

Unlocking Historically Marginalized College Student Success:

Interventions to foster Sense of Belonging and build Metacognition



Key Findings

- Our initial literature review indicates that Black, Latino, Indigenous, and Lower-Income (BLI-LI) postsecondary students graduate at lower rates than their peers, even after controlling for academic preparation or financial disparity. Positive institutional experiences that improve sense of belonging may be a significant factor in success.
- Interventions targeting sense of belonging and metacognition show positive effects for BLI-LI student success, including academic performance and retention.
- Successful interventions incorporate peer interactions, pair instruction with practice or reflection, and build confidence/overcome doubt. More intensive, repeatable interventions yield higher benefits than lightweight one-time interventions.



Background

Despite growing postsecondary education enrollment of students from Black, Latino, Indigenous or low-income backgrounds (BLI-LI), graduation rates remain below those of their White, Asian and middle or higher income peers (Cahalan et al, 2018; PARITII, 2021). After background factors such as academic preparation or financial support are taken into account, graduation rates for BLI-LI students are still lower than their peers, indicating that the institutional experience, including positive academic and social experiences, is a significant factor in success for these students (Engle & Tinto, 2008).

Much of the literature on college success is rooted on Tinto's Model of Institutional Departure (1975), which posits the idea that academic and social integration into an institution of higher education affects college departure decisions (Aljohani, 2016; PARITII, 2021). However, this model has been criticized for not being inclusive of minority experience (Lopez, 2018).

This critique is rooted in the implication that in order to integrate, minority groups must assimilate to the dominant White, middle or upper-class culture. Tierney (1992) suggested that home culture, not assimilation, is a better predictor of student success for underrepresented groups. Other literature emphasizes the impact of home culture, racial climate, perceptions of discrimination, and racial or ethnic identity on student success (Nora & Cabrera, 1996; Museus et al., 2008; Tierney, 1992, 1999).

Two promising areas of research emerged from our literature review. This review of college success literature indicates that student sense of belonging (such as perceptions of peer and faculty interactions, and campus environment) and student metacognitive skills and attributes (such as self-confidence, goal-setting, and study skills) are correlated with student success, especially for BLI-LI students or students identified as at-risk for departure (Engle & Tinto, 2008; Hurtado & Carter, 1997; Hussain & Jones, 2021; Johnson et al., 2007; Lotkowski et al., 2004; Oxendine & Taub, 2021; Strayhorn, 2008; Walton & Cohen, 2007, 2011). Based on this research, we hypothesized that sense of belonging and metacognitive interventions could have outsized impacts on success for BLI-LI students.



Purpose

The intent of this literature review was to identify sense of belonging and metacognitive interventions in postsecondary education that lead to student success among BLI-LI students, and identify overlaps in interventions between the two. Based on these findings, this summary offers practical recommendations for designers and practitioners to implement when developing educational products and services to specifically improve postsecondary success outcomes among this cohort of students. Furthermore, we give detailed solutions that we designed and tested with BLI-LI students over the course of two semesters.

Methods

A comprehensive literature search using Google Scholar and ERIC was used to locate peer-reviewed journal articles published in the United States that focused on sense of belonging and/or metacognition and college students. We retrieved literature through the end of April 2022. Results were only eligible for inclusion in our review if they reported empirical results from an intervention. Intervention studies meeting the following criteria were included:

- ✓ The study came from a peer-reviewed journal and contained correlational data
- ✓ The intervention targeted students attending a college or university
- ✓ The intervention included Black, Latino, Indigenous, and/or students experiencing poverty
- ✓ The intervention that the study presented aimed at directly and/or indirectly manipulating sense of belonging or metacognition
- ✓ The study included a collegiate success outcome variable
- ✓ The study was published in English
- ✓ The study was published between 1980 and 2022



Overview of Findings

Sense of Belonging

Sense of belonging in college settings refers to how students understand their role and their social fit in a college environment and what behaviors they exhibit in response (Hurtado & Carter, 1997).

Having an understanding of sense of belonging allows us to understand what forms of academic and social interaction enhance student affiliation to institutions. Research indicates that a decreased sense of belonging can contribute to race-based disparities in education, and an increased sense of belonging can reduce feelings of marginalization, change emotional states, and improve prospects for success (Hurtado & Carter, 1997; Strayhorn, 2008; Walton & Cohen, 2007).

In the literature review, we found three primary types of sense of belonging interventions for BLI-LI students:

1 Interventions that Normalize Adversity and Doubts:

This most common intervention type aimed to render feelings of adversity and doubt as normal, surmountable, and temporary. These brief (often approximately 1 hour) interventions included exposure to success stories of overcoming adversity from peers, and a reflection exercise. Many, but not all, studies showed an improved sense of belonging; the most consistent student success improvement was seen in cumulative student GPA. This approach appeared most effective for underperforming students; students in non-supportive classroom environments where instructors had a fixed, rather than growth mindset regarding student abilities; and is most effective when paired with other interventions (Binning et al., 2020; Broda et al., 2018; Fink et al., 2020; Hammarlund et al., 2022; LaCosse et al., 2020; Murphy et al., 2020; Stephens et al., 2014; Strayhorn, 2021; Walton & Cohen, 2007, 2011; Weaver et al., 2021; Wolf et al., 2017).



2 Interventions that Validate Belonging from Administration:

This intervention type, found in two studies using the same sample, aimed to improve sense of belonging by emphasizing students as valued members of the college community through early communication from the university administration and a small, university-branded gift. The results showed that while sense of belonging did not improve, the recipients had less rapid decline of this sentiment; belonging also predicted a student's intent to graduate from the university. Long-term data analysis compared this intent data with actual persistence data, and found a positive effect on White students and a neutral effect on Black students (Hausmann et al. 2007; Hausman et al. 2009).

3 Interventions that Promote Classroom Community:

This intervention type aimed to enhance classroom community through active learning and involved restructuring classes or adding a supplemental course to employ teaching strategies such as increased class discussion and peer learning communities. Results showed mixed perceptions of belonging but reduced achievement gaps for BLI-LI students and improved self-efficacy in the course. The proposed driving factors of these improvements stem from higher perceptions of faculty support, collaborative peer learning, and improved classroom comfort (Ballen et al., 2017; Stanich et al., 2018; Wilton et al., 2019).

In summary, the more intensive interventions that took place over the course of a semester had more positive effects on achievement gaps and self-efficacy, though sense of belonging improvements were mixed; questions of scalability of these programs persist. Lighter touch interventions that consisted of a single treatment had some demonstrated impacts on sense of belonging and some aspects of academic performance, but this might not be enough to influence sense of belonging or students' success long-term. Common themes across all three intervention types include peer-to-peer or peer-to-faculty/staff interaction; direct exposure to peer stories plus student reflection; and activities aimed to build confidence in student abilities, or self-efficacy.



Metacognition

Metacognition, or how one thinks about one's own thinking processes, "occurs when learners demonstrate awareness of their cognitive processes and then monitor and analyze those processes" (Conley, 2014). In practice, this means the student is aware of, thinks about, and tries to improve and apply their best learning strategies, skills, and habits. Examples of metacognitive skills include self-assessing strengths and weaknesses; planning and applying strategies for desired outcomes; monitoring progress; and evaluating at the end of a task to determine if goals were met. Research shows that students that employ metacognitive skills in their learning perform better in their classes; given that BLI-LI students have been shown to face challenges regarding academic preparation, financial resources, and additional work and family obligations, we predict that improved metacognitive strategies can help positively counteract these challenges (Engle & Tinto, 2008; Stebleton & Soria, 2013).

Our literature review found that there is limited research tailoring metacognitive interventions to BLI-LI students; however we found two primary types of metacognitive interventions that included BLI-LI students in the sample:

1 Reflection interventions

These interventions primarily consisted of a student completing reflection diaries throughout a course. These diaries included daily surveys and open-ended questions. In the studies reviewed, we found that interventions that only focused on reflection did not relate to improved student success outcomes. Reflection interventions appeared most efficacious when they were paired with some form of direct instruction, similar to the intervention type listed below (Carpenter et al., 2020; Cogliano et al., 2020).



2 Direct instruction interventions

These interventions included direct instruction on metacognitive theory and specific strategies. Interventions were typically ongoing, reiterative, and cyclical in nature. There were three variations of direct instruction that emerged: instruction on metacognition within a specific course; and metacognitive training modules that took place outside of a course, which was the most common type.

Specialized courses on metacognition.

These courses provided direct instruction on strategies and opportunities to apply strategies and received feedback from peers. These interventions appeared to have the most positive impact on graduation rates and GPAs and closed achievement and course completion gaps (Bail et al. 2008; Stanich et al. 2018; Patterson et al., 2014; Tuckman, 2003).

Content area courses with direct metacognition instruction.

Direct instruction on metacognition, paired with practice with feedback, within a content area course (i.e., an introductory biology course) also saw higher performance data and improved use of strategies, though these effects faded unless students received interventions again (Bernacki et al., 2020; Cogliano et al., 2020; Hudesman et al., 2013; Zimmerman et al., 2011).

Metacognitive training modules.

These modules, often designed in three parts to address planning, monitoring, and evaluating, happened outside of regular classroom instruction. These saw increased strategy use but were often not tested for improved academic performance (Biber et al., 2020; Carpenter et al., 2020; Çubukçu, 2008; Grunschel et al., 2018; Rasmussen & Stewart 2018; Saenz et al., 2019).

In particular, learning how to use feedback to inform future efforts and learning to track one's own progress or accurately judge one's own knowledge showed up in every intervention with significant academic impacts.

Overall, interventions that were cyclical or ongoing, incorporated multiple stages of metacognition, and paired instruction with practice or reflection resulted in the most robust positive outcomes. Successful metacognitive interventions shared several key features:

- ✓ Students received instruction
- ✓ Students were given a chance to apply or practice what they learned
- ✓ Students received feedback on their attempts
- ✓ Students reflected and adjusted their approach accordingly

Although BLI-LI students generally did not see greater gains compared to their peers who also received interventions, they did see significant improvements in test scores, GPAs, and graduation rates. One exception to this was a study for a metacognitive specialized course, which found significant gains among Latino and Indigenous students compared to their peers. This is particularly noteworthy as “...Native Americans are the minority within the minority. An intervention that significantly improves retention and graduation rates for the highest group of college dropouts would seem adaptable and generalizable to the larger minority groups” (Patterson et al., 2014, p. 222).

Limitations and future research

Much of the existing literature on models of student success does not take into account emerging fields of study, such as cultural wealth or cultural integrity. These emergent research fields shift the focus of student success interventions in two key ways. The first is shifting from deficit-based to asset-based models of success, which recognize the strengths of BLI-LI students, rather than focusing on their deficits that need to be remediated (Aronson et al., 2002; Gonzales et al., 2015; Mosholder et al., 2016; Museus et al., 2017; Yosso, 2006). The second is institutional changes; in other words, how we can make college fit the student, rather than the student fit the college. Much of this emergent cultural wealth and integrity research is qualitative in nature; not much empirical data or interventions have been identified. Sense of belonging and metacognitive skill interventions in the literature still largely come from a deficit model and places the onus of integration on the student, rather than the institution. This literature review and resulting design recommendations should be updated as new research emerges.

Another limitation is the tendency to generalize BLI-LI students and treat them as a data monolith in the research; this does not account for nuanced differences between racial, ethnic, or income sub-groups or intersectionality for students who belong to multiple groups. Several groups, in particular Indigenous student groups, are underrepresented in the literature. Similarly, factors such as type of institution, generational status, academic status, and commuter versus residential student status need to be considered more fully in the research. Future research should continue to disentangle these various factors and develop targeted interventions that account for the nuances in subgroups and intersectional groups. Finally, the lack of longitudinal studies across both sense of belonging and metacognitive domains, as well as the distinction between light-touch and intensive interventions, highlight the need for further research to assess scalability, transferability, and long-term impacts, especially on specific populations.



Design Recommendations

Three common themes emerged among both sense of belonging and metacognitive interventions that warrant extra attention. The first is peer interactions —there is a link between peer mentoring, learning communities, and peer feedback for both sense of belonging and metacognitive interventions; results indicate that peer interactions are a significant part of the college success stories. The second is the interplay between direct instruction or direct exposure to material and resources, including peer stories of adversity, and repeated application and reflection. Results indicate that pairing instruction with practiced application or reflection, repeated over the course of a semester, have the greatest impact. The last common theme to emerge was building confidence through overcoming adversity. Self-efficacy was a commonly measured concept in many of the studies; we hypothesize that overcoming adversity and doubts about college success leads to improved sense of belonging and self-efficacy, which enables students to be more self aware of areas for growth, understand their own strengths and weaknesses, and improve metacognitive monitoring and evaluation.

Based on this, we recommend that interventions that aim to improve student success through improving sense of belonging and metacognitive skills for BLI-LI students consider incorporating the following design principles. A successful sense of belonging and metacognitive intervention will:

- ✓ Build **self-efficacy** by normalizing adversity and doubt, recognizing student strengths, and focusing on skill development.

- ✓ Be **customizable** to specific needs of unique and intersecting BLI-LI populations and different types of institutions.

- ✓ **Pair instruction and practice.** Include both explicit instruction or exposure to resources, and dedicated reflection or practice to reinforce.

- ✓ **Promote social learning**, such as collaborative learning with peers and mentorship relationships with peers, staff, and faculty.

- ✓ Be **repeatable** over the course of a semester or longer; not just a one-time treatment.

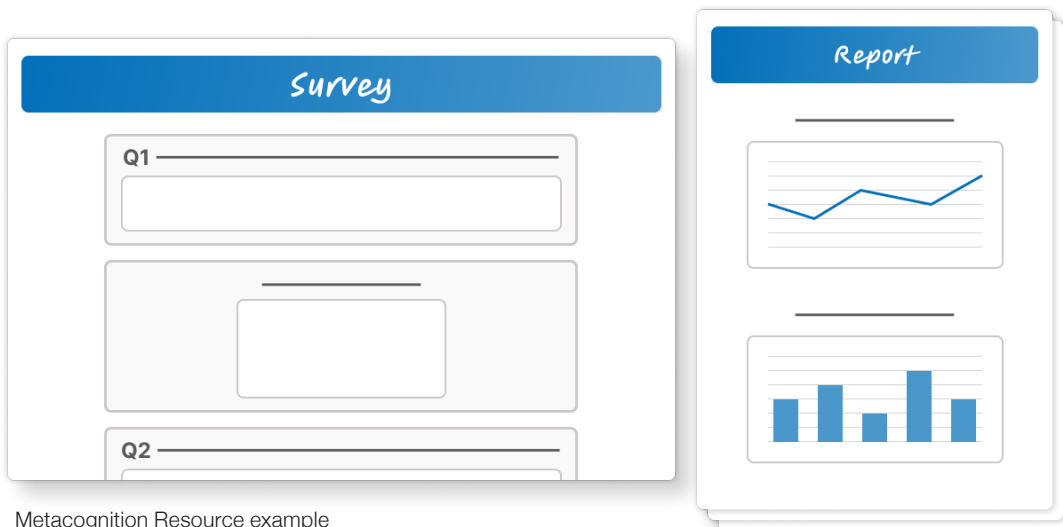


Proposed Solutions

The following solutions are prototypes that were developed with the goal of improving BLI-LI students' sense of belonging and metacognitive skills in first year courses and followed the above design principles. They were co-designed with college students and instructors representing these target audiences and piloted with introductory psychology, sociology, and biology courses.

Metacognition Resource

The metacognition resource gives students the opportunity to improve their metacognitive self-reflection skills by giving them a series of brief, three-question surveys to reflect on their sense of belonging throughout a course. After each question, students are matched with advice from a peer mentor based on their question responses. Instructors receive regular reports on survey results to provide insights on how and when to make adjustments to their course.



Metacognition Resource example

The metacognition resource fulfills the design principles derived from the literature review as follows:

Build self-efficacy

The metacognition resource builds self-efficacy by encouraging students to self-reflect on their sense of belonging and the outside factors that might impact this sentiment, normalizing any adverse feelings of belonging by exposing them to stories of peers who have had similar experiences, and encouraging students to try new tactics to improve the ways they interact with the instructor, their peers, and class material. The language of the questions were carefully crafted to encourage students to reflect on their strengths and contributions, instead of focusing on their deficits.

Customize

The variety of questions and mentor videos are designed to ensure that a student has a unique experience with new advice each time they take a metacognition resource survey, increasing the likelihood that their unique needs will be met in a variety of ways.

Pair instruction and practice

Students receive informal instruction or information about how to improve their sense of belonging from peer mentor videos, then are directed to name what, if any, new ideas they found helpful and if/how they plan to implement them in their own behaviors.

Promote social learning

The metacognition resource encourages collaborative or mentoring peer relationships by asking students to reflect on how they interact with their peers and instructors and provide advice on what they can do to improve these relationships. The instructor-student relationship is also improved by instructor reports. Instructors receive data on how student sentiment is evolving so they can act to improve sentiment in their course in real time.

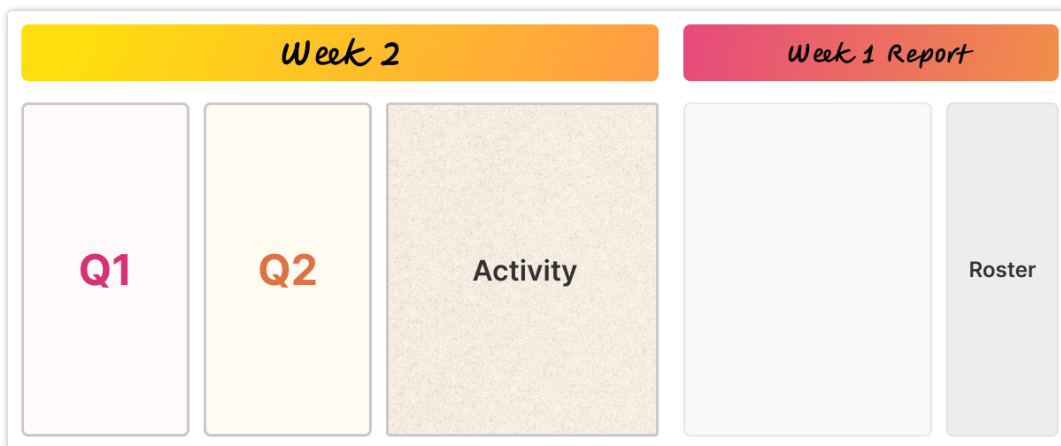
Repeat

The metacognition resource surveys are assigned multiple times throughout the term, with a rotating pool of questions for students to answer so that the experiences feel fresh and engaging for students.



Sense of Belonging Resource

The sense of belonging resource is intended to be a fun, lightweight way for students to learn more about their classmates and build connections with one another based on similar interests or experiences in their lives throughout the term. Each sense of belonging resource activity contains a mixture of get-to-know-you questions and metacognitive questions and a space to share events, ask questions, and give shout-outs to peers. Each activity also contains a report of previous responses as well as rosters and awards for engagement.



Sense of Belonging Resource example

The sense of belonging resource fulfills the design principles derived from the literature review as follows:

Build self-efficacy

The sense of belonging resource builds self-efficacy by incorporating metacognitive questions on a regular basis, which encourages students to reflect on their assets—the strengths and skills they are coming to class with.

Customize

The sense of belonging resource provides basic structure for collaboration activities; beyond that, the page is intended to be a blank canvas for a variety of responses and interactions so that the board becomes customized to the needs and desires of each individual class.

Pair instruction and practice

Students are given generic instructions each week on the purpose and value of contributing to the sense of belonging resource activity. Throughout the term, students are consistently exposed to the ideas and learnings of their classmates and are encouraged to practice and reflect on their learning habits and their peer's responses; this is reflected in reports in which they can review previous sense of belonging resource responses and reflect on what they learned and what they may want to try.

Promote social learning

The rotating features in the sense of belonging resource are intended to encourage social learning. Adding events encourages students to interact with each other at school events or form study groups; anonymous questions give students an opportunity to pose and respond to questions from their peers in a low-stakes environment; and peer shout-outs normalize seeking help from peers and celebrating peer accomplishments.

Repeat

The sense of belonging resource activities are repeated throughout the semester. The questions differ for each activity, but a report of the previous week's responses are provided with each new activity so that students can build upon previous insights. The sense of belonging resource was also designed with gamification elements that give students the ability to earn streaks, or awards for consecutive weeks of participation, to encourage repeat use of the tool.



Conclusion

The proposed solutions of the metacognition resource and the sense of belonging resource are tools instructors can utilize to try to help improve sense of belonging and metacognitive skills among their students, which in turn is hypothesized to improve their academic outcomes. While all design principles from the literature review were used to inform the design of these products, the tools have different strengths and focuses. The metacognition resource is more focused on metacognition skills; its sentiment survey questions are designed to build self-efficacy and pair exposure to resources with practice and reflection. The sense of belonging resource's design focus is improving sense of belonging, with a goal of making social learning both easier to facilitate and more enjoyable.

Both tools are intended to be lightweight enough to be repeatable throughout the semester. This addresses key limitations that were identified in the literature review, namely striking a balance between intensive, semester-long interventions that are more efficacious but harder to scale, and light-touch interventions that are easy to implement but have mixed results when not repeated over an entire term of a course. Throughout the testing phases, we have received specific feedback about how we can make these tools more customizable to unique student populations and institution types.

Finally, the language of the questions embedded in these tools were intentionally written to encourage students to focus on their assets, rather than their deficits. What skills do students arrive at college with that will help them succeed? What can they learn from their peers about how to overcome obstacles in their postsecondary education journey? How can they ask for help from their peers and how can they, in turn, offer help to others based on those strengths they have identified? The metacognition resource and the sense of belonging resource will not fully solve the issues that are derived from deficit-based approaches to improving BLI-LI outcomes, but, with further research, it is possible they are a step in the right direction. Further empirical testing of the impacts of these tools will offer additional insight into the efficacy of these tools on student success.



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