

Enhancing Systems Thinking and Community-Based Innovation in Integrated Behavioral Health: A Retrospective Competency Assessment of the NJ Integrated Behavioral Health Summit

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Abstract

Background

Integrated behavioral health (IBH) is increasingly recognized as essential to addressing the behavioral health workforce crisis and fragmented care delivery. As of December 2025, 137 million Americans (40% of the U.S. population) live in federally designated Mental Health Professional Shortage Areas. Despite growing emphasis from organizations such as the the American Medical Association (AMA), the integration of IBH-related Health Systems Science (HSS) competencies lacks universality among medical school curriculum, systems thinking, and community-based innovation into their curricula. The extent to which conference-based educational interventions can build these competencies among interprofessional learners remains underexplored.

Methods

We conducted a cross-sectional study using an anonymous, Rutgers University IRB-approved retrospective pre/post survey administered via Qualtrics immediately following the Summit. The survey assessed six HSS competencies across Systems Thinking and Change Agency domains using a 5-point Likert scale (1 = Not at all capable to 5 = Advanced). Behavioral intent, confidence to pursue change, program relevance, and an open-ended reflection item were also assessed. Paired t-tests and Wilcoxon signed-rank tests were used for pre/post comparisons, with Bonferroni-adjusted significance threshold ($p < 0.0083$) applied for six comparisons. Cohen's d was calculated for effect size. (IRB Protocol No. Pro2026000054. Trial registration: Not applicable.)

Results

Of 37 survey responses received, 28 (75.7%) were complete and included in analysis. The sample was predominantly medical students ($n = 16$, 57.1%) and graduate students ($n = 6$, 21.4%). All six HSS competencies showed statistically significant improvement (all $p < 0.001$, all surviving Bonferroni correction), with large effect sizes ranging from $d = 1.06$ (interdisciplinary collaboration) to $d = 2.05$ (community-based partnerships). The mean pre-post gain across all items was + 1.59 points. Among respondents, 20 of 28 (71.4%) reported intent to make changes in their IBH-related education or professional activities, and 26 of 28 (92.9%) rated the Summit content as relevant to their career goals. Case Competition participants ($n = 9$ of 28, 32.1%) reported a mean impact score of 4.22/5.0.

Conclusions

A single-day virtual interprofessional IBH summit produced significant gains in self-perceived HSS competency and strong behavioral intent among a diverse group of health professions learners. These

findings suggest that conference-based educational interventions can serve as scalable, high-impact complements to longitudinal IBH curricula. Limitations include reliance on self-report, susceptibility of the retrospective pre/post design to response-shift bias, and a predominantly medical student sample at a single institution.

Background

The behavioral health workforce crisis in the United States has reached a critical inflection point. As of December 2025, 137 million Americans, approximately 40% of the total U.S. population ($n = 342.5$ million), lived in federally designated Mental Health Professional Shortage Areas (HPSAs) (1). Integrated behavioral health (IBH), which embeds behavioral health services within primary care and community settings, has emerged as a leading model to improve access, reduce fragmentation, and address disparities in care delivery (2, 3).

Despite this momentum, undergraduate and graduate medical education has been slow to incorporate the Health Systems Science (HSS) competencies necessary for learners to navigate and improve integrated care systems. Gonzalo and colleagues, through the AMA's Accelerating Change in Medical Education (ACE) Consortium, identified a comprehensive HSS curricular framework encompassing systems thinking, change agency, interprofessional collaboration, and population health (4). The Association of American Medical Colleges (AAMC) similarly has called for training that extends beyond clinical knowledge to include systems-level competencies in the context of IBH (5). A scoping review by Landoll et al. found that while primary care behavioral health (PCBH) training was generally well received in the 21 studies identified, the literature lacked formalized curricula, rigorous program evaluation, and faculty development (6). Few institutions offer structured curricular experiences in HSS domains specific to IBH, and fewer still have evaluated their impact on learner competency.

Conference-based educational interventions represent a potentially scalable approach to addressing this gap. Unlike longitudinal curricula, which require sustained institutional commitment and faculty resources, single-day summits and symposia can convene diverse stakeholders, model interprofessional collaboration, and expose learners to systems-level thinking in an intensive format. A recent study by Guariglia and colleagues evaluated an IBH curriculum embedded in a family medicine clerkship, demonstrating significant improvement in IBH knowledge and confidence ($n = 65$, Wilcoxon signed-rank test, median increase from 3 to 4, $p < 0.001$) (7). However, empirical evidence supporting the educational impact of conference-based IBH experiences on HSS competencies specifically remains limited.

The New Jersey Integrated Behavioral Health Summit, held on March 28, 2026, was a virtual, interprofessional conference designed to enhance participants' understanding of IBH systems, community-based partnerships, and healthcare delivery innovation. The Summit featured expert panels, case-based discussions, and a student case competition focused on developing systems-oriented solutions to real-world IBH challenges. This study aimed to evaluate the Summit's impact on

participants' self-perceived HSS competency, behavioral intent to pursue IBH-related activities, and perceived program relevance.

Methods

Study Design and Setting

We conducted a cross-sectional study using an anonymous, retrospective pre/post survey design. This approach, while subject to response-shift bias, has been shown to reduce the pretest overestimation that can occur in traditional pre/post designs when participants lack familiarity with the construct being assessed (8, 9). The study was approved by the Rutgers University Institutional Review Board (Protocol No. Pro2026000054). The setting was the 2026 NJ Integrated Behavioral Health Summit, a virtual conference organized by the Rutgers Robert Wood Johnson Medical School Distinction in Medical Innovation and Entrepreneurship (DIMIE) program with formal faculty support. The Summit was open to undergraduate and graduate students, residents, faculty, healthcare professionals, and community members.

Participants

All registered Summit attendees aged 18 or older were eligible to participate. Recruitment occurred through a research participation invitation shared during the Summit and a follow-up recruitment email sent to all registered attendees. Participation was voluntary, and informed consent was obtained electronically via a sanctioned Qualtrics survey platform; proceeding with the survey indicated consent.

Survey Instrument

The IRB-approved survey instrument was developed by the study team and aligned with the HSS framework described by Gonzalo et al. (4). The instrument consisted of six sections:

- Section 1: Participant Background. Four items assessed current status (e.g., medical student, graduate student, faculty), primary field of study, program year, and case competition participation.
- Section 2: HSS Competency (Retrospective Pre/Post). Six items assessed self-perceived capability across two HSS domains: Systems Thinking (3 items: payment/reimbursement models, workflow/organizational gaps, community-based partnerships) and Change Agency (3 items: proposing feasible solutions, interdisciplinary collaboration, structural/institutional barriers). Each item was rated on a 5-point Likert scale (1 = Not at all capable to 5 = Advanced) for both “BEFORE the Summit” and “NOW (after the Summit).” No missing data were observed on these six items among the 28 complete responses.
- Section 3: Commitment to Change. Three items assessed behavioral intent to pursue IBH-related changes, specific intended actions (select all that apply), and confidence to pursue changes despite

institutional barriers (1–5 scale). This section draws on the Commitment to Change framework used in continuing medical education evaluation (10, 11).

- Section 4: Program Relevance & Value. Two items assessed perceived relevance of Summit content (5-point Likert) and motivation factors for participation (select all that apply).
- Section 5: Open-Ended Reflection. One optional free-text item asked participants to identify their single most valuable takeaway.
- Section 6: Case Competition Item. One Likert item (displayed only to Case Competition participants via skip logic) assessed perceived impact on ability to analyze IBH challenges and develop systems-oriented solutions.

Data Collection

The survey was administered electronically via Rutgers Qualtrics. An anonymous survey link was shared in the Zoom chat at the conclusion of the Summit and distributed via email to all registered attendees. The survey was designed to take approximately 5 to 10 minutes. No identifying information (name, email, IP address) was collected. Responses were downloaded to a password-protected file accessible only to study staff.

Statistical Analysis

Descriptive statistics (means, standard deviations, frequencies, percentages) were calculated for all items. For the six retrospective pre/post HSS competency items, paired t-tests were used to compare pre- and post-Summit means, with Wilcoxon signed-rank tests as a non-parametric alternative given the ordinal nature of Likert data. A Bonferroni-adjusted significance threshold of $p < 0.0083$ ($0.05/6$) was applied to account for six simultaneous comparisons; all comparisons remained significant well below this threshold. Cohen's d was calculated as the mean difference divided by the standard deviation of the difference scores, interpreted using conventional thresholds (small = 0.2, medium = 0.5, large = 0.8) (12). Only complete responses (Finished = 1) were included in the analysis. Open-ended responses were reviewed for thematic content. All analyses were conducted in Python 3.x using pandas and SciPy.

Results

Participant Characteristics

Of 37 survey responses received, 28 (75.7%) were complete and included in the analysis. Of those who fully completed the survey, the sample was predominantly medical students ($n = 16$, 57.1%), followed by graduate students ($n = 6$, 21.4%), undergraduate students ($n = 2$, 7.1%), residents/fellows ($n = 2$, 7.1%), and community members/other ($n = 2$, 7.1%). The most common primary field was medicine ($n = 16$, 57.1%), followed by biological/health sciences ($n = 5$, 17.9%). Training years were distributed across Year 1 ($n = 5$, 17.9%), Year 2 ($n = 4$, 14.3%), Year 3 ($n = 7$, 25.0%), Year 4 ($n = 6$, 21.4%), and Year 5+ ($n = 2$, 7.1%),

with four respondents (14.3%) identifying as non-trainees (Fig. 1). Nine participants (32.1%) participated in the Case Competition.

[Insert Fig. 1 here]

Pre/Post HSS Competency

All six HSS competency items showed statistically significant improvement from pre- to post-Summit (all $p < 0.001$ on both paired t-tests and Wilcoxon signed-rank tests, all surviving Bonferroni correction at $p < 0.0083$). Effect sizes were uniformly large, ranging from $d = 1.06$ to $d = 2.05$ (Table 1; Fig. 2). The largest gains were observed for community-based partnerships (mean change = + 1.68, $d = 2.05$) and proposing feasible solutions (mean change = + 1.82, $d = 1.67$). The smallest gain, though still significant and large in effect, was interdisciplinary collaboration (mean change = + 1.29, $d = 1.06$), where baseline scores were highest among all items (pre-mean = 2.61). No missing data were present on any of the six competency items among the 28 complete responses.

Table 1
Retrospective Pre/Post HSS Competency Ratings (N = 28)

Competency Domain	Item	Pre Mean (SD)	Post Mean (SD)	Change	t	p	Cohen's d
Systems Thinking	Payment/reimbursement models	2.07 (0.81)	3.64 (0.73)	+ 1.57	-9.04	< 0.001	1.71
Systems Thinking	Workflow/organizational gaps	2.25 (0.84)	3.79 (0.69)	+ 1.54	-7.35	< 0.001	1.39
Systems Thinking	Community-based partnerships	2.25 (0.59)	3.93 (0.66)	+ 1.68	-10.85	< 0.001	2.05
Change Agency	Propose feasible solution	1.96 (0.69)	3.79 (0.83)	+ 1.82	-8.84	< 0.001	1.67
Change Agency	Interdisciplinary collaboration	2.61 (0.83)	3.89 (0.79)	+ 1.29	-5.61	< 0.001	1.06
Change Agency	Structural/institutional barriers	2.46 (0.74)	4.07 (0.72)	+ 1.61	-8.25	< 0.001	1.56
Note. Scale: 1 = Not at all capable, 5 = Advanced. All Wilcoxon signed-rank tests also significant at $p < 0.001$. Bonferroni-adjusted threshold: $p < 0.0083$.							

[Insert Fig. 2 here]

Behavioral Intent and Commitment to Change

Twenty of 28 respondents (71.4%) reported intending to make a change in their education, training, or professional activities related to IBH as a result of their participation in the Summit. Among those intending to change, the most frequently endorsed actions were: engaging in institutional or community-based efforts to improve IBH delivery (n = 13, 65.0%), incorporating IBH concepts into a research or quality-improvement project (n = 11, 55.0%), seeking additional training or coursework related to IBH, policy, or systems science (n = 9, 45.0%), and participating in interdisciplinary or cross-sector IBH initiatives (n = 9, 45.0%) (Fig. 3). Mean confidence to pursue changes despite institutional or structural barriers was 3.60 (SD = 0.82) on a 5-point scale.

[Insert Fig. 3 here]

Program Relevance and Motivation

The mean program relevance score was 4.32 out of 5.0 (SD = 0.61), with 26 of 28 respondents (92.9%) rating the Summit content as relevant to their current or future education, training, or career goals (score of 4 or 5). The most commonly endorsed motivation factors were: interest in healthcare systems, policy, or delivery (n = 20, 71.4%); interest in IBH (n = 18, 64.3%); interest in addressing healthcare disparities (n = 17, 60.7%); opportunity to learn from interdisciplinary speakers (n = 11, 39.3%); case competition participation (n = 10, 35.7%); and mentorship or networking opportunities (n = 7, 25.0%) (Fig. 4).

[Insert Fig. 4 here]

Case Competition

Among the nine Case Competition participants, the mean impact score was 4.22 out of 5.0 (SD = 0.67), with 88.9% (8 of 9) rating 4 or 5 on the statement that participation improved their ability to analyze IBH challenges and develop feasible, systems-oriented solutions. Key post-Summit outcomes across behavioral intent, program relevance, and Case Competition impact are summarized in Fig. 5.

[Insert Fig. 5 here]

Open-Ended Reflections

Seven respondents (25.0%) provided free-text responses. Thematic content centered on three areas: (1) awareness of systemic gaps and structural barriers in behavioral health delivery; (2) appreciation for the interdisciplinary, collaborative nature of the Summit; and (3) recognition of the complexity underlying fragmented care systems. Representative responses included: “Learning the gaps in our health system and how we as clinical providers are able to connect patients to essential services” and “the many complex reasons why the system is broken.”

Discussion

This study demonstrates that a single-day, virtual interprofessional IBH summit can produce statistically significant and practically meaningful gains in self-perceived HSS competency among health

professions learners. The uniformly large effect sizes across all six competency items, combined with high program relevance ratings and strong behavioral intent, suggest that conference-based educational interventions can serve as effective and scalable complements to longitudinal IBH curricula.

The observed gains (mean change = + 1.59 points, Cohen's d range 1.06 to 2.05) are consistent in direction with prior IBH educational evaluations. Guariglia et al. (7) reported statistically significant improvement in IBH knowledge and confidence following a family medicine clerkship curriculum ($n = 65$, median increase from 3 to 4, $p < 0.001$), though their study used medians and Wilcoxon tests rather than effect sizes, precluding direct comparison of magnitude. The concentrated, intensive nature of the Summit format, the diversity of perspectives presented across expert panels, and the active learning opportunities provided by the Case Competition may have contributed to the observed gains. However, the large effect sizes should be interpreted with appropriate caution, as the retrospective pre/post design is susceptible to response-shift bias, in which participants may underestimate their pre-intervention capability after gaining new awareness of a domain's complexity (8, 9). While response-shift can inflate observed effect sizes, it also reflects genuine cognitive restructuring, wherein learners recalibrate their understanding of what competency means in the domain, a process that has educational value in its own right.

The finding that community-based partnerships ($d = 2.05$) and proposing feasible solutions ($d = 1.67$) showed the largest gains is notable (Fig. 6), as these competencies are particularly difficult to teach through didactic instruction alone. The Summit's emphasis on real-world case examples, expert panels featuring community stakeholders, and the Case Competition's focus on developing actionable solutions may have contributed to these gains. The relatively smaller (though still large) effect for interdisciplinary collaboration ($d = 1.06$) may reflect higher baseline competency in this area, as medical students increasingly encounter interprofessional education experiences earlier in their training.

[Insert Fig. 6 here]

The strong behavioral intent observed (20 of 28, 71.4% planning to make changes) aligns with the Commitment to Change model used in continuing medical education evaluation (10, 11). White and colleagues demonstrated that commitment to change instruments are useful tools for assessing congruence between intended behavior change and program objectives, while also documenting unanticipated learning outcomes. The specificity of intended actions in our study, particularly the high endorsement of community-based efforts ($n = 13$, 65.0%) and research/QI integration ($n = 11$, 55.0%), suggests that the Summit's HSS-oriented programming may be particularly effective at motivating systems-level engagement rather than individual clinical skill development alone.

The Case Competition represents an innovative pedagogical approach that merits further study. The high impact ratings (mean = 4.22/5.0) among participants suggest that competitive, team-based problem-solving exercises can effectively develop systems thinking and solution design skills. Future iterations could explore expanding the competition format and evaluating longer-term outcomes.

These findings also carry a practical implication for programs with fewer institutional resources. A full-scale, multi-panel summit with a case competition requires substantial faculty and administrative investment. However, the domains that showed the largest gains here, community-based partnerships ($d = 2.05$) and proposing feasible solutions ($d = 1.67$), were both driven by case-based, discussion-oriented programming rather than large-scale infrastructure. This suggests that smaller institutions or individual clerkships could plausibly adapt the core mechanism (structured exposure to real-world systems problems paired with active, collaborative problem-solving) into a shorter or single-site format without needing to replicate the full summit model, offering a more scalable entry point for building IBH-related HSS competency.

A further methodological consideration concerns instrument validity. The six HSS competency items were developed by the study team and conceptually aligned with the Gonzalo et al. framework (4), but were not subjected to formal psychometric validation, such as content-validity review by external experts, cognitive interviewing with representative respondents, or internal-consistency testing (e.g., Cronbach's alpha), prior to administration. No pilot testing, expert content review, or reliability analysis was conducted on the instrument before the Summit, and this is acknowledged as a limitation of the study. Without established validity and reliability evidence for this specific instrument, the magnitude of observed gains should be interpreted as a first empirical signal rather than a fully validated measure of HSS competency.

Limitations

Several limitations warrant consideration. First, the retrospective pre/post design is susceptible to response-shift bias (8, 9). Relatedly, the 75.7% (28 of 37) survey completion rate among respondents who began the survey may result in a distinct form of self-selection, even separate from the Summit attendance itself; it is not possible to assess whether survey completers differed systematically from non-completers or non-respondents in ways that could inflate observed gains (e.g., more engaged or satisfied attendees being more likely to finish the survey). While Bonferroni correction was applied, the core limitation of self-report remains. Second, all competency measures were self-reported; objective performance assessments would strengthen future evaluations. Third, the sample was predominantly medical students ($n = 16$, 57.1%) at a single institution, which limits generalizability to other learner populations and settings. Fourth, the sample size ($n = 28$) is modest, and total Summit attendance was not captured, precluding calculation of a response rate denominator. Fifth, the study assessed immediate post-event perceptions; longitudinal follow-up would be needed to determine whether competency gains and behavioral intentions persist over time. Sixth, the study lacked a comparison or control group; observed gains may reflect motivated-attendee enthusiasm rather than the Summit's causal effect. Seventh, the six-item HSS competency instrument was developed by the study team and conceptually aligned with an established framework (4) but had not undergone formal psychometric validation (e.g., expert content review, cognitive interviewing, or reliability testing) prior to use; a validated instrument would strengthen confidence in the magnitude of the observed gains. Finally, the survey did

not collect demographic variables such as race/ethnicity, age, or gender identity, which limits the ability to characterize the sample and examine subgroup differences.

Future Directions

Future research should incorporate objective competency measures, longitudinal follow-up to assess the durability of gains and fulfillment of behavioral intentions, and demographic data to enable equity-focused subgroup analyses. Multi-site replication with larger and more diverse samples would strengthen the evidence base for conference-based IBH educational interventions. The development of validated instruments specifically designed to measure HSS competencies in the context of IBH education represents an important area for instrument development. Additionally, qualitative methods such as focus groups could provide richer insight into the mechanisms through which summit-based experiences influence learner development.

Conclusions

The 2026 NJ Integrated Behavioral Health Summit demonstrated significant impact on participants' self-perceived HSS competency, behavioral intent, and perceived program relevance. These findings add to a growing body of evidence supporting conference-based, interprofessional educational interventions as viable strategies for building the systems thinking and change agency competencies needed to advance integrated behavioral health.

While the scale of the behavioral health workforce shortage described at the outset of this paper is national, the present findings are drawn from a single-day, single-institution summit with a modest sample and should be read as an early proof-of-concept rather than evidence generalizable to the broader IBH education landscape. As medical education continues to evolve toward greater inclusion of health systems science content (4), scalable, experiential formats like the IBH Summit offer a promising model for cultivating the next generation of systems-informed healthcare leaders.

Abbreviations

AAMC

Association of American Medical Colleges

ACE

Accelerating Change in Medical Education

AMA

American Medical Association

DIMIE

Distinction in Medical Innovation and Entrepreneurship

HPSA

Health Professional Shortage Area

HSS

Health Systems Science
IBH
Integrated Behavioral Health
IRB
Institutional Review Board
PCBH
Primary Care Behavioral Health
SD
Standard Deviation.

Declarations

Ethics approval and consent to participate

This study was approved by the Rutgers University Institutional Review Board (Protocol No. Pro2026000054). All procedures performed in this study involving human participants were conducted in accordance with the ethical standards of the institutional research committee and with the 1964 Declaration of Helsinki and its later amendments or comparable ethical standards. Informed consent was obtained electronically from all participants via the Qualtrics survey platform prior to participation; proceeding with the survey indicated consent.

Consent for publication

Not applicable. No individual person's data, images, or identifying information are included in this manuscript.

Availability of data and materials

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

DL and CW designed the survey instrument and led data analysis and manuscript preparation. BH and RM contributed to Summit organization and data collection. PFW served as principal investigator, provided study oversight, and was a major contributor to editing the manuscript. All authors read and approved the final manuscript.

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No other parties were involved in study design, data collection, or analysis. Summit staff, IT support, and Middlesex County Government contributed to running the IBH Summit event itself. Claude was used to assist with manuscript formatting and copyediting. All content was reviewed and approved by the authors.

Authors' information

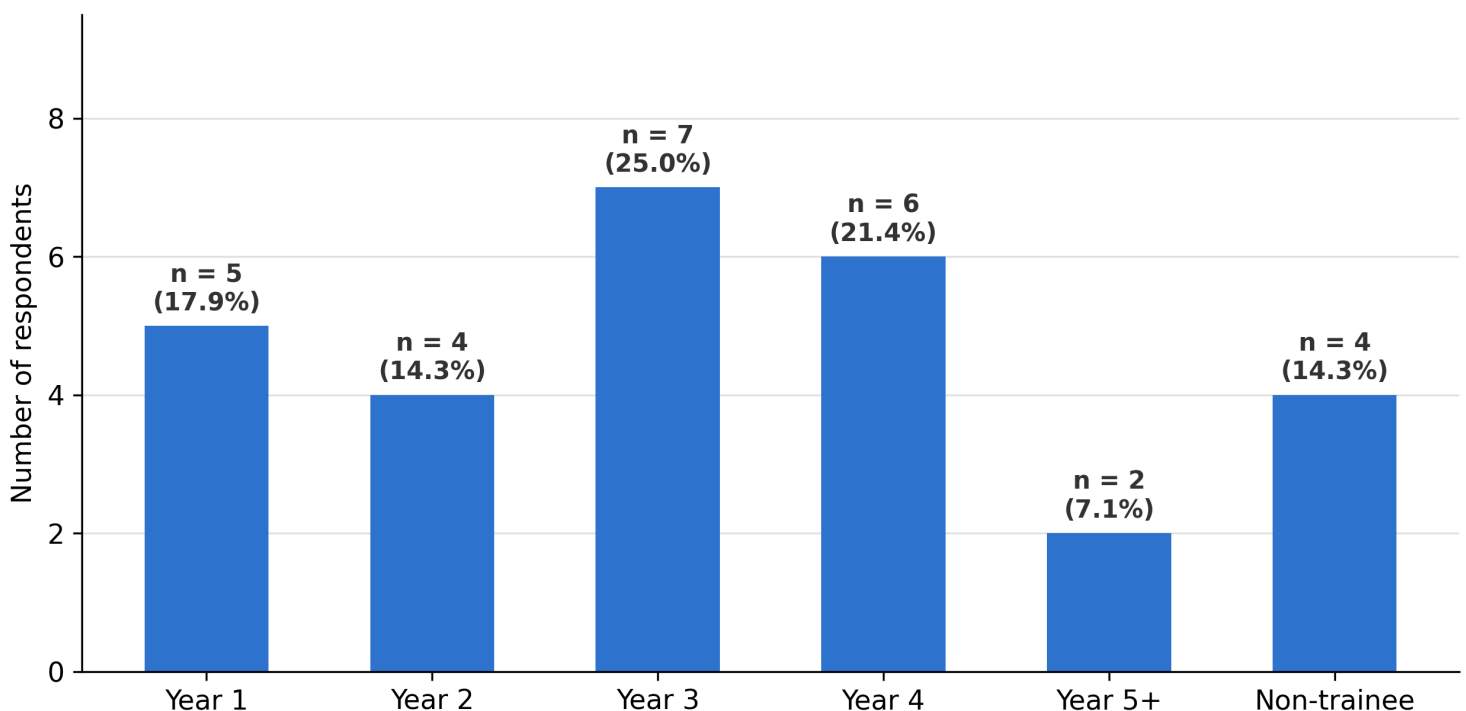
CW and DL are fourth-year medical students at Rutgers Robert Wood Johnson Medical School in New Brunswick, NJ. PFW is the Associate Dean for Continuing Medical Education and an Assistant Professor of Medicine at Rutgers Robert Wood Johnson Medical School and New Jersey Medical School in New Brunswick, NJ. He also serves as the Thread Director of the Health Systems Science (HSS) Undergraduate Medical Education Curriculum at Rutgers Robert Wood Johnson Medical School.

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Figures



N = 28.

Figure 1

Distribution of respondent training year and learner/professional status (N = 28).

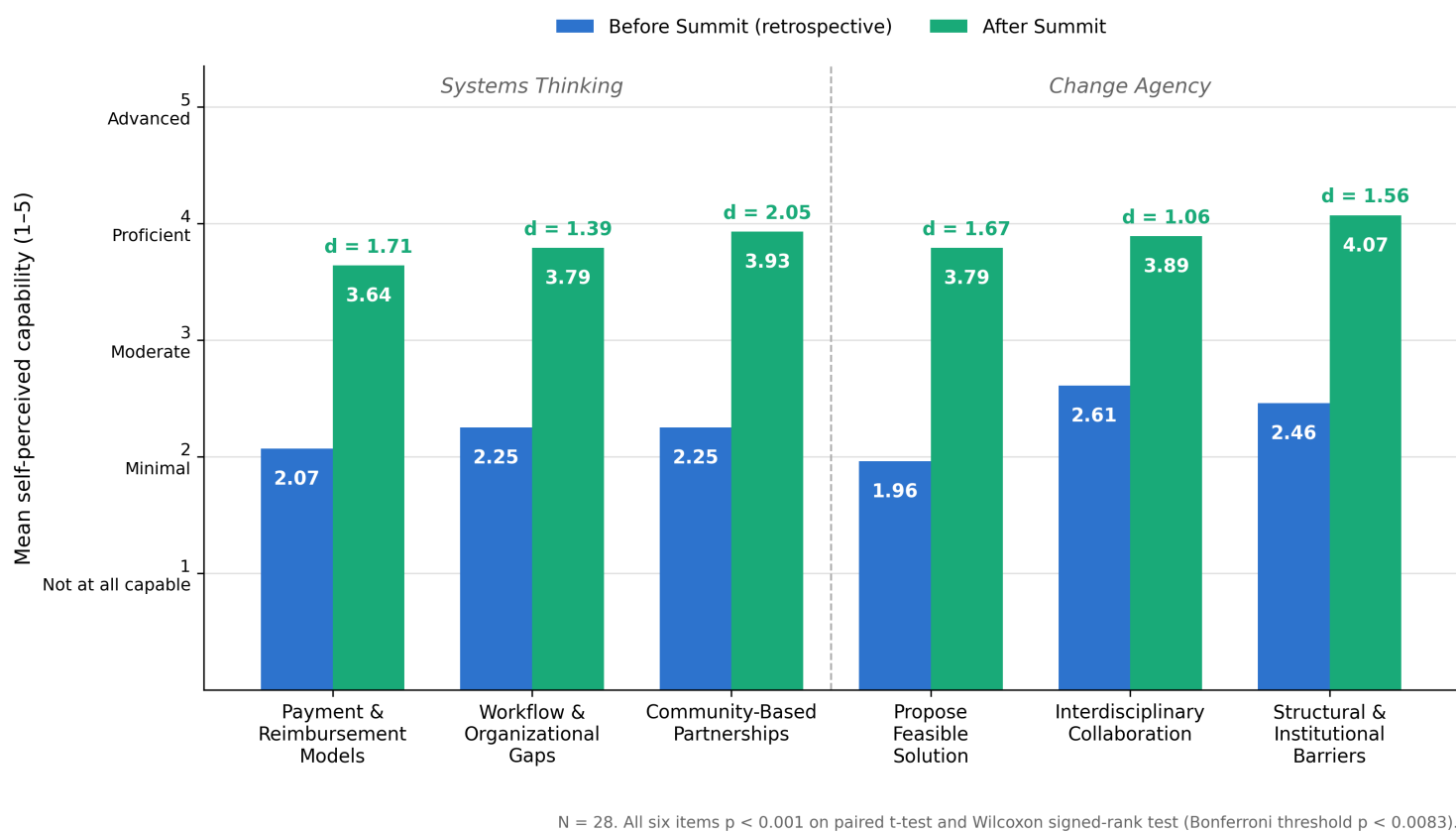
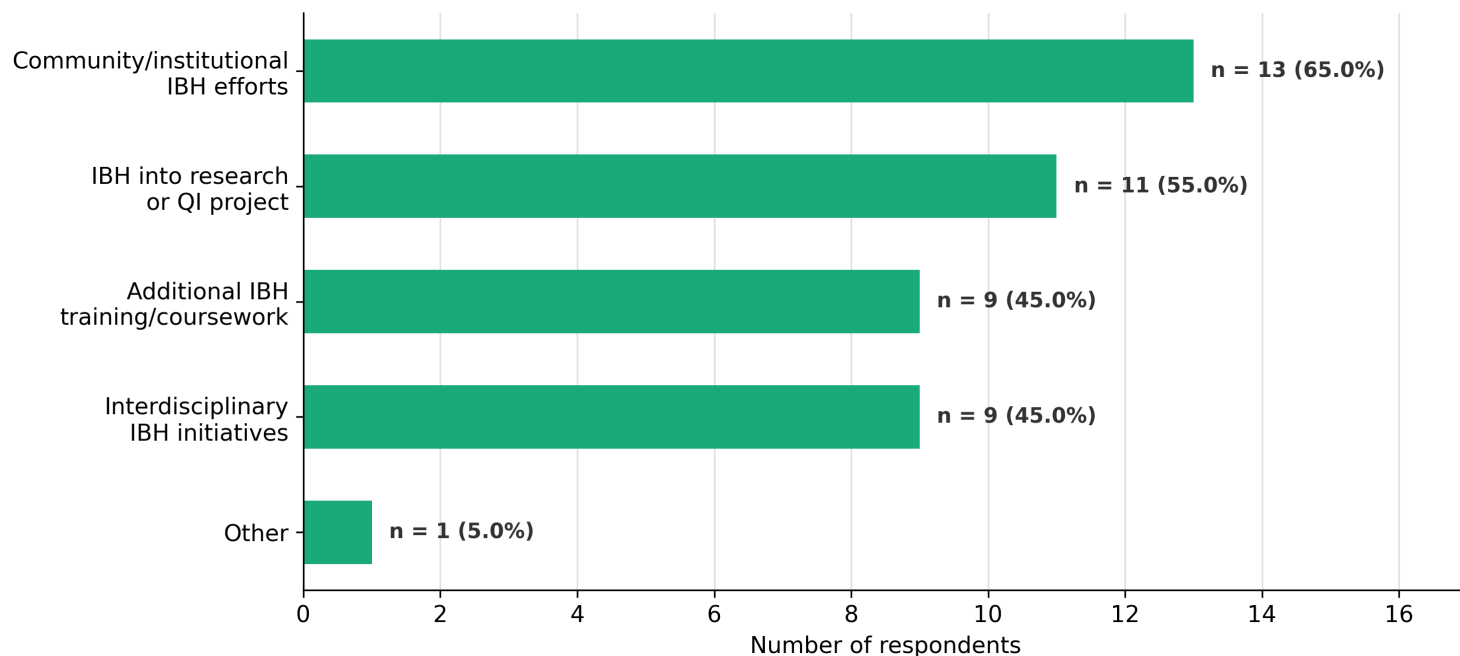


Figure 2

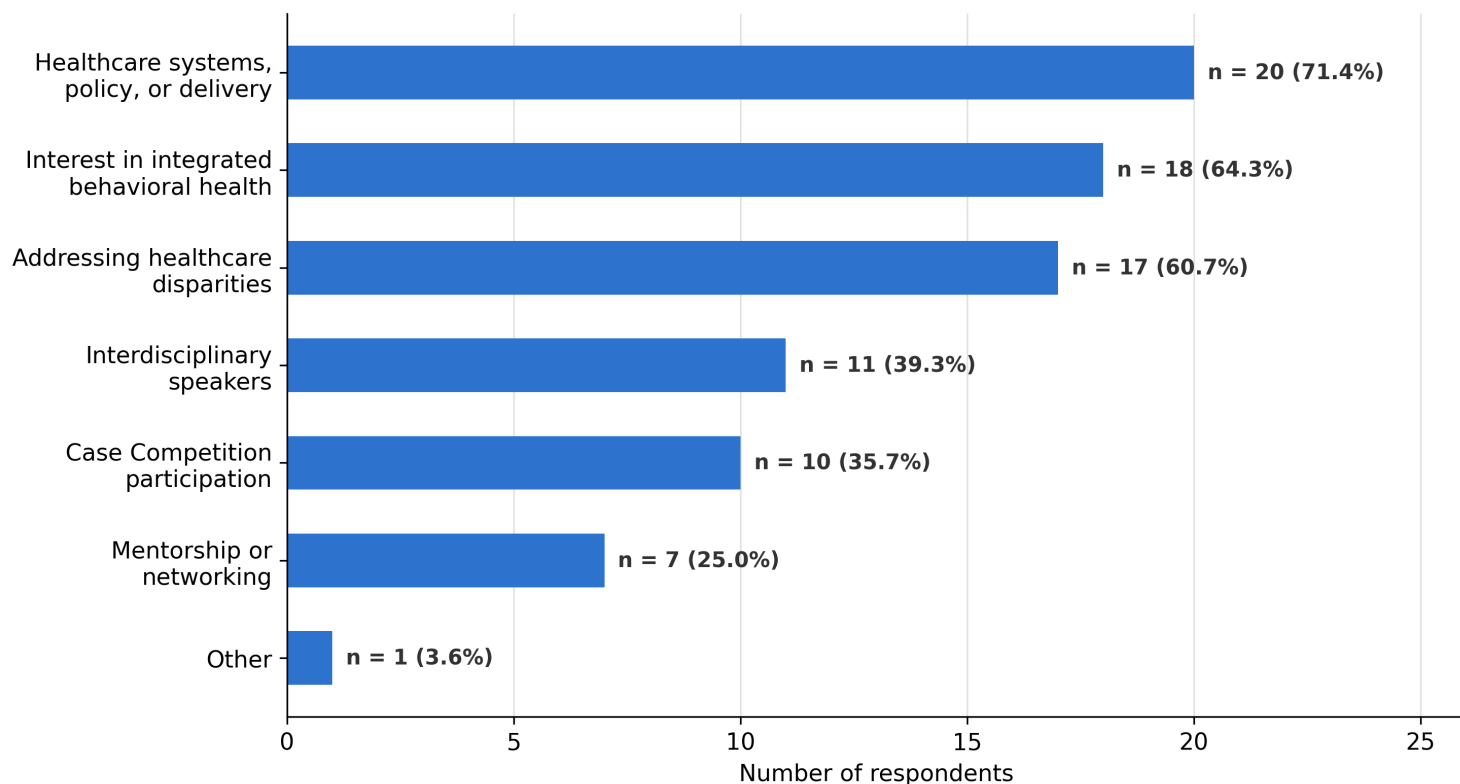
Retrospective pre/post self-perceived Health Systems Science competency ratings across six Integrated Behavioral Health domains (N = 28).



Among respondents intending to change (n = 20 of 28, 71.4%); select all that apply.

Figure 3

Intended IBH-related educational, professional, research, quality-improvement, and community-engagement actions after the Summit (n = 20).



All respondents (N = 28); select all that apply.

Figure 4

Participant motivation factors for attending the NJ Integrated Behavioral Health Summit (N = 28).

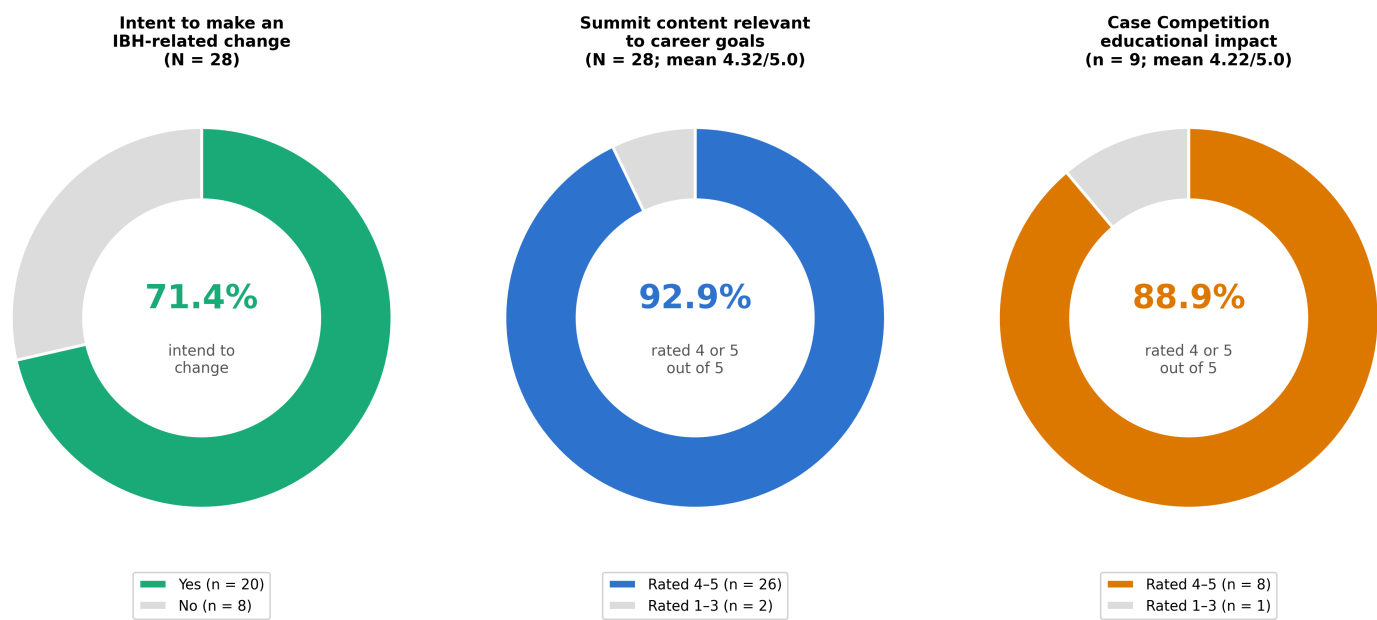


Figure 5

Key post-Summit outcomes: intent to make an IBH-related change (N = 28), perceived relevance of Summit content to career goals (N = 28), and Case Competition educational impact (n = 9).

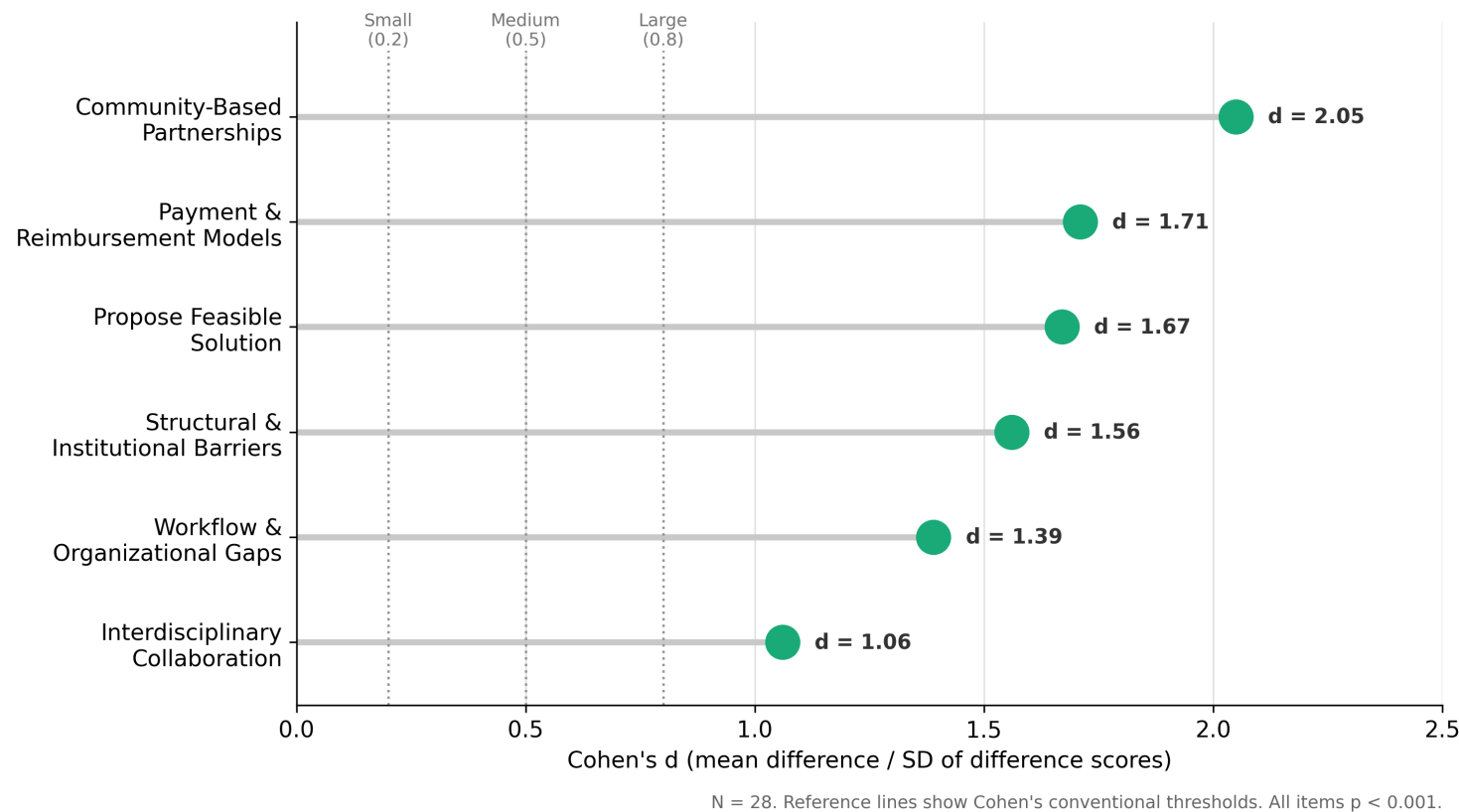


Figure 6

Effect sizes (Cohen's d) for retrospective pre/post HSS competency gains by competency item (N = 28).