

Inspiring Future STEM Professionals: Evaluating the Impact of the #GOALS Live Experience on Middle School Students' Career Interest

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Inspiring Future STEM Professionals: Evaluating the Impact of the #GOALS Live Experience on Middle School Students' Career Interest (Evaluation)

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Abstract

While many high schools have programs that help students define their career path, this is not necessarily the case for middle school. However, middle school is increasingly recognized as a critical period for interventions aimed at preparing students for postsecondary education, including STEM education. Research shows that early exposure to college-related programs significantly influences students' aspirations, academic preparation, and eventual enrollment in higher education [1]-[2]. Programs targeting middle school students capitalize on this developmental stage to instill a college-going culture, particularly for those from underrepresented backgrounds.

The #GOALS (Go Out and Love Science) program, developed by the Ascension Foundation, is a transformative initiative designed to inspire middle school students from underserved communities to pursue careers in healthcare and STEM. The program's broader goal is to address systemic disparities in healthcare by creating a pipeline of diverse talent equipped to meet the needs of an increasingly diverse population [3]. By promoting equity and inclusion in STEM education, #GOALS exemplifies a model for transformative change in preparing the next generation of healthcare professionals.

This study presents the results from the first wave of data collection aimed at evaluating the impact of live #GOALS event using a pre- and post-event survey design. Participants from Nashville and Baltimore completed matched surveys measuring constructs including healthcare career interest, STEM self-efficacy, and perceived relevance of science to real life. Quantitative analysis revealed statistically significant increases in students' career interest and confidence following participation the live #GOALS event. These preliminary findings suggest that the #GOALS live event model offers an authentic and effective approach to early career exploration. The study adds to growing evidence that experiential learning programs can serve as powerful catalysts for fostering STEM motivation and strengthening students' sense of belonging in health-related fields.

Study Context: The #GOALS Program

The #GOALS (Go Out and Love Science) program is a multi-site, middle-school-focused intervention developed by the Ascension Foundation for Health Equity to address long-standing

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inequities in access to healthcare and STEM career pathways among students from underserved communities. Now in its third year, the #GOALS operates through intensive, one-day experiential events hosted at partner institutions, where students engage in hands-on medical simulations, interactive STEM workshops, and structured mentorship with medical trainees and professionals. Grounded in evidence linking workforce diversity to improved healthcare outcomes, the program seeks to build early interest, self-efficacy, and career awareness at a developmental stage increasingly recognized as pivotal for shaping postsecondary aspirations.

An earlier study [4] situates #GOALS program within the broader literature on middle school “pathway to college” interventions, highlighting both the promise and limitations of existing models such as AVID and GEAR UP, which emphasize academic readiness but rarely focus on STEM or healthcare careers. In contrast, #GOALS integrates experiential learning, culturally responsive mentorship, and community-specific content to address local health disparities and systemic barriers to opportunity. Since its inception, the program has reached nearly 2,000 students across multiple U.S. cities, demonstrating scalability through strong cross-sector partnerships with schools, community organizations, and higher education institutions. Recognizing the need for rigorous assessment to support expansion, the Ascension Foundation partnered with the Lucy Family Institute for Data & Society to conduct a comprehensive evaluation study examining the program’s effectiveness in increasing students’ interest in healthcare careers and engagement in STEM. This evaluation framework forms the empirical foundation for subsequent research and program refinement presented in follow-up work.

Theoretical Foundation for the Evaluation Study

This study is grounded in Social Cognitive Career Theory (SCCT) [5] and Eccles’ Expectancy-Value Theory [6]. SCCT posits that individuals’ career development is shaped by self-efficacy beliefs, outcome expectations, and personal goals in interaction with environmental supports and barriers. Expectancy-Value Theory adds that students’ career choices depend on how much they value a career and their belief in succeeding at it. These theories guide the identification of key constructs (e.g., vocational identity [7], self-efficacy [8], motivation [9], growth mindset [10]) and the development of interventions that are both developmentally appropriate and contextually relevant.

This project fills the existing gap in literature by examining how psychological and discursive interventions complement broader programmatic and systemic efforts to reduce inequalities in healthcare career access. Rather than treating awareness and aspiration as the sole entry point, we address the full range of constraints - as conceptualized across four interrelated levels: systemic, policy, programmatic, and individual. This multilevel framework reflects both objective and subjective forces shaping students' life trajectories, described in Figure 1.

The study’s multilevel framework aligns these theories with broader sociological perspectives on structural inequality [11], recognizing that internal dispositions are shaped by – and can respond to – external narratives and systems [12]. While the study employs systemic, policy,

programmatic, and individual dimensions, the majority of evaluation activities will focus on the individual and programmatic levels. This emphasis reflects both the practical scope of the current project and the availability of direct, measurable data related to student engagement, motivation, identity development, and experiences within the #GOALS program. These levels are most immediately influenced by the intervention and offer actionable insights for refining program content, delivery, and educational impact.

The theory of change for this study is being developed as a dynamic, evidence-informed framework that articulates how specific #GOALS interventions lead to desired short-, intermediate-, and long-term outcomes for underserved middle school students exploring healthcare careers. It is being constructed through an iterative process that integrates empirical data, stakeholder input, and established theoretical models from youth development, career psychology, and education equity research.

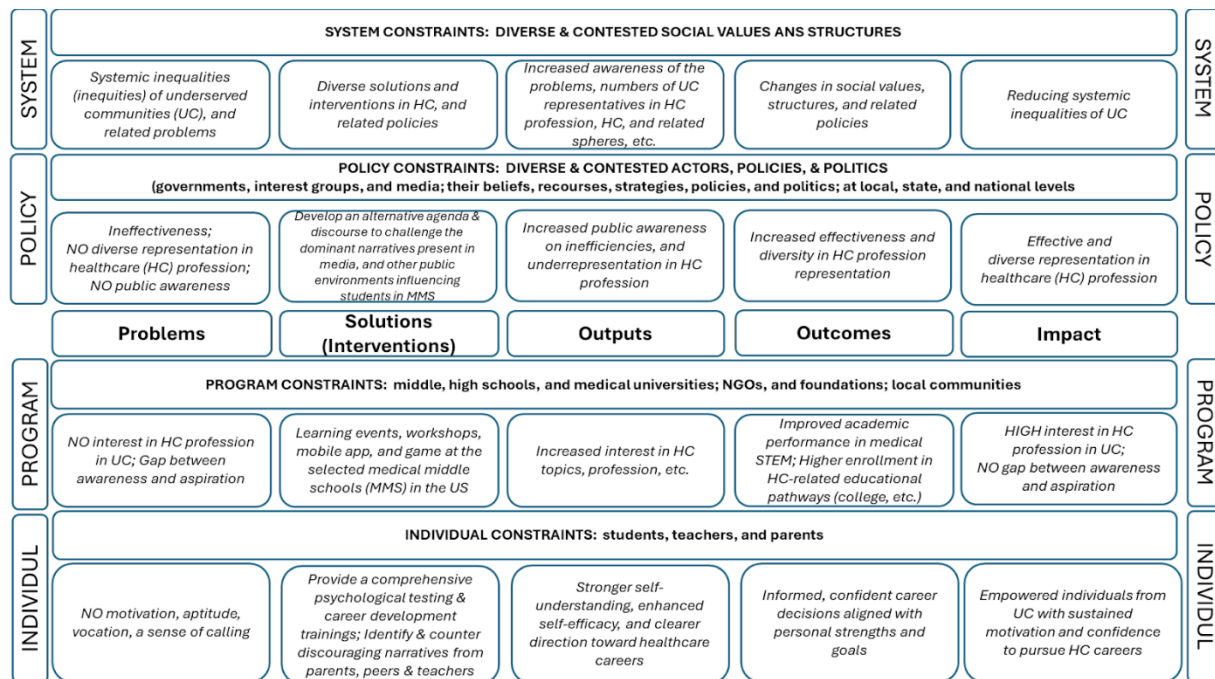


Figure 1. Multilevel Theoretical Framework for Evaluating Students' Life Trajectories

Evaluation Study Design

The overarching goal of this study is to evaluate the long-term impact of the #GOALS program on inspiring underserved middle school students to pursue interests and aspirations related to healthcare careers through a combination of experiential programming and interactive digital tools. The study adopts a longitudinal, data-driven, and scalable evaluation design to examine how participation in #GOALS influences students' educational engagement, confidence, and career-oriented decision-making across key developmental stages.

Methods

There were two different methods of data collection implemented in the study. The first was a quasi-experimental, pre-post evaluation design centered on students' participation in a live #GOALS event. Data collection was structured around matched pre- and post-event surveys administered about two weeks before and two weeks following program participation, allowing for the systematic assessment of short-term changes attributable to the intervention. The choice of time frame accounted for washout (decay) effects, so that children would not remember their responses [12]. The pre-event survey captured baseline measures of students' interest in healthcare and STEM careers, self-efficacy, prior exposure to related fields, and educational aspirations. The post-event survey mirrored these constructs while also assessing students' perceptions of the live #GOALS event, perceived relevance of healthcare careers, and immediate shifts in motivation and confidence.

This design enabled within-subject comparisons, providing a rigorous approach for detecting changes in attitudes and intentions associated with the #GOALS experience while controlling for individual-level heterogeneity. Surveys were administered in a structured, school-coordinated setting to ensure consistency across participants and minimize missing data. The emphasis on pre-post measurement was intentional, as it allowed the study to capture proximal effects of immersive, hands-on programming and mentorship interactions, which are theorized to be critical mechanisms through which #GOALS influences student engagement.

Although the design did not include a randomized control group, the pre-post structure offered a robust and practical framework for evaluating program impact in real-world educational settings. The resulting data provided a foundational empirical basis for subsequent longitudinal analyses, including the integration of follow-up measures and digital engagement data, to assess whether short-term shifts observed after the live event translate into sustained interest and engagement over time.

As an exploratory component of the broader evaluation and a second method of data collection, students were offered to play a custom-built #GOALS game on the Roblox platform. Roblox was chosen as one of the most popular gaming platforms that allows custom game development [14]. The game was designed as an interactive healthcare-themed environment in which students engaged in simulated medical tasks, career exploration activities, and mentorship-based narratives aligned with the goals of the #GOALS program. Core attitudinal and career-interest items paralleled those used in the pre- and post-event surveys but were embedded within gameplay and presented at intervals rather than as a standalone questionnaire.

Access to the game was provided concurrently with survey administration, though gameplay occurred outside formal school hours and at students' discretion. Participation required documented parental consent and school authorization. The game environment was restricted to approved participants, and no external users could access the study space. Data generated through gameplay were de-identified prior to analysis and stored on secure, access-controlled servers in compliance with institutional review board (IRB) and university data governance

standards. Students were eligible for a modest, parent-approved Roblox gift card incentive upon completion of the embedded items, though continued gameplay was not contingent on the reward. Most children played the game for multiple days, and the amount of gameplay became an important control variable used in analyzing survey data.

Samples and Data

Data were collected in two different regions of the country: Nashville and Baltimore. The Nashville sample is drawn from Haynes Middle School, a public middle school in Nashville, Tennessee, and includes students from grades 6 through 8. The Baltimore sample consisted of middle school students recruited from two partner institutions: North Bend Elementary/Middle School and St. Ignatius Academy. These schools were selected in collaboration with local educational stakeholders to reflect the program's focus on engaging students from historically underserved urban communities and to capture variation in institutional context within the same metropolitan area. North Bend Elementary/Middle School serves a predominantly low-income student population and reflects the demographic and structural characteristics common to many public schools in Baltimore, including limited access to sustained STEM enrichment opportunities. In contrast, St. Ignatius Academy is an all-boys middle school with a mission centered on supporting young men from under-resourced backgrounds through rigorous academics, character development, and mentorship. Including both schools allowed the study to examine program engagement across differing school models while maintaining a shared focus on students who face systemic barriers to educational and career pathways in healthcare and STEM. There were students from grades 6-8 in North Bend, and 5-8 in St. Ignatius Academy.

This cross-grade design enables analysis of developmental variation in students' interest, motivation, and emerging vocational identity related to healthcare careers. All students had to provide parental consent and own assent to the study. Students participated in #GOALS programming through school-coordinated recruitment, with every student being provided an opportunity to participate.

The final sample comprises 334 students. 185 of them were from Haynes (73.4% of the school population), 90 – from North Bend (68.7%), and 59 – from St. Ignatius academy (50%). Reasons for not participating included lack of parental consent or absence from school on the data collection day. Nonetheless, students that were missing were missing at random, and the final samples are representative of the school's full enrolment. Out of 334 students, 142 completed both pre-event and post-event questionnaires, and only the matched responses were retained for the analysis.

All students were asked the same set of pre-event and post-event questions, which tapped into career interests - with specific questions about interest in the medical field - alongside measures of self-efficacy, perceived aptitude, and motivation, as well as reflections on students' experiences during the #GOALS event (for the post-event survey). There were 16 pre-event questions and 20 post-event questions, 12 of which were identical to enable direct pre-post

comparisons and assess changes in students' interests, confidence, and attitudes after the intervention. Other questions were evaluating internal consistency reliability, including several items from the scale capturing social desirability bias in responses (Scott, 2008).

Most questions were designed to be measured on a 1-5 Likert scale, where "5" was "yes, absolutely." All questions were carefully worded for age-appropriate reading level. Surveys did not contain any identifiable information except the students' Roblox ID, which was used to link pre- and post-event responses together. All appropriate IRB approvals (from the university and the district school boards) were obtained before data collection.

Analysis

We used paired-sample *t*-tests to evaluate differences in survey questions of interest before and after the #GOALS live event intervention, allowing us to assess within-student changes in career interest, self-efficacy, and motivation attributable to participation in the program. Out of 334 students, 142 completed both pre-event and post-event questionnaires, and only the matched responses were retained for the analysis. We could have treated pre-event and post-event responses as independent samples, but doing so would have ignored the within-student structure of the data and reduced statistical power. By restricting the analysis to matched responses and using paired-sample tests, we were able to control for baseline individual differences and more precisely estimate changes associated with participation in the #GOALS event. This approach provides a more conservative and methodologically appropriate assessment of short-term shifts in students' attitudes and perceptions following the intervention.

Internal Consistency Reliability

Several approaches were used to examine the internal consistency of the survey responses. One illustration is presented in Table 1. All students were offered access to the custom #GOALS game on the Roblox platform, and the post-event survey included a control item asking whether the student had played the game, followed by an optional request to rate it. Table 1 compares students' self-reported gameplay with system-logged activity and summarizes the number of students in each category along with their average game rating.

The results indicate some inconsistencies between recorded gameplay and survey responses. Fifteen students reported playing the game despite no corresponding system record, yet provided an average rating of 3.87. Conversely, fourteen students with documented gameplay reported that they had not played, while still assigning an average rating of 3.57. Among twelve students who correctly reported not playing, an average rating of 4.58 was recorded. These patterns suggest that a subset of responses may reflect misunderstanding of the question, inattention, or response satisficing. Although memory error cannot be ruled out, particularly given the two-week interval between the event and the post-survey, access to the game throughout this period makes memory decay an incomplete explanation. Accordingly, findings that rely on self-reported participation or ratings are interpreted with caution.

Additional consistency checks were conducted using items related to healthcare career interest. Students selected from categorical options (e.g., doctor, nurse, or “medical careers are not for me”) and separately responded to a Likert-scale statement assessing whether they could envision themselves in a medical profession. In the survey data, alignment between categorical choices and Likert responses was weaker than expected, again suggesting some degree of measurement noise.

Table 1: Internal Consistency of Responses to Question “Did you play the #GOALS Roblox game?”

True State	Response	Number of people	Average rating
No	Yes	15	3.87
Yes	No	14	3.57
No	No	12	4.58

By contrast, in the in-game environment, students who selected a medical profession tended to provide correspondingly higher Likert-scale responses regarding future career identification, and related items displayed stronger coherence. While this pattern does not imply that the survey instrument is invalid, it suggests that response context may influence consistency. The game-based format may have facilitated more attentive or contextually grounded responding, though further research is needed to disentangle contextual effects from measurement artifacts.

Results

Table reports average pre-live #GOALS event and post-event responses to a series of attitudinal and motivational items collected via paper-based surveys and in-game surveys embedded within the #GOALS Roblox environment. Across the paper-based surveys, changes from pre- to post-event are generally small and inconsistent, with several items showing little movement over time. For instance, students’ enjoyment of science and confidence in achieving long-term goals remain largely stable, while modest increases are observed for select items related to healthcare pride and perceived social impact. Only one change was statistically significant – the confidence in own ability to help patients in the future. Overall, the paper-based measures suggest limited sensitivity to short-term attitudinal change following the intervention, with lack of internal consistency reliability and high social desirability bias as the likely culprits behind it.

By contrast, the in-game survey data shows larger and more consistent pre- to post-event increases across nearly all items, most of which (except one) are statistically significant ($p < .05$). Substantial gains are observed in students’ confidence in helping patients, solving health-related problems, envisioning themselves in healthcare settings, and recognizing the importance of math and science for their future. Items related to social impact and pride in healthcare training also show notable post-event increases. These patterns indicate that the in-game survey captured clearer shifts in motivation, self-efficacy, and career-related aspirations after the live event.

Findings from the in-game survey (and one question from the paper survey) suggest that the live #GOALS event had a positive effect on students' attitudes toward science and healthcare careers, when measured through the interactive, game-based instrument. While evaluating the validity of the paper survey vis-à-vis in-game data collection is not the purpose of this paper, the stronger and more coherent changes observed in the in-game data imply that in-game data collection tool might be more reliable than the traditional paper survey.

Table 2. Average responses to survey questions using paper based and in-game surveys

Question	Paper Survey		In-Game Data	
	Pre-Event	Post-Event	Pre-Event	Post-Event
Do you like science?	3.755	3.746	3.966	4.393*
I feel confident I can do well in a job that helps patients.	3.088	3.246*	3.490	4.125*
I feel confident doing experiments or solving health-related problems.	3.294	3.126	3.685	4.040*
Do you believe you can get into college?	4.252	4.269	4.288	4.542*
I would feel proud to tell others I was training for a job in healthcare.	3.378	3.378	3.585	4.080*
Do you believe you can achieve your dreams?	4.378	4.378	3.725	4.381*
I believe someone like me could work in healthcare.	3.155	3.168	3.500	3.846*
I like trying things that are difficult because I learn more.	3.588	3.752	3.636	4.316*
Learning math and science is important for my future.	4.041	4.093	4.204	4.246
I can see myself working in a hospital or clinic someday.	2.351	2.619	3.455	3.930*
Do you think your actions made a difference for people?	3.439	3.697	3.870	4.281*

Note. * $p < 0.05$

This could be due to a variety of reasons, including greater student engagement with the game-based format and a reduced tendency to respond in ways intended to “please the adult.” Unlike paper surveys administered in a classroom or event setting, where students may feel implicit pressure to provide socially desirable or expected answers, the in-game environment situates responses within a familiar, low-stakes context that emphasizes play rather than evaluation. As a result, students may have felt more comfortable expressing genuine interests and attitudes, leading to more internally consistent and differentiated responses. This reduced “please the adult” bias likely contributed to the stronger coherence and sensitivity observed in the in-game data, suggesting that game-embedded measures may better capture authentic student perceptions following the live #GOALS intervention.

Overall, the findings indicate that #GOALS is a promising approach to engaging middle school students in science and healthcare pathways through immersive, experience-based learning. Within the two-week post-event observation window, participants demonstrated measurable short-term shifts in confidence, motivation, and interest in healthcare careers following the live #GOALS event. These results suggest that the intervention can produce immediate attitudinal and perceptual changes aligned with its theory of change.

However, given the limited follow-up period, the present analysis does not permit conclusions regarding the durability of these effects or the program's long-term influence on educational trajectories and career outcomes. While the integration of experiential learning and interactive assessment mechanisms shows methodological promise and supports the feasibility of scalable engagement models, longitudinal data will be necessary to determine whether the observed gains persist over time and translate into sustained academic and vocational commitments in STEM and healthcare fields.

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