

Shifting Perceptions: Impact of a Women of Welding Camp

Bradley D. Borges
Texas State University
601 University Dr.
San Marcos, TX 78666
512-245-7106
b_b518@txstate.edu

Sarah Parks
Texas State University
601 University Dr.
San Marcos, TX 78666
512-245-4851
m_d553@txstate.edu

Ryan G. Anderson
Texas State University
601 University Dr.
San Marcos, TX 78666
512-245-3325
r_a461@txstate.edu

Introduction/Framework

The welding industry faces a high demand for workers, with a critical gender gap (Bureau of Labor Statistics, 2023, 2024a; American Welding Society, 2024; Scott et al. 2022). Efforts to recruit women, including initiatives by non-profits and industry groups (Women Who Weld, 2024; This One's for the Gals, 2024; American Welding Society, 2023; NSRP, 2021), address the need for targeted recruitment and role model. Early career exposure is vital (Magnuson & Starr, 2000; Xing et al. 2019), but gender imbalance may deter young women, despite increasing female enrollment in welding courses (Decker, 2023). Therefore, encouraging women to explore welding is crucial for workforce diversification (American Welding Society, 2023).

This study investigates the effect of a "Women of Welding" (WOW) camp on high school girls' interest and perceptions of welding careers, drawing on the theories of Sense of Belonging (Baumeister & Leary, 1995) and Social Identity (Tajfel & Turner, 1979). The central hypothesis is that a targeted, female-focused welding environment can cultivate a stronger sense of belonging, essential for human motivation and academic success (Good et al. 2003), while mitigating the negative effects of stereotyping (Cheryan et al., 2009; Murphy et al., 2007). Additionally, the camp aims to foster a positive social identity through group membership, particularly important during adolescence (Pfeifer & Berkman, 2018). By assessing changes in these factors, the study evaluates whether the WOW camp, with its supportive atmosphere and female role models, serves as a valuable strategy to reduce the gender disparity in the skilled trades. Specifically, it measures how the camp experience influences girls' identification with the welding community and their views on welding as a suitable career path for women.

Purpose and Objectives

This study aims to describe the impact of a six-day WOW camp on high school girls' perceptions and interest in welding careers. This study aligns with the American Association for Agricultural Education research values by nurturing positive youth development through agriculture, food, and natural resource systems and ensuring diversity, equity, inclusion and belonging (2023). The purpose of this study will be fulfilled by the following objectives:

1. Describe the impact of the camp on girls' sense of belonging in relation to welding.
2. Describe the impact of the camp on girls' social identity related to welding.
3. Describe the impact of the camp on girls' welding personal identity.
4. Determine if the camp influenced the girls' welding career intentions.
5. Describe the impact of the camp on girls' perceived career knowledge of the welding industry.

Methods

High school girls (ages 14-18) attending the six-day WOW camp at [University] in 2022 and 2023 (24 participants each year) completed an electronic questionnaire before and after the camp. The questionnaire, based on established constructs (Stout et al., 2013; Camaco et al., 2021), assessed Sense of Belonging, Personal Identity, Social Identity, Career Intention, and Perceived Career Knowledge, using a 15-item, five-point Likert scale. Reliability was good (Cronbach's $\alpha = 0.770$) (George & Mallery, 2003).

Results

Forty-eight high school girls (ages 14-18, primarily rising seniors and 64.6% white) with prior welding experience participated in the 2022 and 2023 WOW Camps. Pre- and post-camp data on sense of belonging, identity, and career intention, collected via a five-point Likert scale, showed significant increases across all constructs.

Table 1

Sense of Belonging, Welding Social and Personal Identity and Career Intention Pre And Post Women of Welding Camp (N = 48)

Construct	Pre		Post		<i>t</i>	<i>df</i>	<i>P</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			
1. Sense of Belonging	3.51	0.50	3.73	0.38	-2.89	47	0.02
2. Welding Social Identity	3.89	0.88	3.99	0.91	-0.67	47	<0.01
3. Welding Personal Identity	4.01	0.97	4.31	0.79	-2.40	47	<0.01
4. Welding Career Intention	4.23	0.84	4.38	0.87	-1.74	47	<0.01

Table 2 shows an item analysis of perceived career knowledge regarding the welding industry. The final item, “*I feel I personally know a lot of women who are welders*” saw the largest increase of all items in the survey.

Table 2

Item Analysis of Perceived Career Knowledge Pre and Post Women of Welding Camp

Construct	Pre		Post		<i>t</i>	<i>df</i>	<i>P</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			
I feel I have a good understanding of the processes used in welding.	3.71	0.84	4.47	0.59	-4.56	47	<0.01
I feel I have a good understanding about careers in welding.	3.78	0.83	4.31	0.67	-3.25	46	<0.01
I feel I personally know a lot of people who are welders.	3.39	1.06	4.07	0.90	-2.93	45	<0.01
I feel I personally know a lot of women who are welders.	2.26	1.25	3.67	1.25	-5.61	47	<0.01

Conclusions, Implications, and Recommendations

This study examined the impact of a six-day WOW camp on high school girls' welding career perceptions. Out of 135 applications, 48 girls were selected, with increased tribal nation applications in the second year. While ethnicity wasn't a selection criterion, the camp's demographics, mirroring the welding industry's (American Welding Society, 2024), were primarily white, with 30-40% non-white participants, suggesting a continued need to address diversity. Most participants were 17 or older, likely due to application requirements favoring stronger writing skills. The WOW camp successfully enhanced participants' sense of belonging, social, and personal identity in welding, particularly by exposing them to female welders (Good et al. 2003). This increased sense of belonging and identity can lead to greater career participation (Stout et al., 2013; Camaco et al., 2021). Recommendations include continued women-focused industry events, industry-driven recruitment and longitudinal studies to assess long-term impacts of interventions like the WOW camp.

References

- American Association for Agricultural Education (AAAE). AAAE Research Values.
- American Welding Society. (2023). *Women in Welding Virtual Conference: Automation in Manufacturing*. American Welding Society. <https://membernetnetwork.aws.org/events/event-description?CalendarEventKey=ba1eeb76-6c44-471d-ab2f-018487674fbc&Home=%2Fhome>
- American Welding Society. (2024). *Shining a light on the welding workforce*. American Welding Society. <https://weldingworkforcedata.com/>
- Baumeister, R. F., & Leary, M. R. (1995). The need to belong: Desire for interpersonal attachments as a fundamental human motivation. *Psychological Bulletin*, 117(3), 497-529.
- Bureau of Labor Statistics. (2023, September 6). *Employment by detailed occupation*. U.S. Bureau of Labor Statistics <https://www.bls.gov/emp/tables/emp-by-detailed-occupation.htm#top>
- Bureau of Labor Statistics. (2024, April 17). *Occupational Outlook Handbook, Welders, Cutters, Solderers, and Brazers*. U.S. Bureau of Labor Statistics. <https://www.bls.gov/ooh/production/welders-cutters-solderers-and-brazers.htm>
- Cheryan, S., Plaut, V. C., Davies, P. G., & Steele, C. M. (2009). Ambient belonging: How stereotypical cues impact gender participation in computer science. *Journal of Personality and Social Psychology*, 97(6), 1045-1060. doi: 10.1037/a0016239
- Camacho, T. C., Vasquez-Salgado, Y., Chavira, G., Boyns, D., Appelrouth, S., Saetermoe, C., & Khachikian, C. (2021). Science identity among Latinx students in the biomedical sciences: The role of a critical race theory-informed undergraduate research experience. *CBE—Life Sciences Education*, 20(2), 1-10. doi: 10.1187/cbe.19-06-0124
- Decker, S. K. R. (2023). *Student perceptions of male and female instructors in a post-secondary welding course*. [Unpublished master's thesis]. Utah State University.
- George, D., & Mallery, P. (2003). *Using SPSS for Windows step by step: A simple guide and reference* (4th ed.). London: Pearson Education.
- Good, C., Aronson, J., & Inzlicht, M. (2003). Improving adolescents' standardized test performance: An intervention to reduce the effects of stereotype threat. *Journal of Applied Developmental Psychology*, 24(6), 645-662. doi: 10.1016/j.appdev.2003.09.002
- Magnuson, C. S., & Starr, M. F. (2000). How early is too early to begin life career planning? The importance of the elementary school years. *Journal of Career Development*, 27(2), 85-98. doi: 10.1177/089484530002700203

- Murphy, M. C., Steele, C. M., & Gross, J. J. (2007). Signaling threat: How situational cues affect women in math, science, and engineering settings. *Psychological Science, 18*(9), 879-885. doi: 10.1111/j.1467-9280.2007.01995.
- National Shipbuilding Research Program. (2021). *Women in Welding Investigating Recruitment and Training Practices for Women Agreement 2018-455-021*.
<https://www.nsrp.org/project/women-in-welding-2018-455-021/>
- Pfeifer, J. H., & Berkman, E. T. (2018). The development of self and identity in adolescence: Neural evidence and implications for a value-based choice perspective on motivated behavior. *Child Development Perspectives, 12*(3), 158–164. doi: 10.1111/cdep.12279
- Scott, R. E., Wilson, V., Kandra, J., & Perez, D. (2022). *Botched policy responses to globalization have decimated manufacturing employment with often overlooked costs for Black, Brown, and other workers of color*. Washington DC: Economic Policy Institute.
<https://www.epi.org/publication/botched-policy-responses-to-globalization/>
- Stout, J. G., Ito, T. A., Finkelstein, N. D., & Pollock, S. J. (2013). *How a gender gap in belonging contributes to the gender gap in physics participation*. Physics Education Research Conference (Vol. 1513, pp. 402-405). DOI: 10.1063/1.4789737
- Tajfel, H., & Turner, J. C. (1979). An integrative theory of inter-group conflict. In W. G. Austin & S. Worchel (Eds.), *The social psychology of inter-group relations* (pp. 33–47). Brooks/Cole.
- This One's For The Gals. (2025). Retrieved from <https://thisonesforthegals.com/>
- Women Who Weld. (2025). Retrieved from <https://www.womenhoweld.org/#women-who-weld>
- Xing, X., Huerta, M., & Garza, T. (2019). College and career preparation activities and their influence on post-high school education and work attainment. *Journal of Career and Technical Education 34*(1), 8-28.