarely included in research on programming to address student wellbeing.

Conclusion

Science students in both undergraduate and graduate programs face a number of challenges specific to their studies that may cause increased stress and ultimately lead to longer program completion times or increased drop-out. Issues of student mental health and well-being require community-level interventions with attention to a variety of different programs targeting various aspects of student support (Swaner, 2007). Future investigations on student mental health and well-being should include the perspectives of professors and staff as coordinated, faculty-level approaches are needed to improve retention, especially of marginalized students.

References

American College Health Association. (2019). *American College Health Association - National College Health Assessment II: Canadian reference group data report spring 2019.* American College Health Association.

Astin, A. W. (1999). Student involvement: A developmental theory for higher education. *Journal of College Student Development, 40*(5), 518–529.

Becker, M., Martin, L., Wajeeh, E., Ward, J., & Shern, D. (2002). Students with mental illnesses in a university setting: Faculty and student attitudes, beliefs, knowledge, and experiences. *Psychiatric Rehabilitation Journal*, *25*(4), 359–368. https://doi.org/10.1037/h0095001

Bertocci, D., Hirsch, E., Sommer, W., & Williams, A. (1992). Student mental health needs: Survey results and implications for service. *Journal of American College Health, 41*(1), 3–10. https://doi.org/10.1080/07448481.1992.9936300

Billingsley, J. T., & Hurd, N. M. (2019). Discrimination, mental health and academic performance among underrepresented college students: The role of extracurricular activities at predominantly white institutions. *Social Psychology of Education*, *22*(2), 421–446. https://doi.org/10.1007/s11218-019-09484-8

Brockelman, K. F., Chadsey, J. G., & Loeb, J. W. (2006). Faculty perceptions of university students with psychiatric disabilities. *Psychiatric Rehabilitation Journal*, *30*(1), 23–30. https://doi.org/10.2975/30.2006.23.30

Cunningham, C. E., Zipursky, R. B., Christensen, B. K., Bieling, P. J., Madsen, V., Rimas, H., Mielko, S., Wilson, F., Furimsky, I., Jeffs, L., & Munn, C. (2017). Modeling the mental health service utilization decisions of university undergraduates: A discrete choice conjoint experiment. *Journal of American College Health*, *65*(6), 389–399. https://doi.org/10.1080/07448481.2017.1322090

Czyz, E. K., Horwitz, A. G., Eisenberg, D., Kramer, A., & King, C. A. (2013). Self-reported barriers to professional help seeking among college students at elevated risk for suicide. *Journal of American College Health*, *61*(7), 398–406. https://doi.org/10.1080/07448481.2013.820731

Daempfle, P. A. (2003). An analysis of the high attrition rates among first year college science, math, and engineering majors. *Journal of College Student Retention: Research, Theory & Practice*, *5*(1), 37–52. https://doi.org/10.2190/dwqt-tya4-t20w-rcwh

Dunbar, M. S., Sontag-Padilla, L., Kase, C. A., Seelam, R., & Stein, B. D. (2018). Unmet mental health treatment need and attitudes toward online mental health services among community college students. *Psychiatric Services*, *69*(5), 597–600. https://doi.org/10.1176/appi.ps.201700402

Eisenberg, D., Hunt, J., Speer, N., & Zivin, K. (2011). Mental health service utilization among college students in the United States. *The Journal of Nervous and Mental Disease*, *199*(5), 301–308. https://doi.org/10.1097/nmd.0b013e3182175123

Eisenberg, D., Hunt, J., & Speer, N. (2012a). Help seeking for mental health on college campuses: Review of evidence and next steps for research and practice. *Harvard Review of Psychiatry*, *20*(4), 222–232. https://doi.org/10.3109/10673229.2012.712839

Eisenberg, D., Speer, N., & Hunt, J. B. (2012b). Attitudes and beliefs about treatment among college students with untreated mental health problems. *Psychiatric Services*, *63*(7), 711–713. https://doi.org/10.1176/appi.ps.201100250

Fink, J. E. (2014). Flourishing: Exploring predictors of mental health within the college environment. *Journal of American College Health*, *62*(6), 380–388. https://doi.org/10.1080/07448481.2014.917647

Fischer, E. M. J. (2007). Settling into campus life: Differences by race/ethnicity in college involvement and outcomes. *The Journal of Higher Education*, *78*(2), 125–161. https://doi.org/10.1353/jhe.2007.0009

Gasiewski, J. A., Eagan, M. K., Garcia, G. A., Hurtado, S., & Chang, M. J. (2012). From gatekeeping to engagement: A multicontextual, mixed method study of student academic engagement in introductory STEM courses. *Research in Higher Education*, *53*, 229–261. https://doi.org/10.1007/s11162-011-9247-y

Giamos, D., Lee, A. Y. S., Suleiman, A., Stuart, H., & Chen, S. P. (2017). Understanding campus culture and student coping strategies for mental health issues in five Canadian colleges and universities. *Canadian Journal of Higher Education*, *47*(3), 136–151. https://doi.org/10.7202/1043242ar

Goodman, L. (2017). Mental health on university campuses and the needs of students they seek to serve. *Building Healthy Academic Communities Journal*, *1*(2), 31–44. https://doi.org/10.18061/bhac.v1i2.6056

Gregg-Jolly, L., Swartz, J., Iverson, E., Stern, J., Brown, N., & Lopatto, D. (2016). Situating second-year success: Understanding second-year STEM experiences at a liberal arts college. *CBE—Life Sciences Education*, *15*(3), ar43. https://doi.org/10.1187/cbe.16-01-0044

Gulliver, A., Farrer, L., Bennett, K., & Griffiths, K. M. (2019). University staff mental health literacy, stigma and their experience of students with mental health problems. *Journal of Further and Higher Education*, *43*(3), 434–442. https://doi.org/10.1080/0309877x.2017.1367370

Harsh, J. A., Maltese, A. V., & Tai, R. H. (2012). A perspective of gender differences in chemistry and physics undergraduate research experiences. *Journal of Chemical Education*, *89*(11), 1364–1370. https://doi.org/10.1021/ed200581m

Hedges, K., & Mania-Farnell, B. (2002). Mentoring students in an introductory science course. *Journal of College Science Teaching*, *32*(3), 194.

Henggeler, S. W., Sallis, J. F., & Cooper, P. F. (1980). Comparison of university mental health needs priorities identified by professionals and students. *Journal of Counseling Psychology*, *27*(2), 217–219. https://doi.org/10.1037/0022-0167.27.2.217

Hsieh, H.-F., & Shannon, S. E. (2005). Three approaches to qualitative content analysis. *Qual Health Res*, *15*(9), 1277-88. https://doi.org/10.1177/1049732305276687

Hughes, B. E. (2018). Coming out in STEM: Factors affecting retention of sexual minority STEM students. *Science Advances*, *4*(3), eaao6373. https://doi.org/10.1126/sciadv.aao6373

Hyun, J. K., Quinn, B. C., Madon, T., & Lustig, S. (2006). Graduate student mental health: Needs assessment and utilization of counseling services. *Journal of College Student Development*, *47*(3), 247–266. https://doi.org/10.1353/csd.2006.0030

Hyun, J., Quinn, B., Madon, T., & Lustig, S. (2007). Mental health need, awareness, and use of counseling services among international graduate students. *Journal of American College Health*, *56*, 109–118. https://doi.org/10.3200/JACH.56.2.109-118

Kardash, C. M., & Wallace, M. L. (2001). The perceptions of science classes survey: What undergraduate science reform efforts really need to address. *Journal of Educational Psychology*, *93*(1), 199-210. https://doi.org/10.1037/0022-0663.93.1.199

Levin, M. E., Stocke, K., Pierce, B., & Levin, C. (2018). Do college students use online self-help? A survey of intentions and use of mental health resources. *Journal of College Student Psychotherapy*, *32*(3), 181–198. https://doi.org/10.1080/87568225.2017.1366283

Linnenbrink-Garcia, L., Perez, T., Barger, M. M., Wormington, S. V., Godin, E., Snyder, K. E., Robinson, K., Sarkar, A., Richman, L. S., & Schwartz-Bloom, R. (2018). Repairing the leaky pipeline: A motivationally supportive intervention to enhance persistence in undergraduate science pathways. *Contemporary Educational Psychology*, *53*, 181–195. https://doi.org/10.1016/j.cedpsych.2018.03.001

May, R. W., & Casazza, S. P. (2012). Academic major as a perceived stress indicator: Extending stress management intervention. *College Student Journal*, *46*(2), 264–274.

Miranda, R., Soffer, A., Polanco-Roman, L., Wheeler, A., & Moore, A. (2015). Mental health treatment barriers among racial/ethnic minority versus white young adults 6 months after intake at a college counseling center. *Journal of American College Health*, *63*(5), 291–298. https://doi.org/10.1080/07448481.2015.1015024

Nash, S., Sixbey, M., An, S., & Puig, A. (2017). University students' perceived need for mental health services: A study of variables related to not seeking help. *Psychological Services*, *14*(4), 502–512. https://doi.org/10.1037/ser0000172

Neuendorf, K. A. (2017). *The content analysis guidebook* (2nd ed.). Sage.

Pickles, K. J., Rhind, S. M., Miller, R., Jackson, S., Allister, R., Philp, J., Waterhouse, L., & Mellanby, R. J. (2012). Potential barriers to veterinary student access to counselling and other support systems: Perceptions of staff and students at a UK veterinary school. *Veterinary Record, 170(5)*, 124–132. https://doi.org/10.1136/vr.100179

Queen's University. (2012). *Report of the principal's commission on mental health.* https://www.queensu.ca/principal/sites/webpublish.queensu.ca.opvcwww/files/files/CMHFinalReport.pdf

Ramirez, J. J. (2012). The intentional mentor: Effective mentorship of undergraduate science students. *Journal of Undergraduate Neuroscience Education*, *11*(1), A55.

Richardson, M., Abraham, C., & Bond, R. (2012). Psychological correlates of university students' academic performance: A systematic review and meta-analysis. *Psychological Bulletin*, *138*(2), 353–387. https://doi.org/10.1037/a0026838

Rosenthal, B., & Wilson, W. C. (2008). Mental health services: Use and disparity among diverse college students. *Journal of American College Health*, *57*(1), 61–68. https://doi.org/10.3200/jach.57.1.61-68

Sanabria, T., & Penner, A. (2017). Weeded out? Gendered responses to failing calculus. *Social Sciences*, *6*(2), 47. https://doi.org/10.3390/socsci6020047

Schertzer, C. B., & Schertzer, S. M. (2004). Student satisfaction and retention: A conceptual model. *Journal of Marketing for Higher Education*, *14(1)*, 79–91. https://doi.org/10.1300/J050v14n01_05

Scott, T. P., Thigpin, S. S., & Bentz, A. O. (2017). Transfer learning community: Overcoming transfer shock and increasing retention of mathematics and science majors. *Journal of College Student Retention: Research, Theory & Practice*, *19*(3), 300–316. https://doi.org/10.1177/1521025115621919

Shankar, N. L., & Park, C. L. (2016). Effects of stress on students' physical and mental health and academic success. *International Journal of School & Educational Psychology*, *4(1)*, 5–9. https://doi.org/10.1080/21683603.2016.1130532

Skinner, E., Saxton, E., Currie, C., & Shusterman, G. (2017). A motivational account of the undergraduate experience in science: Brief measures of students' self-system appraisals, engagement in coursework, and identity as a scientist. *International Journal of Science Education*, *39*(17), 2433–2459. https://doi.org/10.1080/09500693.2017.1387946

Smith, E., & Cooke, S. (2011). 'I was told it was going to be hard work but I wasn't told it was going to be this much work': The experiences and aspirations of undergraduate science students. *International Journal of Science and Mathematics Education*, *9*, 303–326. https://doi.org/10.1007/s10763-010-9228-1

Stebleton, M. J., Soria, K. M., & Huesman Jr., R. L. (2014). First-generation students' sense of belonging, mental health, and use of counseling services at public research universities. *Journal of College Counseling*, *17*(1), 6–20. https://doi.org/10.1002/j.2161-1882.2014.00044.x

Swaner, L. E. (2007). Linking engaged learning, student mental health and well-being, and civic development: A review of the literature. *Liberal Education*, *93*(1), 16–25.

Toews, J. A., Lockyer, J. M., Dobson, D. J., Simpson, E., Brownell, A. K. W., Brenneis, F., MacPherson, K.M., & Cohen, G. S. (1997). Analysis of stress levels among medical students, resident, and graduate students at four Canadian schools of medicine. *Academic Medicine, 72,* 997–1002. https://doi.org/10.1097/00001888-199711000-00019

Tucker, F., & Horton, J. (2019). "The show must go on!" Fieldwork, mental health and wellbeing in Geography, Earth and Environmental Sciences. *Area*, *51*(1), 84–93. https://doi.org/10.1111/area.12437

University of Waterloo (2012). *Report of the University of Waterloo student mental health project.*Office of the Associate Provost, Students. https://uwaterloo.ca/mental-health-wellness/sites/ca.mental-health-wellness/files/uploads/files/student_mental_health_project_-_final_report.pdf

Walther, W. A., Abelson, S., & Malmon, A. (2014). Active minds: Creating peer-to-peer mental health awareness. *Journal of College Student Psychotherapy*, *28*(1), 12–22. https://doi.org/10.1080/87568225.2014.854673

Wyatt, T., & Oswalt, S. B. (2013). Comparing mental health issues among undergraduate and graduate students. *American Journal of Health Education, 44*(2), 96–107. https://doi.org/10.1080/19325037.2013.764248

Yorgason, J. B., Linville, D., & Zitzman, B. (2008). Mental health among college students: Do those who need services know about and use them?. *Journal of American College Health*, *57*(2), 173–182. https://doi.org/10.3200/jach.57.2.173-182