2023 Annual Conference & Exposition
Baltimore Convention Center, MD | June 25 - 28, 2023
The Harbor of Engineering Education for 130 Years
ASEE
Paper ID #37461

A Quantitative Analysis on Teamwork Behavior, Disagreement, and Their Linkages to Students' Engineering Identities

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Work in Progress: A Quantitative Analysis on Teamwork Behavior, Disagreement, and Their Linkages to Students' Engineering Identities

Abstract

This Work-in-Progress paper explores how teamwork experience informs students' engineering identity. Teamwork skills are highly valued by employers but are lacking in many engineering graduates. While little is known about the linkage between teamwork and EI, understanding that connection is crucial for inclusive teaching and learning activities because engineering identity may be disproportionately lower for some students, and teamwork designed without considering EI may exacerbate that gap.

We conducted Spearman's correlation analyses on the survey responses of 268 students from 18 engineering classes that have a significant teamwork component over two semesters at a four-year Hispanic Serving Institution. All survey instruments had been validated by prior researchers. EI was cast by a uni-dimensional definition as well as a multi-dimensional lens of performance/competence, interest, and recognition. The teamwork survey assessed team behaviors using the CATME questions, team disagreement (on task, process, and relationship), conflict patterns, and psychological safety. The results revealed a complex and interconnected relationship between engineering identity, disagreement, and teamwork behaviors. We found that task/process conflicts could slide into relationship conflict, suggesting that our students may "have difficulty disagreeing without being disagreeable." Among the dimensions of engineering identities, students who were confident about engineering self-efficacy were found to exhibit more positive teamwork behaviors. Recognition from parents, professors, or peers also played an important role in shaping all but one behavior metric. Conflicts connected with teamwork behaviors and EI in a nuanced way and must be addressed through multivariate statistical models that control for psychological safety and demographics. In future work, we plan to explore multivariate analysis.

Introduction

This paper examines how teamwork experience may shape or be shaped by students' engineering identity (EI). Engineering identity can be defined in whole by how much a student sees themselves as an engineer (Tonso 2006). Alternatively, EI can be defined in a multi-dimensional way, including performance/competence, interest, and recognition (Hazari, et al. 2010, Carlone and Johnson 2007). Survey instruments for both definitions have been developed and validated (Choe, et al. 2019, Patrick, Borrego and Prybutok 2018). Both definitions will be used in the analysis, and comparisons will be made to determine which yields stronger predictive power.

Engineering identity is a type of role identity that students develop as they study and practice their engineering disciplines (Godwin 2016). Several studies have examined how EI is developed. Kajfez et al. (2019) investigated how the structural components of a first-year experience influenced EI for students from various engineering pathways, such as transfer students and regional campus students. Their initial survey, which included 300 completed responses, showed that "students enrolled in direct matriculation first-year-engineering courses may initially exhibit higher levels of confidence in EI," with EI proxied by their career choice. Choe et al. (2019) studied how professional elements promote EI by analyzing survey responses from 1,536 undergraduates across three engineering disciplines from two institutions. After controlling for demographics (gender, race, etc.) and course-related factors (division, major, etc.), they found that students' likings for tinkering, design, and analysis experiences correlate with stronger EI, suggesting the importance of enhancing those experiences to ultimately influence persistence and retention. Their studies, along with others, support the theoretical foundation of our work, which uses EI in quantitative analysis. Our research will explore how EI is linked to behaviors students exhibit during teamwork and whether that linkage is affected by whether/how they disagree.

Literature Review

Establishing the link between EI and teamwork is crucial for several reasons. Teamwork skill is stressed by ABET but unevenly distributed among engineering graduates according to employer surveys (Marra et al. 2016). When students with varying skill levels work together in teams, their interactions and perceptions of themselves and others can influence their EI formation. Underrepresented minority (URM) students may be particularly affected. Studies have shown that female students who asked questions during teamwork were perceived as less competent in STEM (Hoehn et al. 2020), and racial minority students suffered from low self-esteem for fear of being viewed as diversity "tokens" (Ong et al. 2020). Weatherton et al. (2017) found that students with disabilities faced structural and personal impediments in engineering programs. Our collective knowledge calls for more social and structural support to improve persistence and retention for URM students. The effectiveness of such support can be maximized when educators understand how EI informs interactional experiences like teamwork. A solid understanding on the interplay between teamwork and EI can be harnessed to guide students to navigate teamwork successfully and to grow their EI in that process.

In investigating the connection between EI and teamwork, we cannot ignore the compound effects of disagreement that may arise during teamwork. Disagreeing on how to approach an

engineering problem or the tasks involved can be a good thing if the students function constructively in a team, employing behaviors such as showing respect and enabling each other to work effectively. Not disagreeing can hamper students' EI formation when they receive unfair treatment or fail to contribute as a result of their ideas being discounted. Studies have shown that when a team disagrees on who should perform which roles or how resources should be distributed, it produces the best team outcome if one member speaks up while there is no dominant shift or sub-groups within the team (Harrison & Klein, 2007). A healthy amount of disagreement has been found to improve teamwork success across other disciplines (Leslie 2021). In stark contrast, little is known about its effect on engineering students' teamwork and their EI.

In this paper, we discussed how teamwork behavior, disagreement, and EI related to each other through correlation analyses. These correlations will inform us to subsequently design a multivariate statistical model that can explain the compounding effects among multiple variables. By parsing the compound effects of psychological safety and demographics, we can better understand how EI intersects with the degree and type of disagreement in student teamwork . This understanding can expose gaps in their ability to resolve conflicts and identify areas where interventions such as conflict management and self-advocacy training can be implemented in ways that promote EI growth.

Data Collection

We collected a total of 268 complete students' responses to a voluntary survey instrument over two semesters in Spring and Fall 2022. The survey consisted of four parts -- EI, teamwork behavior, disagreement, and psychological safety—all of which were asked on a five-point Likert scale. The EI questions probed how much in general a student saw themself as an engineer via a unidimensional lens (Tonso, 2006) as well as a multidimensional lens of their engineering identities, namely performance/competence, interest, and recognition (Godwin 2016). Teamwork behavior was assessed using survey questions from CATME, a toolbox developed and validated by prior work (Ohland et al. 2012). Students rated themselves and their peers on five teamwork criteria, including contributing to the team's work, keeping the team on track, expecting quality, having relevant knowledge and skills, and interacting with teammates. The survey questions rooted in conflict research (Gonzalez & Hernández, 2014, and Harrison & Klein, 2007) were used to probe three types of conflicts: task, process, and relationship. We used the terms disagreement and conflict interchangeably in this paper.
The survey also collected demographic data. The sample demographics reflected the gender and racial distribution of the engineering student population at our institution, of which 13% were female, one third identified as Hispanic, one third as Asian, 16% as White, 6% as African American, and the rest as either mixed race, Native American, Native Hawaiian, or Pacific Islander. The summary statistics of the survey items were shown in Table A.1 (a) and (b) in the Appendix.

Analysis and Results

Our data, mostly consisted of Likert scores, or qualitative ranking, did not meet the normality assumption that underpinned Pearson correlation analysis. Instead, we used the Spearman's correlation coefficients (Knapp 2018) to describe the associations within EI, teamwork disagreement/conflict, and behaviors each, but also the cross correlation when they were paired.

Spearman's rho explained the monotonic correlation between two variables, producing a positive value when one variable always increased as the other rose, a negative value when one variable always dropped as the other rose, and 0 when no monotonic association existed. When rho was close to zero, the two variables could still be related, although the relationship was not monotonic. In social sciences, a correlation effect was considered small, medium, or large if the coefficient was no greater than 0.1, 0.3, and 0.5, respectively (Bosco et al. 2015).

P-values were also reported to measure the statistical significance of such association. A small p-value offered a strong evidence for a monotonic association. A large p-value suggested a lack of evidence for the association being monotonic. For the most part, we did not report the rho values of which the p-value exceeded 0.05 because the rho values would no longer be reliable at those coarse significance levels.

Within Correlations

The correlation analysis showed that conflicts about task and process could spiral into relationship conflict (e.g., the team has troubles getting along) in students' teamwork, consistent with findings from other fields (Leslie 2021). Specifically, process conflict was linked to relationship tension by a rho value of 0.65 at a significant level of 2.2×10^{-16}. Task conflict was significantly linked to relationship tension by a rho value of 0.37 and a p-value of 5.046×10^{-7}. While both were statistically significant, process conflict was more practically linked to relationship conflict than task to relationship conflict, suggesting that disagreement about process more easily morphed into relationship tension. This finding appeared to mirror what emerged from our qualitative analysis of a subset of the students who responded to the survey (Authors 2023). Several students expressed that it caused friction when some members did not pull their weight or failed to communicate (construed as conflicts about the process).

The multiple dimensions of EI exhibited significantly positive correlations with each other and with the generally stated EI, as shown in Table A.2 in the Appendix. All but three rho coefficients were significant at a p-value of 0.05 or smaller. The three rho values that did not pass the significance test were not reported. These statistically significant results showed that performance/competence, interest, and recognition complemented each other and were all intricately linked to the uni-dimensional EI. A similar "symbiotic" relationship was found among the five behavioral metrics. Admittedly, these positive correlations may be skewed by respondent bias because an overly confident student may rate themselves higher across all metrics whereas a modest student may rate themselves lower across the same metrics. Such biased responses could spuriously increase the significance of correlations among the metrics that we measured. We mitigated such bias by making their responses confidential from their peers and instructors so that their ratings, especially those on teamwork behaviors, were not tied to their grade. We will more rigorously control for respondent bias by comparing a person's self-rating with how they are rated on average by their teammates on each behavior metric. A large difference between the two ratings can indicate respondent bias. The correlation coefficients were summarized in Table A.3.

Cross Correlations

Teamwork behaviors informed the multi-dimensional EI in ways that would otherwise be masked when the uni-dimensional EI was used. For instance, "contributing to the team's work" (behavior metric 1, B.1) was positively associated with virtually all dimensions of a student's engineering identity in statistically and practically significant ways. It yielded the strongest association with the performance/competence aspect of EI that suggested self-efficacy in engineering classes (P1 through P3). Also, students who reported better interactions with teammates (B.5) had a stronger sense of self-efficacy in engineering classes in a statistically significant way. Except for interactions with teammates, all behavior metrics were positively and significantly linked to the EI dimension that measured how much they were perceived as a good engineer by their professors and peers. Similarly, when a student was perceived as a good engineer by their peers, he or she tended to do a better job keeping the team on track (B.2), at a significance level of 0.001. Results were detailed in Appendix Table A.4.

Teamwork behaviors were linked to team conflicts in modest ways. Students who rated themselves lower on interactions with teammates tended to report higher level of relationship and process conflicts, as illustrated by a modest rho value of -0.25 and -0.24, respectively, at a significance level of 0.01. Lacking relevant knowledge/skills was linked to greater conflicts about the process, as shown by a mildly significant correlation coefficient. This finding was plausible as students who did not have the knowledge or skills would have trouble completing their allotment, triggering process-related disagreement. Results were presented in Appendix Table A.5.

By comparison, students' teamwork conflicts interacted with their EI in a more subtle way. The correlation coefficients between conflicts and EI dropped, and their p-values weakened. Students with higher EI in terms of competence/performance (coded as P3 and P4) tended to have less relationship conflict. These correlations were significant at a 0.05 level with modest rho values ($rho_3 = -0.154$, $rho_4 = -0.152$). The other EI dimensions, namely interest and recognition, were not found to connect to how much they disagreed during teamwork, least not in a monotonic way. In addition to respondent bias, which can obscure these interpretations, psychological safety can cut into the frequency of disagreement and students' perceptions of disagreement. In future work, we will attempt to tease out its compound effect in the multivariate analysis.

Conclusions

The correlation analyses have shown a complex and interconnected web among EI, disagreement, and teamwork behaviors. Key findings are summarized below:

a. Even though team disagreement (i.e., conflict) was not frequently observed in teamwork (Loignon 2022), the Spearman's correlation tests showed that task and process conflicts could trickle into relationship conflict in a practically and statistically significant way. This echoed prior work cited in Leslie (2020), which found that an inability to engage in meaningful disagreement could lead to rupture and tension in teams.
b. Students' teamwork skills reflected on the degree and type of team disagreement in modestly significant ways, as illustrated by medium-sized rho values at a significance level of 0.05 or

smaller. Teamwork skills were proxied by the CATME behavior evaluations. Students who lacked interpersonal skills generally suffered greater relationship and process conflicts. Lacking relevant knowledge/skills was found to thrust a student into process conflict.

c. Students' engineering identities informed team disagreement in subtle ways. Students who were confident of their self-efficacy (construed as competence/performance of EI) tended to have lower relationship conflict. The other aspects of EI were found to have insignificant rho value with regard to team disagreement. It was worth noting that an insignificant coefficient did not mean a void of relationship. The relationship might well exist. It just did not happen in a monotonic way.
d. Engineering identities were intertwined with the skills or behaviors students brought to their teams. Students who were confident of their self-efficacy tended to function more positively in all behavior metrics. When students felt that they were perceived as a good engineer by parents, professors, and peers, these recognitions reflected positively on all behavior metrics except interacting with teammates. Recognition from relatives and friends played minimal roles in shaping teamwork behaviors.

There were a few limitations to this study. First, we found that disagreement was infrequent in students teamwork, similar to what had been found in professional teamwork (Loignon 2022). Its under-representation can obscure the correlation significance informing how disagreement shaped engineering identities. Second, we must address the compounding effect by psychological safety because how comfortable a student felt around other people influenced how he/she disagreed with their team. We will explore psychological safety through multivariate statistical analyses. Lastly, students tended to rank each other high in teamwork evaluations. Spearman's correlation test was able to handle ordinal data like rank-based scores because it did not require the data to be normally distributed. But when the data became severely skewed, like in some evaluation scores, it can impact statistical inference and that should be confronted in future work.

When interpreting the correlation results, we must tread cautiously to not mistake correlation for causality. In other words, a positive correlation could imply that contributing constructively to teamwork causes a hike in a student's engineering identities, or it could merely reflect that students with greater EI are inclined to function more constructively in teams. Both directions are plausible. To pinpoint cause and effect, we must gather contextual information from observational studies or interviews (Authors 2023).

Acknowledgments

This work was supported by the National Science Foundation's [Blinded for review]. Any opinions, findings, conclusions, or recommendations expressed in this material are those of the authors and do not necessarily reflect the views of NSF. We also thank anonymous reviewers for their comments to an earlier draft.

References

Authors, 2023. [Blinded for review]

Bosco, F.A., Aguinis, H., Singh, K., and Field, J.G. (2015) Correlational Effect Size Benchmarks. Journal of Applied Pscynology Vol. 100, No. 2, 431 – 449.

Carlone, H.B. and Johnson, A. (2007) Understanding the science experiences of successful women of color: Science identity as an analytic lens. *Journal of Research in Science Teaching* 44(8): 1187-1218.

Choe, N.H., L. Martins, M. Borrego., & M. Kendall (2019) Professional aspects of engineering: Improving prediction of undergraduates' engineering identity. *Journal of Professional Issues in Engineering Education and Practice* 145(3): DOI: 10.1061/(ASCE)EI.1943-5541.0000413

Godwin, A. (2016) The development of a measure of engineering identity. Proceedings of the ASEE's 123rd Annual Meeting, New Orleans, LA. June 26-29, 2016.

Gonzalez-Roma, V., & Hernandez, A. (2014). Climate uniformity: Its influence on team communication quality, task conflict, and team performance. *Journal of Applied Psychology 99*: 1042-1058.

Harrison, D. A., and Klein, K. J. (2007) What's the difference? Diversity constructs as separation, variety, or disparity in organizations. *Academy of Management Review 32*: 1199-1228.

Hazari, Z., Sonnert, G., Sadler, P. and Shanahan, M.C. (2010) Connecting High School Physics Experiences, Outcome Expectations, Physics Identity, and Physics Career Choice: A Gender Study. *Journal of Research in Science Teaching* 47(8): 978-1003.

Hoehn, J.R., Gifford, J.D., and Finkelstein, N.D. (2020) Epistemic stances toward group work in learning physics: Interactions between epistemology and social dynamics in a collaborative problem solving context. *Physics Education*. arXiv:2005.02425

Kajfez, R. L., Mohammadi-Aragh, M. J., Clark, A., Sassi, S., and Petrie, J. (2019, June*), Board 29: Initial Qualitative Exploration into First-Year Engineering Community and Identity. The* 2019 ASEE Annual Conference & Exposition, Tampa, Florida. 10.18260/1-2—3231

Knapp, H. (2018) *Intermediate Statistics Using SPSS*. SAGE Publications, Inc.

Leslei I. (2021) *Conflicted: How Productive Disagreements Lead to Better Outcomes*. Harper Collins.

Loignon, A (2022) Comments made during the Advisory Board Meeting for the NSF Project # [Blind for review]

Marra, R.M., Steege, L., Tsai, C., and Tang, N.E. (2016) Beyond "group work": an integrated approach to support collaboration in engineering education. *IJ STEM Ed* 3(17). https://doi.org/10.1186/s40594-016-0050-3

Ong, M., Jaumot-Pascual, N., and Ko, L.T. (2020) Research literature on women of color in undergraduate engineering education: A systematic thematic synthesis. *Journal of Engineering Education* 109 (3): 581 - 615.

Patrick, A. Borrego, M., & Prybutok, A. (2018) Predicting persistence in engineering through an engineering identity scale. *International Journal of Engineering Education,* 34(2(A)), 351-363.

Tonso, K. (2006) Teams that work: campus culture, engineer identity, and social interactions. *Journal of Engineering Education* 95(1): 25-37.

Weatherton, Y.P., Mayes, R.D., and Villanueva-Perez, C. (2017) Barriers to Persistence for Engineering Students with Disabilities. The ASEE Annual Conference & Exposition. June 25 - 28, 2017, Columbus, OH.

Appendix

Table A.1 (a) Summary Statistics of the 5-point Likert Variables (No. Obs. = 268)

Code	Question/Statement	Mean	Std. Dev.	Min.	Max.	Mode
P1	I can understand the concepts I have studied in my engineering classes.	4.135	0.668	2	5	4
P2	I am confident that I can understand engineering subjects in class.	4.132	0.689	2	5	4
P3	I can overcome setbacks in engineering classes.	4.07	0.718	2	5	4
P4	I am confident that I can understand engineering subjects outside of class.	4.113	0.731	2	5	4
P5	I can do well on exams in engineering classes.	3.663	0.908	1	5	4
P6	Others ask me for help in engineering classes.	3.586	0.966	1	5	4
I1	I enjoy learning engineering.	4.357	0.736	2	5	5
I2	I am interested in learning more about engineering	4.427	0.714	2	5	5
R1	Do the following see you as an engineer? - Parents	3.901	1.159	1	5	5
R2	Do the following see you as an engineer? - Relatives	3.805	1.152	1	5	5
R3	Do the following see you as an engineer? - Friends	3.846	1.109	1	5	5
R4	Do the following see you as an engineer? - Professors	3.415	1.087	1	5	3
R5	Do the following see you as an engineer? - Peers	3.759	0.985	1	5	4
Task	We had task-related disagreements (i.e. we had different viewpoints on the task, different ideas about the task, or differing opinions about the work being done.)	2.651	1.209	1	5	2
Relation-ship	We had difficulty getting along (i.e. our personalities clashed, we disagreed about personal matters and non-work things (i.e. social or personal things)).	1.748	1.031	1	5	1
Process	We had disagreements during the project's process (i.e. determining who should do what in the project, task responsibilities, or resource allocation in our project).	2.061	1.079	1	5	2
B1	Behavior 1: Contributing to the team's work	4.343	0.714	2	5	5
B2	Behavior 2: Keeping the team on track	4.27	0.773	2	5	5
B3	Behavior 3: Expecting quality	4.344	0.82	2	5	5
B4	Behavior 4: Having relevant knowledge, skills, & abilities	4.318	0.8002	2	5	5

B5	Behavior 5: Interacting with teammates	4.472	0.742	1	5	5
PS1	If you make a mistake on this team it is often held against you.	3.479	1.377	1	5	4
PS2	Members of this team are able to bring up problems and tough issues.	4.088	1.058	1	5	5
PS3	People on this team sometimes reject others for being different.	3.746	1.087	1	5	4
PS4	It is safe to take a risk on this team.	4.465	0.936	1	5	5
PS5	It is difficult to ask other members of this team for help.	4.089	0.886	1	5	5
PS6	No one on this team would deliberately act in a way that undermines my efforts.	4	1.086	1	5	4
PS7	Working with members of this team, my unique skills and talents are valued and utilizeed.	3.991	1.101	1	5	4

Table A.1 (b) Summary Statistics of the Demographic Variables (No. Obs. = 268)

Category	**Type**	**# of Students**	**Percentage**
Conflict Types	Individual	25	11%
	Dyad	36	17%
	Subgroup	26	12%
	Team	62	29%
	None of the above	66	31%
Gender	Male	185	86%
	Female	29	13%
	Others	1	0.40%
Race	Hispanic	68	32%
	White	34	16%
	Black or African American	13	6%
	Asian	73	34%
	American Indian or Alaska Native	1	0.40%
	Native Hawaiian or Other Pacific Islander	11	5%
	Some other race	15	7.00%
Highest education degree that parents attained	High School (e.g., GED)	53	25%
	Some college credits, no degree	27	13%
	Associate degree (e.g., Associate of Arts [AA], Associate of Science [AS])	21	10%

	Bachelor's degree (e.g., Bachelor of Arts [BA], Bachelor of Science [BS])	52	24%
	Graduate degree (e.g., Master's degree, doctorate)	35	16%
	Unknown	26	12%
Last school attended before enrolled to [Blinded for review]	High school (private or public)	124	58%
	Community college in California	66	31%
	Community college outside of California	4	2%
	Another university within the CSU system	6	3%
	A university within the UC system	4	2%
	Other institution of higher education in California	0	0%
	An institution of high education outside of California	10	4%
Full-Time or Part-Time Student	Full-Time	198	92%
	Part-Time	17	8%
International Student	Yes	14	7%
	No	201	93%
Pell Recipient	Yes	56	26%
	No	159	74%
Student Status at [Blinded for review]	Freshmen	79	37%
	Sophomores	7	3%
	Juniors	18	8%
	Seniors	101	47%
	Graduates	10	5%

Notes: The gender and race distributions of the sample reflect those of the student population at the institution where the research is conducted. This institution is designated as a Hispanic-serving institution.

Table A.2. Spearman's Correlations between Dimensions within EI

	P1	P2	P3	P4	P5	P6	I1	I2	R1	R2	R3	R4	R5	EI
P1	1.00	0.74	0.57	0.58	0.51	0.43	0.51	0.50	0.41	0.26	0.31	0.41	0.36	0.35
P2		1.00	0.55	0.57	0.50	0.45	0.56	0.48	0.36	0.32	0.36	0.39	0.36	0.36
P3			1.00	0.60	0.50	0.28	0.42	0.42	0.29	0.24	0.30	0.32	0.27	0.31
P4				1.00	0.47	0.51	0.46	0.52	0.39	0.33	0.42	0.33	0.39	0.35
P5					1.00	0.48	0.25	0.24**	--	--	0.18*	0.23**	0.16*	0.16*
P6						1.00	0.29	0.33	0.22**	0.18*	0.31	0.26	0.36	0.22
I1							1.00	0.78	0.18*	0.18*	0.20**	--	0.16*	0.38
I2								1.00	0.28	0.26	0.21**	0.21**	0.24**	0.42
R1									1.00	0.73	0.61	0.49	0.57	0.47
R2										1.00	0.66	0.46	0.51	0.42
R3											1.00	0.53	0.70	0.49
R4												1.00	0.75	0.44
R5													1.00	0.47
EI														1.00

--values were not reported because they did not pass the significance test with a 0.05 significance level.
** means significant at 0.01 significance level
* means significant at 0.05 significance level
Unmarked values have a significance level of 0.001.
Row/column names are defined in Table A.1(a).

Table A.3 Spearman's Correlations within the Five Behavior Metrics

	B1_Self	B2_Self	B3_Self	B4_Self	B5_Self
B1_Self	1.00	0.63	0.48	0.49	0.40
B2_Self		1.00	0.53	0.53	0.48
B3_Self			1.00	0.65	0.57
B4_Self				1.00	0.54
B5_Self					1.00

Row/column names are defined in Table A.1(a)

Table A.4. Cross-Correlations between Behaviors and EI

	B1_Self	B2_Self	B3_Self	B4_Self	B5_Self
P1	0.28***	0.22**	0.22**	0.22**	0.24**
P2	0.29***	0.14	0.15*	0.19*	0.18*
P3	0.25***	0.14	0.17*	0.10	0.23**
P4	0.17*	0.14	0.14	0.16*	0.14
P5	0.19*	0.10	0.08	0.15*	0.16
P6	0.16*	0.21**	0.19*	0.22**	0.13
I1	0.16*	0.05	0.04	-0.03	0.13
I2	0.16*	0.04	0.13	0.08	0.13
R1	0.23**	0.20**	0.14	0.19*	0.12
R2	0.07	0.11	0.10	0.11	0.08
R3	0.14	0.16*	0.07	0.04	0.04
R4	0.23**	0.17*	0.15*	0.16*	0.09
R5	0.19*	0.26***	0.15*	0.20**	0.14
EI	0.20**	0.09	0.17*	0.21**	0.05

***indicates a significance level of 0.001.
**indicates a significance level of 0.01.
*indicates a significance level of 0.05.

Table A.5. Cross-Correlations between Teamwork Conflicts and Behaviors

	B1_Self	B2_Self	B3_Self	B4_Self	B5_Self
Task Conflict	-0.03	-0.01	-0.01	0.02	-0.04
Relationship Conflict	-0.13	-0.09	-0.14	-0.11	-0.25**
Process Conflict	-0.07	-0.05	-0.14	-0.17*	-0.24**

*indicates a significance level of 0.05
**indicates a significance level of 0.01
Unmarked values did not pass a significance level of 0.05.