

A new assessment for savior complex in humanitarian engineering project-based learning

Ogochukwu Elisha-Wigwe, University of Texas at Austin

Ogo is a Nigerian PhD student in Mechanical Engineering at The University of Texas at Austin. She earned both her Bachelor's and Master's degrees in Mechanical Engineering from Miami University of Ohio. Her research lies in humanitarian design engineering and focuses on how designers and engineers are trained to work in global and cross-cultural contexts, with an emphasis on building strong contextual understanding and empathy. She is passionate about human-centered innovation and using design and technology to create meaningful, sustainable impact in resource-constrained communities. Outside of academia, Ogo enjoys traveling and exploring new regions, cooking, musicals, playing racquet sports, and embracing joy in her everyday life.

Dr. Anastasia M. Schauer, University of Texas at Austin

Dr. Anastasia Schauer is an Assistant Professor of Mechanical Engineering at the University of Texas at Austin. Dr. Schauer's research program specializes in the development and validation of tools to aid designers in producing innovative, high-quality, and equitable design outcomes. A current focus of the Design Understanding, Cognition, and Knowledge (DUCK) Lab is the study of how designers interface with technology such as virtual reality and generative artificial intelligence to result in better designs for humanitarian engineering projects and beyond. Throughout her academic career, Dr. Schauer has been recognized for her contributions to both research and teaching, receiving the prestigious National Science Foundation Graduate Research Fellowship and multiple awards for her work on equitable development of engineering education curricula, including the Best Paper Award at the International Symposium on Academic Makerspaces. She received her Ph.D. in Mechanical Engineering from Georgia Institute of Technology in 2024, where her doctoral research focused on the identification and mitigation of cognitive bias in the design process. She also holds an M.S. in Mechanical Engineering from Georgia Tech and a B.S. in Mechanical Engineering from the University of Cincinnati.

Work-In-Progress: A new assessment for savior complex in humanitarian engineering project-based learning

Humanitarian engineering (HE) is a form of international project-based learning that has been touted for its ability to enhance student interest and motivation, positively impact communities across the world, and emphasize sociotechnical thinking in an engineering education context. Despite good intentions, HE has been criticized as reinforcing structures of oppression, “voluntourism,” and white saviorism. In existing literature, the “savior complex” has been qualitatively studied within the confines of defining and identifying themes associated with the phenomenon. The goal of this work is therefore to propose a method for exploring savior complex concretely and quantitatively within an engineering education setting by devising a new survey instrument that will allow educators and researchers to track savior complex and its progression over time. We developed and deployed a 23-item savior complex survey instrument in two courses with 28 students at two HE field sites in Kenya and Greece, using a multi-aspect validity framework to assess the new instrument. While the grounding of the survey items in rigorous qualitative analysis of savior complex addressed content validity, we found that the internal consistency of the instrument ($\alpha = 0.67$) was slightly outside the recommended range. Statistically significant relationships between several of the savior complex items, demographic factors, and related constructs such as cultural intelligence, empathy, culture shock, and self-efficacy, also partially supported the construct validity. One preliminary finding was that students on the Kenya project were more likely to exhibit savior complex than students on the similar trip in Greece, emphasizing that savior complex is context-dependent and motivating the need to collect data at varying field sites to develop a construct that is valid across contexts. Future work will entail deployment to a larger sample of students to assess validity evidence, as well as further testing across a range of HE contexts. This assessment is a concrete step toward addressing complex issues in humanitarian engineering that lead to miscommunication, power imbalances, and ultimately unsuccessful projects.

1. Introduction

Project-based learning (PBL) engages students by centering curriculum around real-world problems, enhancing student interest, motivation, and ability while applying relevant classroom concepts [1]. PBL through service-learning or humanitarian engineering can result in even greater impacts on cognitive skills, attitudes, and identities [2]. Humanitarian engineering is broadly defined as an engineering specialization that supports the sustainable development of resource-constrained communities [3], often targeted toward meeting “the basic needs of all – especially the powerless, poor, or otherwise marginalized” [4]. The popularity of programs focused on tackling and implementing real-world humanitarian engineering projects across the world has boomed over the past decade. However, humanitarian engineering projects undertaken in the US are often situated in the Global South, presenting a unique set of challenges to communication, collaboration, and engagement for engineers taking on roles outside of their home countries [5], [6]. Challenges exist even when teams have the resources to travel for face-to-face interaction with stakeholders and end users. Johnson et al. [7] have criticized humanitarian engineering as depriving communities of the agency to determine which solutions will best serve their communities in favor of allowing more powerful “savior” entities to decide “what these people really need” [7]. In the context of Engineers Without Borders, a US-based organization that engaged 10,000 student and professional engineers in 2023 alone [8], some scholars have raised questions as to whether efforts to help others actually reinforce structures of white supremacy [9]. This concept of the “savior complex” or “voluntourism” is a common criticism of Engineers Without Borders and similar humanitarian engineering programs [10]. Despite good intentions, this phenomenon may result in humanitarian engineering interventions reinforcing structures of oppression [11], disempowering communities, and promoting neo-colonialism [10]. Savior complex, which is often referred to as “white savior complex” but will be referred to in this paper as the Western Savior Complex (WSC) to reflect its roots in Western colonialism, has previously been studied in humanitarian engineering qualitatively through interviews and case studies. The goal of this paper is to propose an instrument that will allow educators to quantitatively investigate and track savior complex in an undergraduate global learning context.

2. Background

There exists a growing body of literature examining the savior complex across multiple scholarly discourses, including volunteer tourism (voluntourism), humanitarian aid, peace and advocacy missions, development studies, critical whiteness studies, and postcolonial and neocolonial critiques [12], [13], [14], [15], [16]. Within this literature, the savior complex which is often discussed under terms such as the White Savior Industrial Complex or White Savior Complex, is not framed as a matter of individual malice, racism, moral failure, or ill-intent, but rather as structural and ideological phenomenon that emerges at the intersection of privilege, moral identity, and global inequality. Scholars have consistently noted that individuals who exhibit savior-oriented tendencies are frequently well-meaning and motivated by a genuine desire to help. However, the danger of the savior complex lies not in intent, but in its underlying assumptions and consequences. One recurring critique is the tendency for savior-oriented actors to overlook or minimize their own positionality and complicity in the historical, political, and economic conditions that have contributed to the very problems they seek to address [12], [13]. This selective amnesia allows action to proceed without sustained critical reflection, reinforcing narratives in which suffering is detached from its systemic roots. The lack of acknowledgement of the systemic nature of these problems can often result in short-term solutions that do not

address the true root of an issue or make considerations for long-term sustainability, comprising one common cause of failed humanitarian engineering projects [17].

Another central theme across the literature is the imposition of Eurocentric, middle-class, and Western concepts of development, progress, and stability onto communities positioned as “in need” [12], [18], [19]. In these cases, local voices, knowledge systems and lived experiences are frequently marginalized, while external factors assume they are better positioned to diagnose problems and prescribe solutions. Flaherty [20] summarizes this phenomenon and its root causes by stating that “people with race and gender privilege are taught by white supremacy and patriarchy that they have a certain authority to impart to the world.” This dynamic is often reinforced through deficit-based thinking, which frames communities primarily in terms of lack or incapacity rather than agency. Finnegan’s work further illuminates how saviorism is sustained by deeper psychological and cultural mechanisms. Drawing on interviews with individuals involved in humanitarian advocacy movements, she describes saviorism as offering participants a sense of purpose, moral clarity and identity: a “path to find purpose” grounded in binary moral frameworks of right and wrong [14]. Within this framing, action becomes a mechanism for affirming one’s goodness while avoiding deeper examination of self, privilege, and systemic inequities. Concepts such as “moves to innocence” further describe how rapid intervention can function to alleviate discomfort or guilt associated with privilege without addressing root causes.

Despite the richness and depth of this body of scholarship, much of the existing work on savior complex remains conceptual, critical or qualitative in nature. To date, there has been little effort to explicitly operationalize, measure or validate the savior complex as a psychological or behavioral construct. This absence of measurement tools limits the ability to systematically identify savior-oriented tendencies, compare them across contexts, or evaluate interventions designed to mitigate their effects. Developing instruments that can reliably capture aspects of saviorism represents a necessary first step toward increasing awareness, enabling empirical study, and ultimately supporting efforts to reduce or prevent the reproduction of these dynamics in humanitarian and educational settings. Building on this gap, the present study seeks to move beyond reflection or purely theoretical critique by developing and piloting a survey instrument aimed at measuring savior-oriented tendencies alongside related psychological constructs.

3. Methods

3.1. Positionality Statement

The first author approaches this work as a Black Nigerian woman and an engineering researcher trained within Western academic institutions, who has participated in and observed humanitarian engineering initiatives from multiple positional standpoints. Her lived experience spans both resource-constrained contexts in the Global South and privileged educational spaces in the United States, positioning her simultaneously as someone who has been the intended beneficiary of humanitarian interventions and as someone who now studies and evaluates such interventions from within the systems that design and deploy them. She acknowledges that her perspectives are shaped by pre-adulthood immersion in Global South communities and by an engineering education situated primarily within U.S. institutions during adulthood, which together influence and constrain her interpretations. While her proximity to communities affected by humanitarian initiatives provides important contextual insight, it does not grant her authority to speak for these communities. The second author identifies as a white woman at a U.S. R1 institution, where she is relatively new to the field of global engineering projects. Her work is informed by a

commitment to sociotechnical thinking and critical reflection on power, equity, and representation in engineering design. She acknowledges that her interest in savior complex is motivated by a desire to expand the body of work on the phenomenon in order to reflect on and improve the way she approaches global engineering processes. Both authors recognize that their training, institutional affiliation, and role as researchers afford them power in how this phenomenon is defined, measured, and interpreted. This work is therefore grounded in reflexivity and humility, recognizing that quantitative instruments have the potential to illuminate, oversimplify, and obscure lived realities.

3.2. Survey Item Development

Qualitative analyses, interviews, and critical case studies on savior complex provided the conceptual foundation for WSC item generation in the present study [12], [13], [14]. Savior complex items were developed through an iterative, theory-informed process grounded in this body of qualitative and critical scholarship, during which detailed notes were taken on recurring arguments, illustrative examples, and explanatory mechanisms. These were subsequently organized into emergent thematic categories, including perceived competence and authority, marginalization of local voices, motivations for participation, expectations of impact and recognition, responses to critique and feedback, and engagement with structural or historical causes of inequality. From each thematic category, provisional survey items were developed to reflect how these dynamics might manifest in short-term, project-based study-abroad contexts. Item wording was informed by both the literature and the researcher's experiences observing and participating in humanitarian engineering and study-abroad programs. Questions were framed as first-person, self-reflective statements to encourage honest engagement while avoiding overtly moralizing or accusatory language. Following initial development, items were reviewed and refined to improve clarity, reduce redundancy, and align with best practices in survey design. This process reduced the initial pool of 35 items to a final set of 23, as shown in Table 1.

Of the 23 WSC survey items, 18 items were organized into two dedicated savior complex blocks, while the remaining five items were strategically embedded within related construct blocks where conceptually appropriate. These additional constructs included questions designed to assess course outcomes, self-efficacy [21], empathy [22], cultural intelligence [23], and culture shock [24]. Responses to all survey items were recorded using a six-point Likert-type scale [25] ranging from 0 (strongly disagree) to 5 (strongly agree). This scale was intentionally selected to eliminate neutral response options and reduce the effects of central tendency bias [26] or social desirability bias [27]. The 74 items in the final question bank were then distributed across multiple survey phases, resulting in approximately 57–64 questions per administration.

3.3. Initial Field Deployment

For the first field deployment of the WSC survey, data was collected from 28 undergraduate students enrolled in two different humanitarian engineering-related courses with a study abroad component in May-June 2025 through a public R1 university in the southern United States. Of the 28 survey participants, 12 traveled to Greece through a course on technology in refugee communities, led by an engineering faculty member. The other 16 traveled to Kenya through a course on wastewater and water treatment, co-led by one engineering and one public affairs faculty member. In each course, a member of the instructional team distributed the survey through Qualtrics approximately halfway through the travel period (In-Location) and upon students' return to the US (Post-Trip). Students enrolled in the Kenya course also took the survey

prior to departing to Kenya (Pre-Departure). A participant identification system was implemented to enable longitudinal matching of responses while preserving anonymity through self-generated, anonymous identification codes [28], [29] that remained consistent across survey administrations and allowed responses to be linked.

Overall, 28 participants, 12 from the Greece program and 16 from the Kenya program, completed at least one survey. Participants ranged in age from 18 to 24 years old, with an average age of 20.7 ± 1.6 years. The majority of participants were women, with 21 women and 7 men providing demographic information. In addition, 12 participants identified as white, 7 as Asian/Pacific Islander, 4 as Hispanic, 2 as Black/African American, and 3 as more than one race. Eight participants had previously lived outside of the US for one year or more, including countries in Asia, Africa, Europe, and North America.

Table 1. List of items on the first iteration of the WSC survey instrument

Item #	Statement
1	I believe that what I am doing here has the potential to change the lives of the people in the community.
2	I have spent time doing research into the major contributors that have led to the problems I am trying to solve. (-)
3	My work in this community would not adversely impact their progress.
4	I believe that this program is an avenue to be a part of something much bigger than myself.
5	I believe that by going on this program, I am depriving myself of certain pleasures.
6	I think I will forever remember the impact the community and its members have on me.
7	I believe that my presence in this community will enable them to improve their present living conditions.
8	I feel a sense of responsibility to help the people in this community.
9	I believe that I know how to solve these problems.
10	I believe that my initial ideas to impact this community would be successful.
11	I believe that solving this issue would lead to more issues being solved in this community.
12	I believe that even a year from now, the community will only have good things to say about us.
13	I believe that once this project is complete, the issue I am trying to solve in this community will be solved for the long term.
14	If the community does not adopt my product/process/solution/ideas, I would be okay with it. (-)
15	If the community does not adopt my product/process/solution/ideas, they would be okay. (-)
16	I believe that the community members are capable of providing these solutions for themselves. (-)
17	I would consider every criticism provided by the members of the community. (-)
18	I believe that the opinions and inputs of the community members are important at all stages of the project. (-)
19	Feedback from my UT supervisor/professor/TA holds more impact / significance than feedback from the members of the community.
20	I signed up for this trip because it sounded like a really cool travel opportunity.
21	This is a more impactful way to spend my summer compared to interning.
22	I believe that being on this trip makes me a more interesting and unique person.
23	I see myself as a potentially stable positive influence in the community.

4. Results and Discussion

To assess this initial deployment of the WSC survey, we follow guidance from the Standards for Educational and Psychological Testing [30], [31], collaboratively developed by the American Educational Research Association (AERA), the American Psychological Association (APA), and the National Council on Measurement in Education (NCME). Validity is often classified into various “types” [32], although the testing standards refer to different types of *validity evidence*: test content, response processes, internal structure, relations to other variables, and consequences of testing [30], described in Table 2.

Table 2. Summary of validity evidence defined by Standards for Educational and Psychological Testing [30]

Validity Evidence	Definition	Examples
Test content	Relationship between the construct and the content of the items, tasks, or questions on a test	Themes, wording, and formatting of items; development of items by expert observation or based on academic literature
Response processes	Relationship between the construct and the performance/response engaged in by test-takers, often analyzed through analysis of individual responses	Eye movement, response times, attention checks
Internal structure	Relationships among test items and components	Reliability coefficients such as Cronbach’s alpha, differential item functioning, factor analysis
Relations to other variables	Relationship between the construct and other, external variables, such as similar/different constructs or demographic differences	Correlations with surveys intended to measure other similar or dissimilar constructs, evaluating test-criterion relationships, validity generalization, group differences
Consequences of testing	Soundness of data interpretation for intended use; unintended consequences of conducting testing	Evaluation of unintended consequences, relationships to “downstream” variables

4.1. Evidence for Content Validity

Content validity was addressed by grounding savior complex survey items in existing literature that have explored the construct in-depth qualitatively rather than quantitatively. Each survey item was developed to reflect a specific theme discussed in the literature, as discussed in section 3.2. While individual questions were not intended to map one-to-one onto a single source, every item can be traced back to at least one documented theme or argument in the savior complex literature. Table A1 in the Appendix presents a mapping between savior complex survey items, the conceptual themes they were designed to capture, and representative literature from which themes were drawn. This mapping demonstrates that item development was theory-informed and provides transparency in how qualitative insights were translated into measurable survey questions.

4.2. Evidence for Response Processes

For insight into the cognitive processes undergone by participants while taking the WSC instrument, we conducted two rounds of pilot testing and iteration. These pilot tests included observing participants, who had traveled to Kenya as members of the previous year's cohort, as they completed the survey, as well as a debrief interview upon completion of the survey. Changes implemented as a result of this feedback included shortening the overall length of the survey, consolidating redundant items, as well as adjusting for confusing or unclear wording. As shown in Table 1, six items used reverse scaling (meaning that statements were negatively worded relative to the savior complex construct), so that higher levels of agreement on reverse-scaled statements indicated lower savior complex. This was applied as an attention check [33] as well as an attempt to mitigate acquiescence bias [34]. However, this process is controversial [35] and will likely be modified in future iterations. For further insight into response processes, future work should involve the investigation of participants' time taken to complete each survey item. This would provide further insights into any remaining ambiguous wording in the questions. Additionally, because the survey is intended to capture implicit attitudes, future work could involve displaying items individually and providing a certain amount of time for participants to respond to each item, to reduce the likelihood of responses being impacted by overthinking or social desirability bias.

4.3. Evidence for Internal Structure

Cronbach's alpha is a measure of internal consistency, or the amount of correlation between items in a survey instrument [36]. Cronbach's α is commonly used to validate survey instruments or assessments in similar engineering education scenarios [37], [38], [39]. For the original 23-item WSC survey, the raw Cronbach's alpha was 0.670, which is slightly outside of the recommended range of 0.70-0.90 [40]. The output from R indicated that Cronbach's alpha would increase to 0.739 (within the acceptable range) if items 2, 5, 6, 8, and 21 were dropped.

4.4. Evidence for Relations with Other Variables

The packaging of the WSC survey alongside several other commonly used surveys enabled us to assess correlations between WSC scores and other constructs, as shown in Table A2 in the Appendix. Kendall's Tau-b was used to calculate correlations between aggregate scores for each other instrument and (1) aggregate WSC scores or (2) scores for each of the 23 WSC items in Table 1. It was expected that WSC would be negatively correlated with both measures of cultural intelligence as well as empathic perspective-taking. These factors are generally considered desirable in humanitarian engineering, so a negative correlation would indicate that students who exhibited lower amounts of savior complex exhibited higher levels of cultural intelligence and empathic perspective-taking. On the other hand, it was expected that there would be a positive correlation between WSC and empathic concern, as well as culture shock. Previous work has connected the concepts of culture shock and voluntourism [41], which is commonly motivated by savior complex. Additionally, it is expected that empathic concern may manifest as pity, which is a sentiment common among individuals with savior complex [42]. Although WSC as an aggregate score was not significantly correlated with any of the external variables, the following sections will explore significant relationships between individual WSC items and each external variable.

4.4.1. Cultural Intelligence

Neither the motivational nor cognitive dimensions of Ang et al.'s [23] cultural intelligence scale had a statistically significant correlation with aggregate WSC ($p = 0.082$ and $p = 0.347$, respectively). For the motivational aspect of cultural intelligence, three WSC items (2, 5, & 14) were negatively correlated (as expected) with CQS-MO, while five items were unexpectedly positively correlated with CQS-MO. The five positively correlated WSC items (3, 4, 9, 12, & 13) were tied together by a common theme of the impact that students expected to have on the community – specifically, students' belief in their ability to provide effective long-term solutions to the community. Because high motivational CQ is reflective of strong motivation to engage with and adapt to a new cultural environment, it is logical that students who are driven to engage and adapt might be more confident in their ability to provide successful engineering solutions.

For the cognitive dimension of cultural intelligence, two WSC items (16 & 17) were negatively correlated (as expected) with CQS-C, while an additional two items (20 & 22) were unexpectedly positively correlated with CQS-C. While the former trend indicated that students with high cognitive cultural intelligence were more aware of the value of community input, the latter trend indicated that increased knowledge and awareness of the culture may have led to perceptions of the travel opportunity as “cool” or “interesting.”

4.4.2. Empathic Perspective-Taking and Empathic Concern

This analysis, based on the seven Perspective Taking items from the Interpersonal Reactivity Index [22], did not find a statistically significant correlation between IRI-PT and WSC ($p = 0.393$). However, two individual WSC items were negatively correlated (as expected) with IRI-PT, while question 16 was positively correlated with IRI-PT. The latter correlation indicated that participants who scored higher on IRI-PT were less likely to believe that community members were capable of providing solutions for themselves. This shows that even among students with higher capacity for empathic perspective-taking, incomplete understanding or assumptions related to the community may result in inaccurate perspective-taking.

Although empathy is generally considered a positive trait that can evolve over time [43], we posit that affective empathy in particular may be disadvantageous in humanitarian engineering contexts, resulting in emotional sympathy responses from designers and potentially reinforcing power imbalances and savior complex [44]. Based on the seven Empathic Concern items from the IRI [22], there was not a statistically significant correlation between IRI-EC and WSC ($p = 0.447$). One WSC item was positively correlated (as expected) with IRI-EC, while two WSC items were unexpectedly negatively correlated with IRI-PT. Question 6, with a statistically significant positive correlation, showed that students who scored higher on IRI-EC were more likely to be emotionally affected by the study abroad experience, as they were more likely to report that they would forever remember how the community and its members impacted them.

One potential explanation for the unexpected results is that the IRI instrument measures a participants' general capacity for empathy (trait empathy) rather than their empathy in a particular scenario (state empathy). The authors hypothesize that empathic concern is specifically disadvantageous in a humanitarian engineering setting, whereas higher empathic abilities are generally considered positive. Therefore, assessing trait empathy as context-neutral may have impacted correlations differently compared to assessing state empathy, or students' PT and EC

abilities within a humanitarian engineering context. Future versions of this survey should include a state empathy metric such as Hess et al.'s [45] empathy scale for users in engineering design.

4.4.3. Culture Shock

This analysis was based on Mumford's culture shock scale [24], which was expected to be positively correlated with WSC. Although there was not a significant correlation between culture shock and aggregate WSC across all participant surveys ($p = 0.528$), four individual WSC items were positively correlated with culture shock: questions 5, 6, 17, and 19. These findings were promising and provided validity evidence for some individual items, most of which were also correlated in the hypothesized direction with other constructs. In particular, the positive correlations to questions 17 and 19 indicated that students who experienced higher culture shock were more likely to over-rely on the input of their US-based teaching team and under-rely on the input of community members.

4.4.4. Comparison of Participant Traits

An additional method of collecting validity evidence is to compare various groupings of participants based on traits that are expected to impact the presence of WSC. For example, women might exhibit lower levels of WSC compared to men because of the savior complex's patriarchal roots [20]. While this is a promising method for gathering validity evidence in the future, this will be a strong focus of future work due to the small sample size in this paper. One relevant factor in this deployment was the two different project contexts, as it was expected that students who chose to undertake a project in Kenya might exhibit higher savior complex compared to students working on the project in Greece due to the different colonialist roles played by European and African countries. While in-location, students in Kenya exhibited statistically significantly higher levels of WSC (mean = 3.104 ± 0.361) compared to students in Greece (mean = 2.877 ± 0.219 , $\chi^2 = 4.004$, $p = 0.045$), although this difference was not statistically significant post-trip ($\chi^2 = 2.197$, $p = 0.138$).

4.5. Evidence for Consequences

The final aspect of validity evidence is the consequences of testing. This aspect deals with both the "downstream" consequences of the construct, as well as any consequences to participants that may result from conducting the survey. Within the scope of this work, the Course Outcomes survey questions can provide preliminary insights into how WSC impacted students' experiences throughout the trip and the course. We hypothesized that students might report more positive course outcomes as a consequence of experiencing lower savior complex, resulting in a negative correlation between the constructs. Although there was no significant correlation between course outcomes and aggregate WSC ($p = 0.150$), six items (2, 5, 14, 15, 17, & 18) were negatively correlated with course outcomes, while five items (4, 6, 9, 12, & 13) were positively correlated, as shown in Table A3 in the Appendix, indicating that the impact of WSC on students' experience in the course was relatively mixed.

The second aspect of consequences of testing is related to how students may be impacted by completing the WSC instrument. For example, completing the WSC items might cause students to reflect on their experiences and self-beliefs related to savior complex, resulting in negative impacts on self-efficacy. In order to test for potential consequences on self-efficacy, we calculated correlations between WSC and self-efficacy using Kendall's Tau-b, as shown in Table A3. There

was a significant positive correlation between self-efficacy and WSC ($\tau = 0.251$, $p = 0.004$), indicating that students who exhibited higher self-efficacy also scored higher on the WSC construct. This shows that reduced self-efficacy as a result of reflecting on the WSC questions was likely not a consequence of completing the survey.

5. Limitations and Future Work

While this study provides an initial exploration of measuring savior complex tendencies alongside related psychological constructs in a study-abroad context, several limitations emerged that inform clear directions for future work. These limitations primarily relate to response rate, survey fatigue, participant tracking across phases, potential response biases, and response scale alignment. The primary goals for the next iteration of this survey instrument are to enhance its generalizability, reduce the potential for leading responses, improve response quality, broaden its reach, and substantially increase sample size to strengthen the validity of the findings. Firstly, due to the small sample size, the work presented in this paper should be considered a preliminary deployment of the proposed instrument in a real-world context. In the next iteration, we plan to perform a rigorous assessment of validity by recruiting 230 participants in alignment with the rule of thumb of 10 respondents per survey question [46]. We will also make efforts to increase the response rate by including compensation and incentives [47], refining question sequencing, varying question formats, improving the user interface, aligning survey deadlines with course schedules, and reassessing block composition to reduce cognitive load while preserving data quality.

Another key limitation of the current study is its reliance on self-reported survey data. While self-assessment instruments are widely used and valuable for capturing perceptions, beliefs, and internal states, they are inherently limited by factors such as social desirability bias [48], self-awareness, and participants' ability to accurately reflect on their own development. In future iterations, survey responses should be supplemented with additional qualitative artifacts, such as prompted reflection essays; structured written, audio, or video narratives; and ethnographic observations when feasible. These complementary data sources will enable a more nuanced view of transitions in student perspectives and positionalities that may not be fully captured through survey responses alone.

Based on the evidence of validity discussed in section 4, we have identified several areas of focus for the next round of survey deployment. There were four items (1, 8, 11, & 23) that were not significantly correlated to any of the related constructs (cultural intelligence, empathy, or culture shock), self-efficacy, or course outcomes. Of these four items, item 8 was also recommended for removal to increase internal consistency. In our future work, we will pay particular attention to these items, along with items 3, 4, 9, 12, 13, 16, 20, 21, and 22 due to conflicts between expected and actual directions of correlation. Future work will involve collaboration with sociologists and social psychologists to further revise item wording and structure to reduce the extent to which savior complex items are leading or suggestive. Multiple rounds of pilot testing and cognitive interviews will be conducted to ensure that items are interpreted consistently and do not elicit social desirability bias.

6. Conclusion

This paper presents an initial step toward measuring the savior complex using a concrete and practical survey tool. This tool provides a foundation for future quantitative research on the subject, which will benefit both engineering education and community-based project outcomes. Our ultimate goal is to produce an open-source survey instrument that can be implemented in any relevant coursework for research or educational purposes. This paper demonstrated how the Standards for Educational and Psychological Testing [30] might be used to assess validity evidence in future deployments of the instrument. One preliminary finding was that students who reported higher self-efficacy also exhibited higher levels of WSC, indicating that self-reflection resulting from participating in the survey likely did not negatively impact student self-efficacy. Future data collection should explore evidence of consequential validity further by assessing long-term project outcomes and centering the experience of community stakeholders.

Researchers remain optimistic that “white saviors” can change through accountability and critical reflection [49]. We believe that quantifying and tracking the evolution of savior complex in an individual or group over time can act as a driver for reflection, similar to how activating awareness of implicit bias can help mitigate future instances of bias [50]. Surveys similar to the one proposed in this paper can also enable relatively quick and simple formative assessment for instructors to monitor course objectives. By implementing a tool such as this one in their classroom, educators can track how student perspectives shift and evolve over time, allowing them to develop course content accordingly. We encourage other researchers and educators to use the proposed instrument as a starting point for their own work as we work toward an instrument that has been validated across various contexts.

References

- [1] G. Rulifson, C. J. McClelland, and L. A. Battalora, "Project-based Learning as a Vehicle for Social Responsibility and Social Justice in Engineering Education," presented at the 2018 ASEE Annual Conference & Exposition, Jun. 2018. Accessed: Jun. 11, 2025. [Online]. Available: <https://peer.asee.org/project-based-learning-as-a-vehicle-for-social-responsibility-and-social-justice-in-engineering-education>
- [2] A. Bielefeldt, K. Paterson, and C. Swan, "Measuring the Value Added from Service Learning in Project-Based Engineering Education," *International Journal of Engineering Education*, vol. 26, no. 3, pp. 535–546, Jan. 2010.
- [3] A. Mazzurco and S. Daniel, "Socio-technical thinking of students and practitioners in the context of humanitarian engineering," *Journal of Engineering Education*, vol. 109, no. 2, pp. 243–261, 2020, doi: 10.1002/jee.20307.
- [4] C. Mitcham and D. Munoz, *Humanitarian Engineering*. Morgan & Claypool Publishers, 2010.
- [5] D. E. Damian and D. Zowghi, "The impact of stakeholders' geographical distribution on managing requirements in a multi-site organization," in *Proceedings IEEE Joint International Conference on Requirements Engineering*, Sep. 2002, pp. 319–328. doi: 10.1109/ICRE.2002.1048545.
- [6] T. Mattelmäki, K. Vaajakallio, and I. Koskinen, "What Happened to Empathic Design?," *Design Issues*, vol. 30, no. 1, pp. 67–77, Jan. 2014, doi: 10.1162/DESI_a_00249.
- [7] A. W. Johnson, C. L. Bowen, C. C. Cruz, and R. B. Rodrigues, "Ethical issues in mechanical and aerospace engineering," in *The Routledge International Handbook of Engineering Ethics Education*, Routledge, 2025.
- [8] Engineers Without Borders USA, "Power Through Partnership: 2023 Annual Report," 2023. Accessed: Jun. 11, 2025. [Online]. Available: https://ewb-usa.org/files/galleries/EWB_2023AnnualReport_Final-0625.pdf
- [9] L. Thompson, A. Chan, J. Cannon, and J. Lehr, "Deconstructing the White Savior Model through Engineers Without Borders student chapters: an unlikely intervention," presented at the 2022 ASEE Annual Conference & Exposition, Aug. 2022. Accessed: Oct. 10, 2024. [Online]. Available: <https://peer.asee.org/41807>
- [10] C. H. Birzer and J. Hamilton, "Humanitarian engineering education fieldwork and the risk of doing more harm than good," *Australasian Journal of Engineering Education*, vol. 24, no. 2, pp. 51–60, Jul. 2019, doi: 10.1080/22054952.2019.1693123.
- [11] M. Keshavarz, "Violent Compassions: Humanitarian Design and the Politics of Borders," *Design Issues*, vol. 36, no. 4, pp. 20–32, Sep. 2020, doi: 10.1162/desi_a_00611.
- [12] B. A. Aronson, "The White Savior Industrial Complex: A Cultural Studies Analysis of a Teacher Educator, Savior Film, and Future Teachers," *jctp*, vol. 6, no. 3, p. 9270485, 2017, doi: 10.31274/jctp-180810-83.
- [13] R. Bandyopadhyay, "Volunteer tourism and 'The White Man's Burden': globalization of suffering, white savior complex, religion and modernity," *Journal of Sustainable Tourism*, vol. 27, no. 3, pp. 327–343, Mar. 2019, doi: 10.1080/09669582.2019.1578361.
- [14] A. C. Finnegan, "Growing Up White Savors," *Journal of Applied Social Science*, vol. 16, no. 3, pp. 617–636, Sep. 2022, doi: 10.1177/19367244221082023.
- [15] B. Shringarpure, "Africa and the Digital Savior Complex," *Journal of African Cultural Studies*, vol. 32, no. 2, pp. 178–194, Apr. 2020, doi: 10.1080/13696815.2018.1555749.
- [16] T. Fisher, "Challenging the White-Savior Industrial Complex," *TPJ*, vol. 1, no. 2, 2017, doi: 10.15274/tpj.2016.01.02.01.
- [17] A. E. Wood and C. A. Mattson, "Design for the Developing World: Common Pitfalls and How to Avoid Them," *Journal of Mechanical Design*, vol. 138, no. 031101, Jan. 2016, doi: 10.1115/1.4032195.

- [18] A. B. Anderson, "Teach For America and the Dangers of Deficit Thinking", Accessed: May 14, 2025. [Online]. Available: https://www.academia.edu/31760571/Teach_For_America_and_the_Dangers_of_Deficit_Thinking
- [19] J. McCurdy, "The Privileged Guardian Angel: An Examination of White Saviour Complex in Western Media," *PSUR*, vol. 2, no. 1, pp. 23–32, Oct. 2016, doi: 10.29173/psur60.
- [20] J. Flaherty, *No More Heroes: Grassroots Challenges to the Savior Mentality*. AK Press, 2016.
- [21] R. Schwarzer and M. Jerusalem, "General Self-Efficacy Scale." Jan. 09, 2012. doi: 10.1037/t00393-000.
- [22] M. H. Davis, "A Multidimensional Approach to Individual Differences in Empathy," *Journal of Personality and Social Psychology*, vol. 10, pp. 85–103, 1980.
- [23] S. Ang *et al.*, "Cultural Intelligence: Its Measurement and Effects on Cultural Judgment and Decision Making, Cultural Adaptation and Task Performance," *Management and Organization Review*, vol. 3, no. 3, pp. 335–371, Nov. 2007, doi: 10.1111/j.1740-8784.2007.00082.x.
- [24] D. B. Mumford, "The measurement of culture shock," *Social Psychiatry and Psychiatric Epidemiology*, vol. 33, no. 4, pp. 149–154, Mar. 1998, doi: 10.1007/s001270050037.
- [25] L. M. Lozano, E. García-Cueto, and J. Muñiz, "Effect of the number of response categories on the reliability and validity of rating scales.," *Methodology: European Journal of Research Methods for the Behavioral and Social Sciences*, vol. 4, no. 2, pp. 73–79, Jan. 2008, doi: 10.1027/1614-2241.4.2.73.
- [26] J. T. Nadler, R. Weston, and E. C. Voyles, "Stuck in the Middle: The Use and Interpretation of Mid-Points in Items on Questionnaires," *The Journal of General Psychology*, vol. 142, no. 2, pp. 71–89, Apr. 2015, doi: 10.1080/00221309.2014.994590.
- [27] R. Garland, "The Mid-Point on a Rating Scale: Is it Desirable?," *Marketing Bulletin*, vol. 2, pp. 66–70, 1991.
- [28] L. M. Audette, M. S. Hammond, and N. K. Rochester, "Methodological Issues With Coding Participants in Anonymous Psychological Longitudinal Studies," *Educational and Psychological Measurement*, vol. 80, no. 1, pp. 163–185, Feb. 2020, doi: 10.1177/0013164419843576.
- [29] L. Ripper, S. Ciaravino, K. Jones, M. C. D. Jaime, and E. Miller, "Use of a Respondent-Generated Personal Code for Matching Anonymous Adolescent Surveys in Longitudinal Studies," *Journal of Adolescent Health*, vol. 60, no. 6, pp. 751–753, Jun. 2017, doi: 10.1016/j.jadohealth.2017.01.003.
- [30] American Educational Research Association, American Psychological Association, and National Council on Measurement in Education, *Standards for Educational & Psychological Testing*. Washington, DC: American Educational Research Association, 2014. [Online]. Available: <https://www.era.net/publications/books/standards-for-educational-psychological-testing-2014-edition>
- [31] T. S. Henderson, A. Godwin, and A. R. Carberry, "Supporting fair use in context of instruments in engineering education research: A renewed conversation about validity," *Journal of Engineering Education*, vol. 115, no. 1, p. e70041, 2026, doi: 10.1002/jee.70041.
- [32] S. Messick, "Validity of psychological assessment: Validation of inferences from persons' responses and performances as scientific inquiry into score meaning," *American Psychologist*, vol. 50, no. 9, pp. 741–749, 1995, doi: 10.1037/0003-066X.50.9.741.
- [33] J. D. Abbey and M. G. Meloy, "Attention by design: Using attention checks to detect inattentive respondents and improve data quality," *Journal of Operations Management*, vol. 53–56, pp. 63–70, Nov. 2017, doi: 10.1016/j.jom.2017.06.001.
- [34] B. Toner, "The impact of agreement bias on the ranking of questionnaire response," *The Journal of Social Psychology*, vol. 127, no. 2, pp. 221–222, 1987, doi: 10.1080/00224545.1987.9713684.
- [35] S. Sivo, J. Katt, A. N. Miller, and O. Edwards, "Enhancing source credibility measurement: addressing reverse-coded item bias," *Educational Research and Evaluation*, vol. 30, no. 7–8, pp. 623–643, Nov. 2025, doi: 10.1080/13803611.2025.2504006.
- [36] J. R. Santos, "Cronbach's Alpha: A Tool for Assessing the Reliability of Scales," *The Journal of Extension*, vol. 37, no. 2, Apr. 1999, [Online]. Available: <https://open.clemson.edu/joe/vol37/iss2/15>

- [37] M. A. Godil, J. Deboer, and D. B. Radhakrishnan, "How Do Engineering Attitudes of Learners Who Are Displaced Change after Exposure to a Relevant and Localized Engineering Curriculum?," presented at the 2023 ASEE Annual Conference & Exposition, Jun. 2023. Accessed: Jan. 07, 2026. [Online]. Available: <https://peer.asee.org/43359>
- [38] N. C. T. V. Tyne, T. M. Chowdhury, D. Kim, J. D. O. Álvarez, and M. Soledad, "Believing the Results: Validation of the Tuckman Team Development Questionnaire for Use with Engineering Student Design Teams," presented at the 2023 ASEE Annual Conference & Exposition, Jun. 2023. Accessed: Jan. 07, 2026. [Online]. Available: <https://peer.asee.org/42357>
- [39] B. Pederson, M. Reith, D. Long, R. A. Gera, E. D. White, and J. Zemmer, "A Standardized Methodology for Evaluating a Digital Badging System," presented at the 2025 ASEE Annual Conference & Exposition, Jun. 2025. Accessed: Jan. 07, 2026. [Online]. Available: <https://peer.asee.org/55396>
- [40] M. Tavakol and R. Dennick, "Making sense of Cronbach's alpha," *Int J Med Educ*, vol. 2, pp. 53–55, Jun. 2011, doi: 10.5116/ijme.4dfb.8dfd.
- [41] E. Hultman and F. Lanevik, "Hero Holiday : Swedish voluntourism and The White Savior Complex," 2020. Accessed: Jan. 07, 2026. [Online]. Available: <https://urn.kb.se/resolve?urn=urn:nbn:se:hj:diva-49412>
- [42] N. R. Gadomski, "Beyond the Savior Complex: Narratives of White Teachers Who Prefer Working with Diverse Classrooms," Ed.D., Aurora University, United States -- Illinois, 2019. Accessed: Jan. 07, 2026. [Online]. Available: <https://www.proquest.com/docview/2385258076/abstract/3C1EE0A526D4411PQ/1>
- [43] A. O. Surma-Aho, T. A. Björklund, and K. Holtta-Otto, "Assessing the Development of Empathy and Innovation Attitudes in a Project-based Engineering Design Course," in *Proceedings of the 2018 ASEE Annual Conference & Exposition*, Jun. 2018. Accessed: Aug. 26, 2024. [Online]. Available: <https://peer.asee.org/29826>
- [44] C. H. Birzer and J. Hamilton, "Humanitarian engineering education fieldwork and the risk of doing more harm than good," *Australasian Journal of Engineering Education*, vol. 24, no. 2, pp. 51–60, Jul. 2019, doi: 10.1080/22054952.2019.1693123.
- [45] J. L. Hess, N. D. Fila, E. Kim, and S. Purzer, "Measuring Empathy for Users in Engineering Design," *International Journal of Engineering Education*, vol. 37, no. 3, pp. 733–743, 2021.
- [46] G. O. Boateng, T. B. Neilands, E. A. Frongillo, H. R. Melgar-Quinonez, and S. L. Young, "Best Practices for Developing and Validating Scales for Health, Social, and Behavioral Research: A Primer," *Front. Public Health*, vol. 6, Jun. 2018, doi: 10.3389/fpubh.2018.00149.
- [47] O. K. U. Elisha-Wigwe and A. M. Schauer, "Researchers Better Have My Money: Compensation Practices in Design Theory and Methodology Human Subjects Research," presented at the ASME 2025 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference, American Society of Mechanical Engineers Digital Collection, Oct. 2025. doi: 10.1115/DETC2025-168019.
- [48] A. Durmaz, İ. Dursun, and E. T. Kabadayi, "Mitigating the Effects of Social Desirability Bias in Self-Report Surveys: Classical and New Techniques," in *Applied Social Science Approaches to Mixed Methods Research*, IGI Global Scientific Publishing, 2020, pp. 146–185. doi: 10.4018/978-1-7998-1025-4.ch007.
- [49] A. C. Finnegan, "Growing Up White Saviors," *Journal of Applied Social Science*, vol. 16, no. 3, pp. 617–636, Sep. 2022, doi: 10.1177/19367244221082023.
- [50] P. Kalra and M. Boukes, "Curbing Journalistic Gender Bias: How Activating Awareness of Gender Bias in Indian Journalists Affects Their Reporting," *Journalism Practice*, vol. 15, no. 5, pp. 651–668, May 2021, doi: 10.1080/17512786.2020.1755344.
- [51] Sean Bex and Stef Craps, "Humanitarianism, Testimony, and the White Savior Industrial Complex: What Is the What versus Kony 2012," *Cultural Critique*, vol. 92, p. 32, 2016, doi: 10.5749/culturalcritique.92.2016.0032.

Appendix

Table A1. Thematic groupings and relationship to existing literature for WSC items

Conceptual Theme	Description	Survey Questions
Structural Awareness and Understanding of Root Causes	Awareness of upstream historical, political, or systemic factors contributing to present conditions; whether participants have interrogated "why things are so" beyond surface-level symptoms [12], [13], [14]	[2] I have spent time doing research into the major contributors that have led to the problems I am trying to solve. (–)
Self-Positioning and Perceived Role	How participants position themselves relative to the community; assumptions of authority, competence and moral responsibility [12], [14], [16]	[3] My work in this community would not adversely impact their progress.
		[7] I believe that my presence in this community will enable them to improve their present living conditions.
		[8] I feel a sense of responsibility to help the people in this community
		[9] I believe that I know how to solve these problems.
		[23] I see myself as a potentially stable positive influence in the community.
Motivations for Participation & Meaning-Making	Motivations tied to purpose, identity, novelty, trendiness, "coolness," or moral self-meaning; framing participation as a mission or pathway to significance [13], [14], [51]	[4] I believe that this program is an avenue to be a part of something much bigger than myself.
		[5] I believe that by going on this program, I am depriving myself of certain pleasures.
		[6] I think I will forever remember the impact the community and its members have on me.
		[20] I signed up for this trip because it sounded like a really cool travel opportunity.
		[21] This is a more impactful way to spend my summer compared to interning.
		[22] I believe that being on this trip makes me a more interesting and unique person.

Perception of Community Capacity & Agency	Beliefs about whether community members can identify needs, contribute expertise, and co-lead solutions; whether local voice is treated as central vs secondary [12], [15], [16], [18]	[16] I believe that the community members are capable of providing these solutions for themselves. (–)
		[18] I believe that the opinions and inputs of the community members are important at all stages of the project. (–)
Expectation of Impact & Change	Anticipated effectiveness, scale, permanence, and ripple effects of one's intervention [12], [13], [19]	[1] I believe that what I am doing here has the potential to change the lives of the people in the community.
		[10] I believe that my initial ideas to impact this community would be successful.
		[11] I believe that solving this issue would lead to more issues being solved in this community.
		[13] I believe that once this project is complete, the issue I am trying to solve in this community will be solved for the long term.
Responses to Feedback, Recognition & Accountability	Comfort with critique, lack of adoption, expectations of recognition, and prioritization of institutional versus community validation [12], [14]	[12] Feedback from my UT supervisor/professor/TA holds more impact or significance than feedback from the members of the community
		[14] If the community does not adopt my product/process/solution/ideas, I would be okay with it. (–)
		[15] If the community does not adopt my product/process/solution/ideas, they would be okay. (–)
		[17] I would consider every criticism provided by the members of the community. (–)
		[19] Feedback from my UT supervisor/professor/TA holds more impact or significance than feedback from the members of the community

Table A2. Kendall's Tau-b correlations between WSC and external variables. Top value in each cell is τ_b ; lower value is p . Highlighted cells indicate $p < 0.05$ (green indicates expected direction of correlation; grey indicates unexpected direction)

Question	Cultural Intelligence (Motivational)	Cultural Intelligence (Cognitive)	IRI Perspective Taking	IRI Empathic Concern	Culture Shock
Overall	0.156	0.082	0.075	-0.066	0.077
	0.082	0.347	0.393	0.447	0.528
1	0.169	0.055	0.069	0.140	0.008
	0.098	0.583	0.489	0.158	0.952
2	-0.312	-0.027	-0.253	-0.140	-0.086
	0.002	0.779	0.009	0.147	0.517
3	0.302	0.038	0.173	-0.031	0.179
	0.002	0.690	0.067	0.741	0.168
4	0.231	-0.037	-0.047	0.139	0.081
	0.027	0.716	0.645	0.170	0.563
5	-0.246	0.041	-0.301	-0.265	0.389
	0.010	0.660	0.001	0.005	0.003
6	0.197	0.097	0.059	0.205	0.313
	0.056	0.334	0.559	0.041	0.024
7	0.123	0.038	0.151	0.085	0.065
	0.212	0.693	0.116	0.375	0.625
8	0.147	-0.051	0.032	0.041	-0.036
	0.143	0.603	0.748	0.674	0.790
9	0.281	0.088	0.066	-0.054	0.084
	0.004	0.353	0.490	0.569	0.520
10	0.164	-0.006	0.160	0.125	0.080
	0.099	0.949	0.098	0.197	0.551
11	0.051	-0.027	-0.037	0.011	0.213
	0.614	0.780	0.705	0.908	0.112
12	0.325	0.162	0.158	0.108	-0.020
	0.001	0.096	0.105	0.267	0.883
13	0.248	0.173	0.002	0.107	0.070
	0.010	0.066	0.982	0.253	0.591
14	-0.228	-0.117	0.064	-0.009	-0.166
	0.021	0.221	0.505	0.923	0.209
15	-0.150	0.013	0.107	-0.052	-0.195
	0.131	0.891	0.268	0.590	0.138
16	0.018	-0.260	0.215	0.069	-0.209
	0.852	0.006	0.022	0.464	0.109
17	-0.180	-0.253	-0.045	-0.153	0.277
	0.077	0.011	0.653	0.122	0.043
18	-0.118	-0.121	-0.057	-0.117	-0.061
	0.264	0.240	0.580	0.256	0.674
19	-0.021	0.089	-0.057	-0.122	0.279
	0.835	0.355	0.554	0.202	0.037
20	0.103	0.296	0.076	-0.050	-0.156
	0.308	0.003	0.438	0.610	0.254
21	0.035	0.019	-0.046	-0.194	0.196
	0.725	0.842	0.631	0.042	0.137
22	0.102	0.237	0.078	-0.108	0.050
	0.308	0.015	0.422	0.265	0.710
23	0.106	0.172	0.175	0.059	0.185
	0.294	0.080	0.076	0.547	0.178

Table A3. Kendall's Tau-b correlations between WSC and self-efficacy/course outcomes. Top value in each cell is τ_b ; lower value is p . Highlighted cells indicate $p < 0.05$ (blue indicates positive correlation; orange indicates negative correlation)

Question	Self-Efficacy	Course Outcomes
Overall	0.251 0.004	0.127 0.150
1	0.092 0.358	0.146 0.145
2	-0.223 0.023	-0.335 0.001
3	0.309 0.001	0.160 0.093
4	0.204 0.047	0.394 0.000
5	-0.074 0.437	-0.236 0.012
6	0.095 0.351	0.273 0.007
7	0.267 0.006	0.136 0.162
8	-0.101 0.307	0.057 0.566
9	0.335 0.000	0.348 0.000
10	0.267 0.006	0.127 0.194
11	0.063 0.525	0.076 0.442

Question	Self-Efficacy	Course Outcomes
12	0.390 0.000	0.388 0.000
13	0.308 0.001	0.253 0.008
14	-0.120 0.215	-0.246 0.011
15	-0.078 0.420	-0.238 0.014
16	-0.009 0.924	-0.044 0.642
17	-0.063 0.526	-0.221 0.027
18	-0.089 0.392	-0.263 0.011
19	0.121 0.210	0.042 0.666
20	0.190 0.056	0.141 0.154
21	0.006 0.950	0.110 0.252
22	0.313 0.001	0.159 0.107
23	0.117 0.238	0.179 0.071