Do I Belong in Chemistry? Associations With Socio-Demographic Background and Perceived Affordances

Anna-Lena Dicke, Nayssan Safavian, Yannan Gao & Jacquelynne S. Eccles

University of California, Irvine


*Analyses are ongoing and manuscript is in draft. For more information, please contact: nsafavia@uci.edu

Acknowledgment: This research was supported by a grant from the Institute of Education Sciences (R305A170160) to Drs. Jacquelynne S. Eccles, Michael Dennin, Anna-Lena Dicke and Nayssan Safavian
Theoretical Background

• What motivates undergraduates to pursue STEM?

• Career affordances: perceptions of how careers fulfill desired personal and social goals
  • Agentic (i.e. self-actualization) and communal goals (i.e., connecting with others)
  • Linked with STEM career interests\textsuperscript{1}
  • Vary by students’ gender, ethnicity, and socio-economic status with
    • Females, underrepresented ethnic minority and first-generation college-going (FG) students higher communal goals\textsuperscript{2,3}

• How do perceived STEM career affordances impact STEM persistence?
  • Potential mechanism: Sense of belonging
    • Students more likely to develop sense of belonging when environment perceived as congruent with valued goals\textsuperscript{2}

(\textsuperscript{1}Diekman et al., 2010, \textsuperscript{2}Diekman&Steinberg, \textsuperscript{3}Smith et al., 2014)
Current study

• What are associations of
  1) socio-demographic background (SDB) with perceived chemistry career affordances?
  2) SDB and chemistry career affordances with field belonging in chemical and health sciences

• Sample:
  • Survey of 957 undergraduates in gateway chemistry course
  • 68% female and 40% Hispanic, 44% Asian, 8% Caucasian
  • 57% First generation college-going, 60% English as First language
1) Socio-demographic Background Predicting Affordances

• Gender:
  • Female students higher endorsement career affordances than males

• Ethnicity:
  • Hispanic, Asian and students of other ethnicities higher other communal affordances than Caucasian students.
  • Hispanic students and students of other ethnicities higher agentic and prosocial affordances than Caucasian students.

• No differences by FG and English learner status
2) Predicting Field Belonging

• Socio-demographic background:
  • FG students lower field belonging than continuing generation college-going (CG)
  • Asian students lower Caucasian students.

• Perceived career affordances positively associated with field belonging (Prosocial; Communal; Agentic)

• Significant interaction of FG status and agentic affordances:
  • Agentic affordances were more strongly associated with field belonging for CG than for FG students
Discussion

• Females’ reports of higher levels of prosocial and other communal affordances replicate previous findings. Contradicting previous research, females also report higher levels of agentic affordances.
  □ paradigm shift and/or due to socio-demographically diverse sample.
• Perceiving a career as fulfilling to any type of goal leads to higher feelings of belonging.
  • Agentic affordances were not associated as strongly with field belonging for FG students.
  • This provides important insight into the unique perspective of this important at-risk student group.
Back up slides
Theoretical Background

• Problem: High STEM college attrition rates\textsuperscript{1,2}

• What motivates undergraduates to pursue STEM?

• Career affordances: perceptions of how careers fulfill desired personal and social goals
  • Agentic (i.e. self-actualization) and communal goals (i.e., connecting with others)
  • Linked with STEM career interests\textsuperscript{3}
  • Vary by students’ gender, ethnicity, and socio-economic status with
    • Females, underrepresented ethnic minority and first-generation college-going (FG) students higher communal goals\textsuperscript{4,5}

• How do perceived STEM career affordances impact STEM persistence?
  • Sense of belonging:
    • Students more likely to develop sense of belonging when environment perceived as congruent with valued goals\textsuperscript{4}

\textsuperscript{1}Chen, 2015, \textsuperscript{2}Chen&Ho, 2012, \textsuperscript{3}Diekman et al., 2010, \textsuperscript{4}Diekman&Steinberg, \textsuperscript{5}Smith et al., 2014)
Measure: Affordances

I expect that a career in the chemical and health sciences would allow me to…

**Prosocial Affordances (α=.96):**
...Make a contribution to society
...Care for others
...Serve my community
...Give back to my family
...Give back to my community
...Do work that is worthwhile to society
...Do work that is directly helpful to others

**Other Communal Affordances (α=.90):**
...Develop a connection with others
...Work with other people

**Agentic Affordances (α=.86):**
...Earn a good income
...Do interesting work
...Work independently
...Have a sense of personal accomplishment
...Gain high status
...Seek new experiences
...Impress other people
I identify with the chemical and health sciences.
The chemical and health sciences are a good fit for me.
I don’t know if I really belong in the chemical and health sciences.
Sometimes I'm not sure if I really belong in the chemical and health sciences.
There are times when I question whether a career in the chemical and health sciences will be right for me.
## Descriptive Statistics

<table>
<thead>
<tr>
<th>Category</th>
<th>Min.</th>
<th>Max.</th>
<th>Mean (SD)</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ethnicity</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hispanic</td>
<td></td>
<td></td>
<td></td>
<td>950</td>
</tr>
<tr>
<td>Asian</td>
<td></td>
<td></td>
<td></td>
<td>380</td>
</tr>
<tr>
<td>Caucasian</td>
<td></td>
<td></td>
<td></td>
<td>421</td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
<td></td>
<td>72</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td></td>
<td></td>
<td></td>
<td>653</td>
</tr>
<tr>
<td>Male</td>
<td></td>
<td></td>
<td></td>
<td>302</td>
</tr>
<tr>
<td><strong>College-going Status</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>First Generation</td>
<td></td>
<td></td>
<td></td>
<td>947</td>
</tr>
<tr>
<td>Continuing Generation</td>
<td></td>
<td></td>
<td></td>
<td>546</td>
</tr>
<tr>
<td><strong>English as first language</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td></td>
<td></td>
<td></td>
<td>383</td>
</tr>
<tr>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
<td>566</td>
</tr>
<tr>
<td><strong>Prosocial Affordance</strong></td>
<td>1</td>
<td>7</td>
<td>5.80 (1.19)</td>
<td>953</td>
</tr>
<tr>
<td><strong>Other Communal Affordance</strong></td>
<td>1</td>
<td>7</td>
<td>5.64 (1.29)</td>
<td>954</td>
</tr>
<tr>
<td><strong>Agentic Affordance</strong></td>
<td>1</td>
<td>7</td>
<td>5.50 (1.06)</td>
<td>953</td>
</tr>
<tr>
<td><strong>Field Belonging</strong></td>
<td>1</td>
<td>7</td>
<td>4.33 (1.21)</td>
<td>956</td>
</tr>
</tbody>
</table>
1) Socio-demographic Background Predicting Affordances

<table>
<thead>
<tr>
<th></th>
<th>Prosocial Affordances</th>
<th>Communal Affordances</th>
<th>Agentic Affordances</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>0.21 ***</td>
<td>0.13 ***</td>
<td>0.12 ***</td>
</tr>
<tr>
<td>Eng. as 1st lang.</td>
<td>0.06 †</td>
<td>0.06</td>
<td>0.06 †</td>
</tr>
<tr>
<td>FG</td>
<td>0.05</td>
<td>0.04</td>
<td>0.03</td>
</tr>
<tr>
<td>Hispanic</td>
<td>0.14 *</td>
<td>0.20 **</td>
<td>0.11 †</td>
</tr>
<tr>
<td>Asian</td>
<td>0.09</td>
<td>0.19 **</td>
<td>0.08</td>
</tr>
<tr>
<td>Other</td>
<td>0.11 *</td>
<td>0.16 ***</td>
<td>0.11 *</td>
</tr>
</tbody>
</table>

Note. Caucasian used as reference group for ethnicity; Eng. as 1st lang. = English as first language. FG = First-generation college-going students. *** p < .001. ** p < .01. * p < .05. † p < .10.
## 2) Predicting Field Belonging

<table>
<thead>
<tr>
<th></th>
<th>Model 1a</th>
<th>Model 1b</th>
<th>Model 2a</th>
<th>Model 2b</th>
<th>Model 3a</th>
<th>Model 3b</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Prosocial Aff.</strong></td>
<td>0.28</td>
<td><strong>0.33</strong>*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Other Communal Aff.</strong></td>
<td></td>
<td></td>
<td>0.26</td>
<td><strong>0.28</strong>*</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Agentic Aff.</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.27</td>
<td><strong>0.34</strong>*</td>
</tr>
<tr>
<td><strong>Female</strong></td>
<td>0.06</td>
<td>†</td>
<td>0.08</td>
<td><strong>0.08</strong></td>
<td>0.09</td>
<td><strong>0.08</strong></td>
</tr>
<tr>
<td><strong>Eng. as 1st lang.</strong></td>
<td>0.03</td>
<td>0.03</td>
<td>0.03</td>
<td>0.03</td>
<td>0.03</td>
<td>0.03</td>
</tr>
<tr>
<td><strong>FG</strong></td>
<td>-0.09</td>
<td>*</td>
<td>-0.09</td>
<td>*</td>
<td>0.00</td>
<td>-0.09</td>
</tr>
<tr>
<td><strong>Hispanic</strong></td>
<td>0.00</td>
<td>0.00</td>
<td>-0.02</td>
<td>-0.02</td>
<td>0.01</td>
<td>0.01</td>
</tr>
<tr>
<td><strong>Asian</strong></td>
<td>-0.12</td>
<td>*</td>
<td>-0.15</td>
<td><strong>-0.15</strong></td>
<td>-0.12</td>
<td>-0.11</td>
</tr>
<tr>
<td><strong>Other</strong></td>
<td>0.03</td>
<td>0.03</td>
<td>0.02</td>
<td>0.02</td>
<td>0.03</td>
<td>0.03</td>
</tr>
<tr>
<td><strong>FG*Aff.</strong></td>
<td>-0.25</td>
<td></td>
<td>-0.09</td>
<td></td>
<td>-0.39</td>
<td><strong>0.39</strong></td>
</tr>
</tbody>
</table>

*Note.* Caucasian used as reference group for ethnicity; Aff. = affordance. Eng. as 1st lang. = English as first language. FG = First-generation college-going students. *** p < .001. ** p < .01. * p < .05. † p < .10.
THANK YOU!

For more information, please contact:
Anna-Lena Dicke, Ph.D. adicke@uci.edu

The research reported here was supported by a grant from the Institute of Education Sciences (R305A170160). Opinions expressed do not represent the views of the U.S. Department of Education.