

## A Path Analysis of Gender Differences in Social Presence in Online Course Discussion Forums

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**Abstract:** *Online social presence*—the degree to which individuals project their identities and personalities into a web-based community—plays an essential role in fostering a connected and satisfying learning environment. The present study’s aim was to explore gender differences in behaviors related to social presence in an online course. Using path analysis, we found that students identifying as women or non-binary were more likely than men to use indicators of mood, feeling, and emotion when posting to an online college course discussion forum, holding posting frequency constant. These results have implications for instructional strategies aimed at facilitating social presence in online learning environments.

### Introduction

*Social presence theorists* aim to provide insight about online social interactions by examining the degree to which individuals “project themselves socially and emotionally” in online spaces (Garrison et al., 1999, p. 99). When online learners are socially present, they are perceived as real individuals with histories and fully formed personalities (Kehrwald, 2008). Social presence allows students to overcome feelings of loneliness or isolation typical to online settings by identifying with others (Kehrwald, 2008), which in turn leads to improved course satisfaction and learning (Swan & Shih, 2005). Thus, social presence often makes the difference between an online environment characterized by coldness and isolation, and one characterized by connectedness and interpersonal contact.

However, although social presence can be a critical component of any online learning community (Rovai, 2002), it is possible that not all students contribute to and experience social presence in the same way. As such, “it is unwise to presume that one particular online instructional strategy would affect all students equally” (Rovai & Baker, 2005, p. 32). Thus, to target all students’ interpersonal needs, we need to improve understanding of online communicative behaviors from diverse students.

In this research, given our interest in the relationship between identity and technology in learning environments, we examine how online behaviors related to social presence may differ along gendered lines because gender is “created, maintained, and changed through communication” (Houser et al., 2019, p. 36). Survey studies have found that compared to men, students identifying as women perceive the online environment as having greater levels of social presence (Richardson & Swan, 2003), feel more connected to other students (Rovai & Baker, 2005), and are more likely to see the Internet as a tool for interpersonal communication (Jackson et al., 2001). Thus, it is possible that socially constructed conceptualizations of gender that associate strength and independence with masculinity and emotion and dependence with femininity (Morgan, 2021) yield differences in online behaviors that impact social presence.

Existing studies typically measure social presence using self-report scales, which are often inconsistent in their definitions of social presence (Lowenthal, 2010) and unable to assess behaviors relevant to social presence in real time. Therefore, our research is “concerned not just with how people perceive each of the presences *but also with what people ... actually do during online courses*” (Lowenthal & Dunlap, 2014, p. 27, emphasis added).

### The present study

Our investigation explores gender differences in three defined categories of social presence (affective, interactive, and cohesive) when posting to an online course discussion forum because each of these plays a role in creating a connected learning community (Garrison et al., 1999). *Affective* social presence is “the expression of emotion, feelings, and mood” (Rourke et al., 1999, p.6); *interactive* social presence is evidenced by attentiveness, acknowledgement, and reinforcement from one’s peers (Rourke et al., 1999); and *cohesive* social presence is shown by “activities that build and sustain a sense of group commitment” and unity (Rourke et al., 1999, p.8).

This research is significant because students’ behaviors when interacting via forums impact perceived social presence (Tu & McIsaac, 2002). Thus, it is important to understand how student behaviors are related to social presence in such settings. Our research question is: *Are there gender differences in the use of affective, interactive, or cohesive indicators of social presence in online course discussion forums?*

## Method

### Participants

We analyzed three semesters' worth of discussion forum data in fully online sections of an introductory statistics course at a large public university in the midwestern United States. Data come from the 287 students who voluntarily posted to the discussion forum (1,674 initially enrolled; we removed the 1,381 students who did not post to the discussion form, 1 student with missing gender data and 5 students who enrolled multiple semesters). Our sample included 86 students (30.0%) who identified as men, and 201 (70.0%) who identified as women or non-binary. While we acknowledge that identifying as non-binary is not the same as identifying as a woman, the number of students identifying as non-binary was too small to analyze separately while protecting the privacy of their records (per the Family Educational Rights and Privacy Act).

### Measures

The 287 students produced 801 discussion forum posts. We adapted Rourke et al. (1999)'s coding scheme to assess the three social presence categories in students' messages; see Table 1.

**Table 1**  
*Indicators of Social Presence (adapted from Rourke et al., 1999)*

Category	Indicator	Example	Interrater reliability (Cohen's $\kappa$ )
Affective	1. Expression of emotion	"IS ANYONE GETTING 'C'?"	.89
	2. Use of humor	"I had 3 tries and 4 options. I got the question wrong. Rip"	1.00
	3. Self-disclosure	"I am beyond lost, even with that video"	.71
Interactive	4. Continuing a thread	Software dependent (e.g., "Subject:Re")	–
	5. Quoting or referring explicitly to others' messages	"what do you mean by 'skewed to the left'?"	.74
	6. Explicitly requesting help	"Can someone explain question 3?"	.86
	7. Complimenting or expressing appreciation	"That helped immensely!"	.89
Cohesive	8. Expressing (dis)agreement	"I agree, question 7 sounds misleading"	.74
	9. Using vocatives	"Thanks, Pal"	.91
	10. Using inclusive pronouns	"We unfortunately all have different numbers"	.97
	11. Using phatics, salutations	"Hi all"	.75

For each forum post, we assigned a value of "0" (i.e., the indicator is absent in the message) or "1" (i.e., the indicator is present in the message). The first and second authors each coded the same 20% of the data and obtained substantial agreement (Landis & Koch, 1977). The remaining forum posts were coded by the first author. To determine students' *affective*, *interactive*, and *cohesive score*, we calculated each student's average number of indicators used per post for each social presence category. To account for the possibility that students who were more engaged in discussion forums were also more likely to use social presence indicators in messages, we also assessed each participant's posting frequency, defined as one's total number of posts written during the semester. Gender information was obtained from course data and coded as "0" (man) or "1" (woman or non-binary).

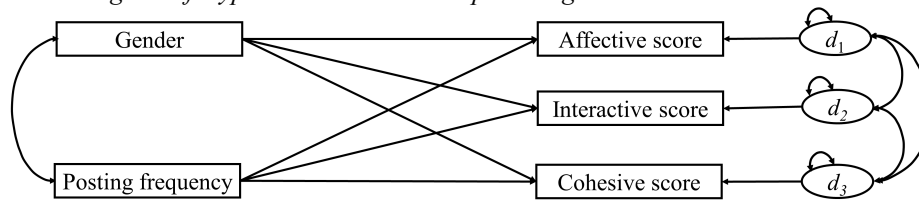
### Analysis

We used path analysis to evaluate the direct effects of gender and posting frequency on affective, interactive, and cohesive score using the *lavaan* package in R (Rosseel, 2012); see Figure 1. Gender and posting frequency were hypothesized to have direct effects on affective score, interactive score, and cohesive score. Disturbances were included in our model to represent influences on outcome variables unaccounted for by our predictors. Gender and posting frequency were allowed to correlate, as were the disturbances corresponding to outcome variables.

### Results

Interactive indicators were the most utilized category of social presence indicators among participants ( $M = 1.00$ ,  $SD = 0.38$ ), followed by affective indicators ( $M = 0.38$ ,  $SD = 0.44$ ), and lastly by cohesive indicators ( $M = 0.16$ ,  $SD = 0.33$ ). In total, participants used an average of 1.54 social presence indicators (across all categories) per post.

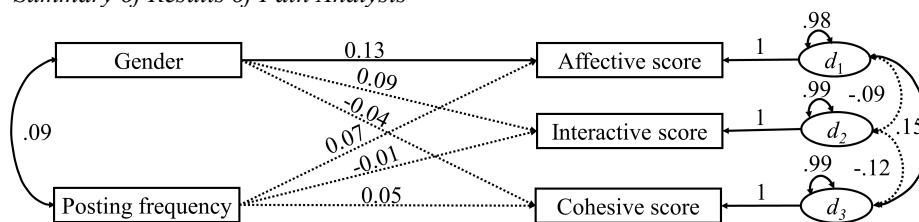
**Figure 1**  
*Path Diagram of Hypothesized Relationships among Variables*



We used maximum likelihood estimation to estimate path model parameters; robust standard errors were used to correct for bias introduced by non-normal distributions in outcome variables (Browne, 1984). Because our model was just-identified, assessment of overall model fit was not relevant (see Yang, 2018).

Of the estimated direct effects, only the effect of gender on affective score was significant ( $\beta = 0.13$ ,  $p = .02$ , 95% CI = [0.019, 0.240]), where students identifying as women or non-binary used a higher number of affective indicators per post than men. The effects of gender on interactive ( $\beta = 0.09$ ,  $p = .19$ , 95% CI = [-0.035, 0.176]) and cohesive score ( $\beta = -0.04$ ,  $p = .50$ , 95% CI = [-0.121, 0.058]) were non-significant, as were the effects of posting frequency on affective ( $\beta = 0.07$ ,  $p = .11$ , 95% CI = [-0.002, 0.017]), interactive ( $\beta = -0.01$ ,  $p = .66$ , 95% CI = [-0.006, 0.004]), and cohesive score ( $\beta = 0.05$ ,  $p = .24$ , 95% CI = [-0.002, 0.010]). Figure 2 summarizes our results in the form of a path model, with fully standardized estimates reported for all parameters.

**Figure 2**  
*Summary of Results of Path Analysis*



*Note.* Solid lines represent significant parameter estimates at  $p < .05$ . Dotted lines represent non-significant parameter estimates at  $p > .05$ . Variances associated with disturbances represent the proportion of variance in an outcome variable unexplained by our predictors (see Yang, 2018).

## Discussion

Our aim was to contribute to ongoing conversations regarding the relationship between identity and technology in learning environments. Towards this end, we explored gender differences in students' contributions to three distinct categories (i.e., affective, interactive, and cohesive) of social presence in an online college course discussion forum. Our findings revealed that students identifying as women or non-binary were more likely than men to express mood, feeling, and emotion when posting online.

This result aligns with previous reports of gender differences in the online expression of emotion (Guiller & Durdell, 2007). We also build on earlier studies by using path analysis to compare the relative effects of gender on three social presence categories, as well as controlling for students' level of engagement in discussion forums. Our results suggest that gender differences in behaviors related to social presence primarily manifested themselves as differences in contributions to affective social presence, rather than to interactive or cohesive social presence.

This study complements previous research reporting that gender may be related to perceived social presence in online courses (Richardson & Swan, 2003; Rovai & Baker, 2005). That is, it is possible that in addition to perceiving other students as being more socially present, women and non-binary students also made more of an effort to be socially present themselves, in part by projecting their affective self into online forum posts. This interpretation is supported by previous research demonstrating that those who perceive greater levels of social presence in online communities are also those who project their personalities into online communities to a greater degree (Swan & Shih, 2005). Future research should simultaneously assess perceptions of and contributions to social presence within a single sample to test this hypothesis.

Furthermore, we can interpret this work through the lens of constructionist theories that see gender as "constructed through communication ... cultivated by social institutions" (Houser et al., 2019, p. 34). Specifically, gendered patterns of socialization that identify intimacy and vulnerability as feminine values may have influenced how students chose to enact their gender identity in the discussion forum setting and thus resulted in disparities

in contributions to social presence (Rovai & Baker, 2005). Thus, to foster greater social presence in online learning communities, it may be important for educators and students to interrogate cultural norms that conceive of affective social presence as an intrinsically feminine quality.

In conclusion, this work contributes to conversations surrounding identity and learning technologies by exploring social presence in more nuanced ways than past studies. We believe that a promising avenue for future research would be to explore how educational and cultural institutions cultivate gendered communicative practices that in turn yield disparities in students' tendencies to project their identities in a web-based learning community. Such work could play an important role in informing conceptualizations of online social presence, challenging stereotypical gender roles, and informing the development of strategies designed to facilitate social presence in online learning environments.

## References

- Browne, M. W. (1984). Asymptotically distribution-free methods for the analysis of covariance structures. *British Journal of Mathematical and Statistical Psychology*, 37(1), 62–83. <https://doi.org/10.1111/j.2044-8317.1984.tb00789.x>
- Garrison, R. D., Anderson, T., & Archer, W. (1999). Critical inquiry in a text-based environment: Computer conferencing in higher education. *The Internet and Higher Education*, 2(2–3), 87–105. [https://doi.org/10.1016/S1096-7516\(00\)00016-6](https://doi.org/10.1016/S1096-7516(00)00016-6)
- Guiller, J., & Durndell, A. (2007). Students' linguistic behaviour in online discussion groups: Does gender matter? *Computers in Human Behavior*, 23(5), 2240–2255. <https://doi.org/10.1016/j.chb.2006.03.004>
- Houser, M. L., Sidelinger, R. J., & Hosek, A. M. (2019). Pedagogy, gender, and communication: Learning and unlearning gender. *Journal of Communication Pedagogy*, 2, 33–36.
- Jackson, L. A., Ervin, K. S., Gardner, P. D., & Schmitt, N. (2001). Gender and the internet: Women communicating and men searching. *Sex Roles*, 44(5/6), 363–379.
- Kehrwald, B. (2008). Understanding social presence in text - based online learning environments. *Distance Education*, 29(1), 89–106. <https://doi.org/10.1080/01587910802004860>
- Landis, J. R., & Koch, G. G. (1977). The measurement of observer agreement for categorical data. *Biometrics*, 33(1), 159. <https://doi.org/10.2307/2529310>
- Lowenthal, P. R. (2010). The evolution and influence of social presence theory on online learning. In *Social computing: Concepts, methodologies, tools, and applications* (pp. 113–128). IGI Global.
- Lowenthal, P. R., & Dunlap, J. C. (2014). Problems measuring social presence in a community of inquiry. *E-Learning and Digital Media*, 11(1), 19–30. <https://doi.org/10.2304/elea.2014.11.1.19>
- Morgan, S. (2021). Working twice as hard for less than half as much: A socio-legal critique of the gendered justifications perpetuating unequal pay in sports. *Columbia Journal of Law & the Arts*, 45(1), 121–145.
- Richardson, J. C., & Swan, K. (2003). Examining social presence on online courses in relation to students' perceived learning and satisfaction. *Online Learning*, 7(1), 68–88. <https://doi.org/10.24059/olj.v7i1.1864>
- Rosseel, Y. (2012). Lavaan: An R package for structural equation modeling and more. Version 0.5-12 (BETA). *Journal of Statistical Software*, 48(2), 1–36.
- Rourke, L., Anderson, T., Garrison, R., & Archer, W. (1999). Assessing social presence in asynchronous text-based computer conferencing. *The Journal of Distance Education/Revue de l'Éducation Distance*, 14(2), 50–71.
- Rovai, A. P. (2002). Building sense of community at a distance. *The International Review of Research in Open and Distributed Learning*, 3(1). <https://doi.org/10.19173/irrodl.v3i1.79>
- Rovai, A. P., & Baker, J. D. (2005). Gender differences in online learning: Sense of community, perceived learning, and interpersonal interactions. *Quarterly Review of Distance Education*, 6(1), 31–44.
- Swan, K., & Shih, L. F. (2005). On the nature and development of social presence in online course discussions. *Online Learning*, 9(3). <https://doi.org/10.24059/olj.v9i3.1788>
- Tu, C. H., & McIsaac, M. (2002). The relationship of social presence and interaction in online classes. *American Journal of Distance Education*, 16(3), 131–150. [https://doi.org/10.1207/S15389286AJDE1603\\_2](https://doi.org/10.1207/S15389286AJDE1603_2)
- Yang, Y. (2018). Path analysis. In B. B. Frey (Ed.), *The SAGE Encyclopedia of Educational Research, Measurement, and Evaluation*. SAGE Publications. <https://doi.org/10.4135/9781506326139.n508>

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