# **Exploring Sense of Belonging in Computer Science Students**

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### Abstract

Student sense of belonging is associated with attributes such as motivation and persistence. However, sense of belonging can show variations across factors such as race and gender. We examine the relationship between undergraduate Computer Science students' participation in networking, outreach, and mentoring activities and their sense of belonging. Results reveal lower levels of sense of belonging in women and self-identified minorities. However, we observed a higher sense of belonging in female students who participated in networking, outreach, and mentoring activities.

## 1. Introduction

#### Sense of Belonging

- "One's personal belief that one is an accepted member of an academic community whose presence and contributions are valued" [1].
- Association with motivation, achievement,

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persistence and student retention.

<sup>3</sup> Buddy Coders instagram.com/buddycoders/

• Race and gender are known predictors of sense of belonging [1-3 Aim: Exploration of gender, self-proclaimed minority status and participation in structured initiatives in the School<sup>1-3</sup>. Women@CompSci women.cs.ucd.ie/ <sup>2</sup> CS Sparks cssparks.ucd.ie/





Survey: All undergraduate students in the department were invited to take part in a survey that followed the format of the "Math Sense of Belonging Scale" [1]. Each question in the survey was initiated with a phrase such as "When I am in a Computer Science setting...". The survey consisted of 18 positively-framed questions (e.g. I feel accepted/I feel respected/etc.) and 12 negatively-framed questions (e.g. I feel excluded/I feel disregarded/etc.). Students were asked to express their agreement on an 8-point Likert scale.

Belongingness: Measured as the sum of positively-framed question scores minus the sum of negatively-framed question scores.

#### Participants

	Total	Male	Female
All	127	88	39
Minority	46 (36%)	18 (20%)	28 (72%)

Table 1. Breakdown of participants. Students with nonbinary gender were excluded to protect their privacy due to the small number of participants



Figure 1. Reasons for self-proclaiming as part of a minority.

#### **Belongingness and Gender**

We found significantly higher belongingness in men compared to women (see Table 2 and Figure 2).

#### **Belongingness and Participation**

We found that women who participated in Women@CompSci, CS Sparks and Buddy Coders did not have a statistically significant difference in belongingness compared to male participants.

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Figure 4. Principal Component Analysis of Belongingness showing gender and identification as a minority.

#### **Belongingness and Minorities**

We found a significantly lower belongingness in students who considered themselves part of a minority compared to those who did not (see Table 2 and Figure 3). Figure 4 shows that Sense of Belonging varies more for those that identify as a minority than it does for those that do not. Students who identify as male or female, but not as part of a minority, cluster more closely than those identifying as minorities.

Table 2. Differences in belongingness across population sub-groups.				
M (SD)		t-statistic (df)	P-value	
Men N=88	Women N=39	20(64)	0.046	
54 (34)	39 (39)	2.0 (64)		
Yes (N=46)	No (N=81)	4.0 (80)	<0.001	
33 (38)	59 (32)	4.0 (80)		
Men (N=13)	Women (N= 13)	0.7 (10)	0 512	
53 (7.8)	44 (47)	0.7 (19)	0.512	
Yes (N=10)	No (N=36)	0 2 (12)	0.763	
29 (43)	34 (38)	0.5 (15)		
	M (SD)   Men N=88   54 (34)   Yes (N=46)   33 (38)   Men (N=13)   53 (7.8)   Yes (N=10)   29 (43)	M (SD)     Men N=88   Women N=39     54 (34)   39 (39)     Yes (N=46)   No (N=81)     33 (38)   59 (32)     Men (N=13)   Women (N=13)     53 (7.8)   44 (47)     Yes (N=10)   No (N=36)     29 (43)   34 (38)	Table 2. Differences in belongingness across populati   M (SD) t-statistic (df)   Men N=88 Women N=39 2.0 (64)   54 (34) 39 (39) 2.0 (64)   Yes (N=46) No (N=81) 4.0 (80)   33 (38) 59 (32) 4.0 (80)   Men (N=13) Women (N=13) 0.7 (19)   53 (7.8) 44 (47) 0.3 (13)   Yes (N=10) No (N=36) 0.3 (13)   29 (43) 34 (38) 0.3 (13)	

### 4. Conclusion

Although the present study is not without limitations, creating inclusive learning environments for all students is of primary importance. We are gathering more data with a view to building upon these preliminary results which suggest that creating opportunities for student networking, outreach and mentoring may have a positive role to play in fostering students' sense of belonging.

#### 5. References

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# 3. Results