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# Variations in Sense of Belonging in Undergraduate Computing Students Through the COVID-19 Pandemic

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## ABSTRACT

Student sense of belonging, or belongingness, is important and has been associated with motivation and persistence. However, belongingness varies according to factors such as race/ethnicity and gender [2]. In previous work, there have been statistically significant differences in the belongingness of computing students identifying as women and as part of a minority [2]. During COVID-19 there was a reduction in the belongingness of students identifying as men, and those not identifying as being part of a minority, and an increase in the belongingness of women identifying as a minority [3]. Our current work shows that the belongingness of men and women not identifying as being part of a minority has not returned to pre-pandemic levels, despite returning to campus, and a further statistically significant drop in the belongingness of men who identify as part of a minority. This work shows that further efforts need to be made to restore student belongingness to pre-pandemic levels and may yield insight into how events affect belongingness.

## KEYWORDS

Belongingness; Inclusion; Sense of Belonging; Underrepresentation

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## 1 EXTENDED ABSTRACT

The COVID-19 pandemic has dramatically impacted education and students' belongingness. This is important as prior research has found that belongingness is associated with motivation, achievement, persistence and student retention.

Since 2017 we have been observing changes in the belongingness of our undergraduate computing students. We utilized a survey adapted from the "Math Sense of Belonging Scale" [1]. In addition, we asked students to self-identify their gender and race/ethnicity, and if they identified as part of a minority we asked them to self-describe what minority they belonged to. In some cases, students gave a number of reasons for belonging to a minority.

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130 students completed the survey between Apr. 2017 and Dec. 2019 (92 men (M); 41 women (W)). Our campus closed in March 2020, and the 68 students who completed the survey in the Summer of 2020 were studying remotely. 69 students (45 M; 24 W) completed the survey after they returned to campus in September 2021. A small number of students did not declare as either a man or a woman and were excluded from this analysis to protect their privacy.

Pre-COVID, women who identified as a minority had the lowest belongingness of all students (statistically significant), however, their belongingness increased when teaching moved online and dropped again after returning to campus. Women who do not identify as being part of a minority had very similar belongingness to non-minority men, although they have slightly diverged recently. Most recently, and concerning, is a dramatic and statistically significant decrease in the belongingness of men who identify as a minority ( $N=15$ ,  $M=13$ ,  $SD=36$ ) compared to those who do not ( $N=30$ ,  $M=41$ ,  $SD=38$ ),  $t(27)=2.25$ ,  $p=.033$  (Welch's t-test) (Fig. 1).

Men cited race/ethnicity, dis/ability, age, and socio-economic status as reasons for identifying as a minority. They tended to be less socially active, were less likely to be members of student clubs/societies and were more likely to have entered the programme through alternative access routes. Students cited lack of money and time as reasons for lack of social engagement with fellow students.

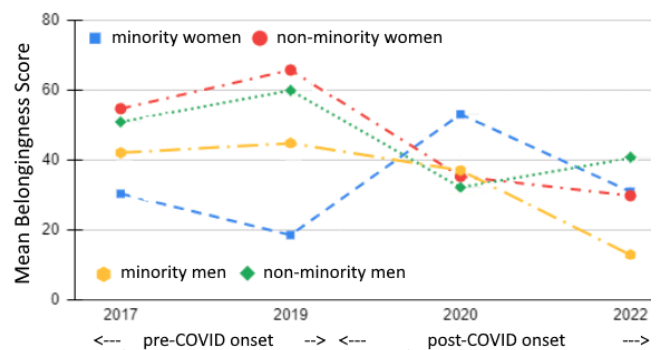


Figure 1: Changes in belongingness from 2017 to 2022.

## REFERENCES

- [1] Catherine Good, Aneeta Rattan, and Carol S Dweck. 2012. Why do women opt out? Sense of belonging and women's representation in mathematics. *Journal of Personality and Social Psychology* 102, 4 (2012), 700.
- [2] Catherine Mooney and Brett A. Becker. 2020. Sense of Belonging: The Intersectionality of Self-Identified Minority Status and Gender in Undergraduate Computer Science Students. *Maguire, J. and Cutts, Q. (eds.). UKICER '20: United Kingdom Ireland Computing Education Research conference*. <https://doi.org/10.1145/3416465.3416476>
- [3] Catherine Mooney and Brett A. Becker. 2021. Investigating the Impact of the COVID-19 Pandemic on Computing Students' Sense of Belonging. In *Proceedings of the 52nd ACM Technical Symposium on Computer Science Education (Virtual Event, USA) (SIGCSE '21)*. Association for Computing Machinery, New York, NY, USA, 612–618. <https://doi.org/10.1145/3408877.3432407>