Connecting with others versus doing science: Exploring how communal goals might explain the gender gap in STEM participation

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During the spring of 2012, I was awarded CU Boulder’s Chancellor’s Award for Excellence in STEM Education. This award came with a $15,000 monetary sum for research expenses. I used this money to pay student participants to complete surveys relevant to my research questions. The following is a description of the theoretical background, methodology and results of the research to date.

**Theoretical Background.** Women continue to be underrepresented in many disciplines related to STEM (National Science Foundation, 2011). One explanation for why women, more than men, avoid STEM professions is because women perceive STEM to be incongruent with their communal goals. That is, women, more than men tend to place value on life goals such as connecting with others, caring for others and altruism (Diekman et al., 2010; Diekman et al., 2011; Twenge, 1997) - goals that they would like to meet at a personal as well as professional level (Evans & Diekman, 2009; Lippa, 1998). Importantly, studies show that women and men alike perceive that STEM disciplines do not afford individuals involved in those professions the freedom to meet communal goals (Diekman et al., 2010; Diekman et al., 2011).

It would appear that one way to increase the number of women who pursue STEM would be to either change women’s perception of the field or to change the field itself. Interestingly, the degree to which women are underrepresented in STEM varies between subfields of STEM. For example, over the past 10 years, the following percentages of Bachelor's degrees were awarded to women in biosciences at CU: 63% in Integrative Physiology, 58% in Biological Science – MCD, and 57% in Ecology and Evolutionary Biology. In contrast, the following percentages of degrees were awarded to women in what is heretofore referred to as pSTEM fields (i.e., physical sciences, technology, engineering and mathematics) over the past 10 years at CU: 42% in Chemistry; 17% in Physics; 20% in Civil Engineering; and 12% in Computer Science [data obtained from The Office of Planning, Budget, & Analysis [OPBA] at CU; this pattern of data is also consistent with data from The National Science Foundation, 2011]. Might these observed differences in the gender distribution among various subdisciplines of STEM be explained by variation in students’ perception that these subdisciplines afford individuals the leverage that they need to pursue their communal goals?

This is an empirical question that has yet to be examined, and it lays the groundwork for my research questions, which are as follows: Might individuals perceive subdisciplines within STEM to differentially allow one to meet their communal goals? If so, do these differences in communal goal affordances influence individuals’ choice to pursue one type of STEM degree over another? Importantly, research examining the role of communal goal affordances on career decisions has only looked at individuals’ perceptions of their ability to meet those goals in their selected career path. My ultimate goal was to extend this focus to observe whether perceptions of communal goal affordances predict students’ actual decisions.
Specifically, I aimed to track first year students who are undeclared majors over the course of their academic career to assess whether the type of major they eventually select would vary as a function of the degree to which they believed they would be able to meet communal goals in STEM careers related to those majors (see Methodology for Study 1 for more details).

**Methodology and Results.** This research placed specific focus on understanding variation in women’s representation among various subfields of STEM. In the sections that follow, I report findings from two studies and layout the framework for a third study that share this focus.

**Study 1: Do communal goal affordances predict variation in gender representation across subfields of STEM?** As indicated above, there are marked differences in gender representation across subsets of science majors at CU: whereas women are equally as likely or even slightly more likely to pursue bioscience majors than men, women are vastly outnumbered by men in pSTEM majors. In order to assess the role that communal goal affordances might play in women’s decision to pursue various types of STEM, I recruited incoming first year students who were undeclared majors at the beginning of the fall 2012 academic semester and asked that they complete an online survey assessing their communal goals, as well as the degree to which they believe they would be able to meet their communal goals in a variety of academic majors. I also asked students’ permission to obtain their unofficial transcripts over the course of their undergraduate career at CU so that we could track what major they eventually select while at CU (see Future Directions for more details). To date, I have found (a) women personally endorse communal goals more strongly than men, (b) students believe that they will be able to meet communal goals to an incrementally lesser degree in the Behavioral Sciences versus Biological Sciences versus pSTEM fields and (c) women believe that they will be less able to meet communal goals in pSTEM fields than men. Importantly, women reported less interest in majoring in a pSTEM field than men, which was statistically explained by women’s lower expectations to meet communal goals in pSTEM than men.

**Study 2: Do personal communal goals predict women’s participation in various fields of STEM?** I also assessed the degree to which women’s tendency to personally endorse communal goals differed among women who had already opted into various STEM fields. During the fall of 2012, I recruited women who had declared a behavioral science, bioscience or pSTEM major at CU and assessed their personal communal goals. I found that women majoring in pSTEM personally endorsed communal goals to a less degree than women majoring in the behavioral and biological sciences. This finding suggests that women may selectively opt into certain career paths that correspond with their personal goals. That is, to the degree that people (and women in particular) tend to view pSTEM as incongruent with communal goals, it may be the case that women who value communal goals less tend to pursue pSTEM careers.

**Future Directions.** Because the results of Study 2 are correlational in nature, my ultimate goal is to do conduct a longitudinal study sheds more light on the causal nature of communal goal endorsement on career choices. Thus, at the end of the spring 2013 semester (the end of my Study 1 sample’s first year of college), my
colleagues and I at CU will assess the degree to which students’ communal goals predict the type of major they opted into. We will be particularly interested in whether women’s vs. men’s relatively lower perceived ability to meet communal goals in a pSTEM career will predict women’s weaker tendency to opt into a pSTEM major.

Impact of the Current Work. My work provides insight into one reason why individuals pursue various career paths related to STEM, namely, variation in perceived communal goal affordances across STEM fields. This information may benefit the STEM community for a few reasons. First, my findings provide faculty members in STEM disciplines with important information about students’ stereotypes about what they can achieve in STEM fields. To the degree that many people (and women in particular) find communal goals to be important when making career decisions, faculty members ought to be particularly vigilant in highlighting the communal natures of their courses and their research. Because the pSTEM workforce in particular is in dire need of talented and motivated employees, endeavors aimed at broadening students interest in pSTEM careers are very important indeed. I am confident that faculty members concerned with STEM education are aware of my results, as I gave three talks and presented one poster on this work within the CU community during my tenure as a Chancellor’s fellow. My reported work also serves as a first step in a larger program of research at CU in collaboration with members of the Department of Psychology and Neuroscience and the Department of Physics. Our ultimate goal is to present this work outside of the CU community and to publish our results in high impact psychology and STEM education journals.