Sense of Belonging, Metacognition and Postsecondary Success for Black, Latino, Indigenous, and Low-Income Students:

A Review of the Literature

Project Overview

Prior research has shown that despite the growing number of college enrollments of students from Black, Latino, Indigenous, or low-income backgrounds (BLI-LI), graduation rates for these populations remain below those of their White and middle-class peers (PARITII, 2021). According to NCES data from 2019, the 4-year postsecondary graduation rate by race/ethnicity was as follows: 45% for White students, 21% for Black students, 23% for Indigenous students, and 32% for Latino students (PARITII, 2021). Similarly, bachelor's degree attainment by age 24 for the lowest family income quartile as defined by the Pell Institute was 11%, compared to 58% of the highest income quartile (Cahalan et al., 2018). BLI-LI students are more likely than their non- BLI-LI peers to enter college with lower levels of academic preparation, receive less financial support from their parents, have unmet financial needs after receiving financial aid, and have work and family obligations while in school (Engle & Tinto, 2008; Stebleton & Soria, 2013). However, even after taking such background factors into account, BLI-LI students are still less likely to persist and go on to graduate, indicating that the institutional experience is also a significant factor in student success (Engle & Tinto, 2008). Therefore, this review focuses on interventions that have been shown to support the unique needs and concerns of this student population.

True equity in postsecondary education requires more than improving college access, but also requires colleges and universities to provide support and remove critical barriers to encourage student success. Student success can be measured by a variety of objective measures

including retention, persistence, enrollment, grade point average (GPA), and graduation rates. We have specifically chosen to focus on persistence and retention as they have been identified as critical early-stage indicators of student success and have become increasingly common ways for colleges and universities to evaluate themselves (Engle & Tinto, 2008).

Much of the literature on college retention is rooted in Tinto's Model of Institutional Departure (1975), which concludes that college departure decisions are caused primarily by a student's lack of integration, both academically and socially, into an institution of higher education (Aljohani, 2016; PARITII, 2021). Tinto's Model has come under criticism in the decades since its publication for not being inclusive of the 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) posited that home culture, rather than integration, is a better predictor of student success, as maintaining identity is an anchor for student success among underrepresented groups. Much of the literature related to BLI-LI student success in the current work is rooted in revisions of Tinto's Model that focus on the impact of home culture, racial climate, perceptions of discrimination, and the importance of racial or ethnic identity in shaping campus experiences and measures of student success (Guiffrida, 2006; Hurtado, 1992; Hurtato et al., 2015; Nora & Cabrera, 1996; Museus et al., 2008; Tierney, 1992, 1999).

Two particularly promising areas of research with regard to promoting postsecondary success are students' sense of belonging and metacognition. A review of the college success and retention literature shows that non-cognitive factors related to sense of belonging (such as peer and faculty interactions, and campus environment) and metacognition (such as self-confidence, goal-setting, and study skills) are correlated with student success, especially for BLI-LI students

(Duran et al., 2020; Engle & Tinto, 2008; Hurtado & Carter, 1997; Hussain & Jones, 2021; Johnson et al., 2007; Laskey & Hetzel, 2011; Lotkowski et al., 2004; Maestas et al., 2007; Museus et al., 2017; Oxendine & Taub, 2021; Strayhorn, 2008; Walton & Cohen, 2007, 2011). Sense of belonging literature places emphasis on marginalized or stigmatized groups at postsecondary institutions, which include the BLI-LI populations, and suggests that improving sense of belonging can have particularly meaningful impacts on these subgroups (Strayhorn, 2008; Walton & Cohen, 2007). While much of the research is not focused specifically on BLI-LI populations, previous metacognition research has shown that increased metacognitive activity among students is correlated with improved performance and retention (Dinsmore et al., 2008; Donker et al., 2014; Ellis et al., 2014; Theobald, 2021). We posit that metacognitive interventions could have outsized benefits for BLI-LI students, as challenges such as low levels of academic preparation, inadequate financial resources, and balancing work, family, and school requirements could lead to reduced guidance for navigating college expectations and reduced study time. Therefore, this review of the literature was undertaken to summarize key findings regarding sense of belonging and metacognitive interventions in a postsecondary setting that lead to student success focusing on BLI-LI students.

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 a clear understanding of students' sense of belonging allows researchers to assess which forms of both social and academic interaction enhance student affiliation with their institutions (Hurtado & Carter, 1997; Strayhorn, 2008). Researchers have also looked into the

relationship between sense of belonging and marginalization, or race-based subordination and feelings of isolation and is exacerbated by an unwelcoming, non-inclusive environment, and stigmatization, or negative characterization of students in a campus environment (Strayhorn, 2008; Walton & Cohen, 2007). Strayhorn (2008) emphasized that this sense of belonging is particularly instrumental for students who report feeling marginalized on campus to adjust to the context of the college environment. An increased sense of belonging can help reduce marginalization (Hurtado & Carter, 1997). Walton and Cohen (2007) argued that sense of belonging is also related to issues of stigmatization; the more stigmatized an individual is within a group, the more they question the quality of their bonds within a group and can exist in a state of belonging uncertainty. They also theorized that belonging uncertainty directly contributes to race-based disparities in academic achievement. They argued that reported sense of belonging is correlated with reported daily adversity levels (as low self-reported daily adversity leads to a higher sense of belonging, and high self-reported daily adversity leads to a lower sense of belonging) and, given that changing emotional states have been shown to predict student outcomes, they theorized that resolving sense of belonging issues through interventions would improve prospects for student success.

Sense of Belonging Interventions

To identify which interventions have a potential impact on sense of belonging of BLI-LI students, we performed a literature search focusing on interventions that were designed to enhance students' sense of belonging. This was primarily measured subjectively via self-report and we focused on BLI-LI students enrolled in a postsecondary institution. We prioritized looking at interventions that also included objective, or direct assessment, and measures of

student success (i.e., course grade, exam grade, cumulative GPA). After a review of the literature within these bounds, we identified three discernible approaches to interventions, each with similar goals and activities. The three identified approaches include normalizing adversity and doubt, establishing students as valued members of the community, and fostering the establishment of a classroom community.

Interventions that normalize adversity and doubt

Multiple studies have demonstrated a correlation between adversity, doubt, and sense of belonging on college campuses (Hurtado & Carter, 1997; Hussain & Jones, 2019; Johnson et al., 2007; Walton & Cohen, 2007, 2011). Sense of belonging interventions that normalize adversity or doubt most commonly includes some element of exposure and camaraderie – that is, a situation in which students are exposed to a narrative or description of other students' experiences with doubts of belonging (What Works Clearinghouse, 2022). The goal of these interventions is to render feelings of adversity not only normative but also temporary and surmountable over time (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).

These interventions were similar in structure and delivery; most were presented close to the beginning of a student's first semester, they were often presented as a series of narratives such as a video testimonial or a series of quotes from upper class peers, followed by an opportunity for students to reflect upon their own experiences and future potential as an essay or a personal testimonial, and often took under an hour to complete (What Works Clearinghouse, 2022). Narratives generally included the experiences of upper class students of similar racial and ethnic backgrounds, in which they detailed their academic and social challenges upon campus

arrival, as well as their experience overcoming these challenges. Types of narratives ranged from written stories or testimonials (Binning et al., 2020; Fink et al., 2020; Murphy et al., 2020), survey results and quotes (Broda et al., 2018; Hammarlund et al., 2022; LaCosse et al. 2020, Weaver et al., 2021), videos (Wolf et al., 2017; Strayhorn, 2021), and panel discussions (Stephens et al., 2014). Examples of challenges that were discussed in these narratives included issues stemming from leaving home (Broda et al., 2018), feeling intimidated by instructors (Weaver et al., 2021), and feelings of uncertainty and doubt regarding academic preparedness and social fit (Wolf et al., 2017). These narratives often also included methods for overcoming these challenges, including coping strategies (Murphy et al., 2020) and help-seeking behaviors (Strayhorn, 2021), how initial fears and feelings of uncertainty faded over time (Weaver et al., 2021), and reframing potentially stigmatizing racial, ethnic or cultural differences of BLI-LI students - in other words, helping students identify that their backgrounds are not just a source of challenge (a first-generation student has to overcome multiple obstacles to attend college), but also strength (learning how to overcome these obstacles have given first-generation students skills to handle the rigor of a college learning experience) (Stephens et al., 2014). After receiving the narrative, students were prompted to react through a reflective exercise. These exercises included reflective essays or writing prompts (Binning et al., 2020; Broda et al., 2018; Fink et al., 2020; LaCosse et al., 2020), preparing messages on what they learned for future students to watch (Stephens et al., 2014; Walton & Cohen 2011; Weaver et al., 2021), and engaging in group discussions (Binning et al., 2020; Hammarlund et al., 2022; Wolf et al., 2017).

Studies implementing interventions normalizing adversity have demonstrated significant impact on various measures of success in students that represent the BLI-LI population (Binning et al., 2020; Hammarlund et al., 2022; LaCosse et al., 2020; Murphy et al., 2020; Walton &

Cohen, 2011; Wolf et al., 2017). The most frequently used outcome measure of student success among these interventions was cumulative GPA; other measures included term GPA, course grades, exam performance, attendance, and course retention (Binning et al., 2020; Hammarlund et al., 2022; LaCosse et al., 2020,; Murphy et al., 2020). Of the interventions that measured sense of belonging or social fit as an outcome, several studies reported improved belonging outcomes for students in the intervention group compared to those who did not receive the intervention (LaCosse et al., 2020; Strayhorn, 2021; Walton & Cohen, 2011), though some did not (Stephens et al., 2014; Weaver et al., 2021). There was no discernable distinction in the results for different populations of BLI-LI students, as most studies grouped a combination of BLI-LI students together in their data; only two studies focused on a single population of Black students (Walton & Cohen, 2007, 2011). Walton and Cohen (2011) found increased sense of belonging and cumulative GPA for Black students in the intervention group compared to those who did not receive the intervention.

Overall, interventions that normalized adversity and doubt had positive impacts on sense of belonging and some measures of success identified above, but mixed results for other success measures have also been found. A 2022 study published by What Works Clearinghouse revealed that interventions of this nature tend to have mixed effects on several student success factors, including academic achievement and progressing in college, and no discernible effects on college enrollment. Improved student success outcomes were not always able to be replicated in different institutions, as a handful of studies found no discernable impact on any objective or subjective measures of student success (Broda et al., 2018; Fink et al., 2020; Weaver et al., 2021).

This type of intervention is often seen as a “light touch” intervention – brief, efficient, easy to scale and implement, customizable for different institutions, and promotes student

success outcomes (Broda et al., 2018). Several interventions were designed to have customizable versions, specifically tailored to address an institution's particular situation and contexts, determined (at least in one case) by on-campus focus groups (LaCosse et al., 2020). However, customizable interventions must be carefully calibrated to the context of a specific institution or risk being ill-fitting and leading to reduced impacts (Broda et al., 2018). Another potential pitfall for these interventions is that they may only be effective in particular contexts beyond the institution. For example, some evidence suggests that this type of intervention was most effective in contexts where students were underperforming in general, and did not impact more high-achieving students (Hammarlund et al., 2022; Murphy et al., 2020), though this was not always the case (Binning et al., 2020). Similar effects were found in contexts where instructors had a fixed, rather than growth, mindset regarding their underrepresented students' abilities (Hammarlund et al., 2022). Fixed mindset in this context refers to instructors who believe students cannot change their intelligence or abilities; its inverse is growth mindset (Hammarlund et al., 2022). A fixed instructor mindset has been shown to create a more threatening classroom environment for students, which leads to a decreased sense of belonging (Hammarlund et al., 2022). Hammarlund et al. (2022) found that the intervention had a positive impact on students who had an instructor with a fixed mindset but neutral impacts on students with instructors with a growth mindset, suggesting that, since the fixed mindset students were starting from a lower sense of belonging, "the intervention appears to be effective only where it is needed (p. 7)." Students with instructors with a growth mindset did not need the intervention, since they are starting with a higher sense of belonging.

A sense of belonging intervention designed to de-stigmatize adversity and feelings of doubt is a helpful tool to improve objective success outcomes for underrepresented students;

however, this is one of multiple forms of interventions and should not be treated as a guarantee or silver bullet (Broda et al., 2018; Murphy et al., 2020). It is possible that this type of intervention is impactful primarily for students who struggle academically or are in more threatening classroom contexts (Binning et al., 2020, Murphy et al., 2020). There is no evidence that such interventions are harmful to different populations of students in different contexts, but positive impacts are mixed.

Interventions that emphasize students as valued members of college community

A pair of studies, one primary study and a follow-up study, detailed a different type of intervention approach to improve sense of belonging – focusing on presenting messages and gifts from the administration of an institution to incoming students to emphasize the new students' role as valued members of the campus community (Hausmann, Schofield, & Woods, 2007; Hausmann, Ye, Schofield, & Woods, 2009).

The nature of this approach - emphasizing students as valued members of the community - is linking sense of belonging to faculty and staff support (Hurtado & Carter, 1997; Johnson et al., 2007). These studies also incorporate the construct of faculty and staff validation of diverse student populations, which emphasizes the importance of institutions affirming and supporting diversity in their students (Barnett, 2011; Rendón, 1994). Barnett (2011) found that faculty validation, or interactions between students and faculty promote student feelings of self-worth and self-efficacy, or belief in ability to achieve certain performance outcomes. Barnett (2011) also found that the perceived caring nature of an institution strongly predicted student academic integration, which includes measures such as academic performance and campus activity

participation rates, and intent to persist in college. Similarly, positive perceptions of institutional commitment to diversity, demonstrated through an institutions's nondiscriminatory practices or building of a supportive campus environment, has been shown to act as a buffer against the negative impacts of adversity, discrimination, or bias on campus (Hussain & Jones, 2021). Taking these demonstrated relationships into consideration, it stands to reason that an intervention in which institutional leadership specifically reaches out to diverse BLI-LI students to affirm their status as valued members of the community is a potentially impactful approach to improving students' sense of belonging.

The sample for both studies came from White and African American college students at a PWI, or predominantly White institution whose demographics are at least 50% White (Hausmann et al., 2007; Hausmann et al., 2009). The interventions contained two distinct stages – one in which the students received personal, written communication from high-ranking university administrators that first, welcomed them and stated their importance to the university community, and second, communicated that their input derived from surveys would be used in efforts to improve campus life for all students in the community (Hausman et al., 2007; Hausmann et al., 2009). An additional element found in both interventions was the inclusion of a small gift bearing the university logo (Hausman et al., 2007; Hausmann et al., 2009).

The first of these two studies provided evidence that students receiving both communication and gifts had a less rapid decline in their sense of belonging than comparison students; these findings held true for both White and African American students (Hausmann et al., 2007). The study also found that sense of belonging was a significant predictor for a student's intent to persist and institutional commitment, or degree of belonging at a specific institution (Nora & Cabrera, 1996), at the beginning of the year, though this association did not remain

throughout the first year of college (Hausmann et al., 2007). Hausmann et al. (2009) was a follow up to this initial study, using the same sample, sense of belonging intervention, and survey as Hausmann et al. (2007), this time including objective measures of persistence, rather than just intent to persist, in the years that passed since the initial study. In contrast to the earlier study, the intervention's effect on sense of belonging and intent to persist for White students was positive while the effect for African American students was neutral (Hausmann et al., 2009). Hausmann et al. (2009) surmised that underrepresented populations at PWIs might need a more intensive sense of belonging intervention that specifically targets an identified concern, rather than a broad, light touch intervention. They suggested more specific methods including dispelling negative stereotypes, offering reassurance of academic capabilities, providing opportunities to obtain additional support, normalizing doubts of belonging, and encouraging diverse interactions with a diverse group of peers (Locks et al., 2008; Steele, 1997; Walton & Cohen, 2007).

These conclusions are consistent with a later case study by Turner and Zepeda (2021), who asserted that simply creating a sense of welcoming does not necessarily translate to fostering a sense of belonging and a culturally validating environment. This qualitative study specifically explored which factors contribute to sense of belonging through a series of interviews with first year, male Black students at a PWI, who are typically less likely to persist than their female peers (Lee & Ransom, 2011). The authors of this study suggested that a more proactive relationship and trust building is needed for an effective sense of belonging intervention (Turner & Zepeda, 2021). Perhaps one reason why interventions that emphasize students as valued members of a college community were not as impactful as other types of interventions is due to this erroneous conflation of "invitation of welcome" with "sense of belonging" (Turner & Zepeda, 2021).

Interventions that foster establishment of classroom community

Three identified studies provided evidence for improved sense of belonging and student success outcomes using a third intervention approach – the use of active learning within course structure, designed to increase engagement between instructors and students and from peer to peer, with the goal of fostering the establishment of a classroom community (Ballen et al., 2017; Stanich et al., 2018; Wilton et al., 2019). Support for this approach is present in literature that relates a sense of belonging with active learning, which includes both peer and faculty interactions within the classroom. Braxton et al. (2000) performed a study examining the influence of active learning on student retention. They found a link between active learning and social integration, which is an assessment of student involvement on campus and can include a sense of belonging measure. Peer and faculty interactions were also a significant component of these types of interventions. Strayhorn (2008) found that frequent interactions with diverse peers not only promoted social success, but also academic success. Another study by Oxendine and Taub (2021) focused on Indigenous identity and sense of belonging at non-Tribal College and University (TCU) institutions. They found that peer-group interaction and staff support were significant contributors to Indigenous students' sense of belonging. Similarly, a study by Maestas et al. (2007) found a link between student sense of belonging and faculty interactions among Latino students at a hispanic serving institution (HSI).

For the interventions that foster establishment of classroom community, the primary goal was to improve student success in STEM courses for underrepresented minority students (URM), which were defined as Black, Latino, Native Hawaiian/Pacific Islander, and Indigenous students. This was done through the adoption of a revised course structure (Ballen et al., 2017; Wilton et al., 2019) or a separate supplementary course (Stanich et al., 2018) that focused on active

learning techniques. Active learning techniques included incorporating smaller, collaborative peer learning groups within the classroom, guided discussion facilitated by trained instructors or student leaders, and low-stake pre-class assignments (Ballen et al., 2017; Stanich et al., 2018; Wilton et al., 2019). The pre-class homework for one study included a series of evidence-based light touch interventions and writing exercises aimed at addressing psychological and emotional challenges students faced during the transition to college, including a sense of belonging light touch intervention modeled after the interventions that normalize adversity listed in a previous section, as well as metacognitive interventions (Stanich et al., 2018).

As a whole, the three above interventions were largely successful at reducing the achievement gap between URM and non-URM students, and demonstrated mixed results regarding improved sense of belonging; some found improved sense of belonging across all groups (Stanich et al., 2018; Wilton et al., 2019) while one study did not see improvements in this measure among URM students (Ballen et al., 2017). Across these studies, it was generally found that improved classroom climate had positive impacts on objective measures of classroom success (exam performance, reduced failure rates, course grades) over the course of a semester, due to factors such as higher perceptions of faculty support, classroom comfort, and collaborative, confidence-building classroom culture (Ballen et al., 2017; Stanich et al., 2018; Wilton et al., 2019). Qualitative data collected from one study also indicated that group-led active learning had a positive impact on class performance and that positive classroom culture led to improved sense of belonging for students (Stanich et al., 2018). Focus groups from this study also indicated that the inclusion of peer facilitators was a key element in the program's success, as they were viewed by students as more empathetic, positive, relatable and approachable than instructors. Overall, results from these three studies indicate that there is a link

between classroom environments that include collaborative peer learning, supportive faculty, and feeling of classroom comfort and community with students' sense of belonging and academic performance (Ballen et al., 2017; Stanich et al., 2018; Wilton et al., 2019).

Summary of Sense of Belonging Interventions

The above interventions can be further grouped into two distinct categories: light touch interventions versus intensive interventions. Light touch interventions that normalized doubt or emphasized students as valued members of the community did have some, albeit limited, impact on BLI-LI student sense of belonging and other measures of student success, but this is influenced by factors specific to the institution. What works for one institution may not work for the specific issues in another; what works for one specific demographic may not be as effective as another. Factors to consider before designing interventions of this nature include the racial or ethnic populations being included in the study, school demographics and status of the institution as a PWI or minority serving institution (MSI), the income level of students or generational student status, the level of preparedness or achievement of incoming students (indication that may not be impactful for students who are already higher achievers), and student commuter versus residential status. Several authors also noted that a one-time intervention may not be enough to have long-term impacts.

Interventions that foster establishment of classroom community are examples of more intensive interventions that go beyond light touch - these are not a quick, one-size fits all approaches, but interventions that require developing a new, supplemental class or completely revamping an existing course; they require developing educational content and recruiting, training, and supporting faculty and/or peer mentors. While time and resource-intensive, these interventions have demonstrated positive impacts on student sense of belonging and other

objective measures of success; research questions that still remain for these interventions are the scalability of these interventions across a campus; the applicability of the interventions to other courses; longitudinal impacts for these students throughout the course of their college careers; and impacts on the specific needs of different populations of BLI-LI students.

Despite these differences, common themes emerged across all the different interventions. Successful sense of belonging interventions shared one or more of the following characteristics: a focus on peer-to-peer or peer-to-faculty interaction, direct exposure to content paired with opportunity for reflection, and building confidence in academic abilities.

Metacognition

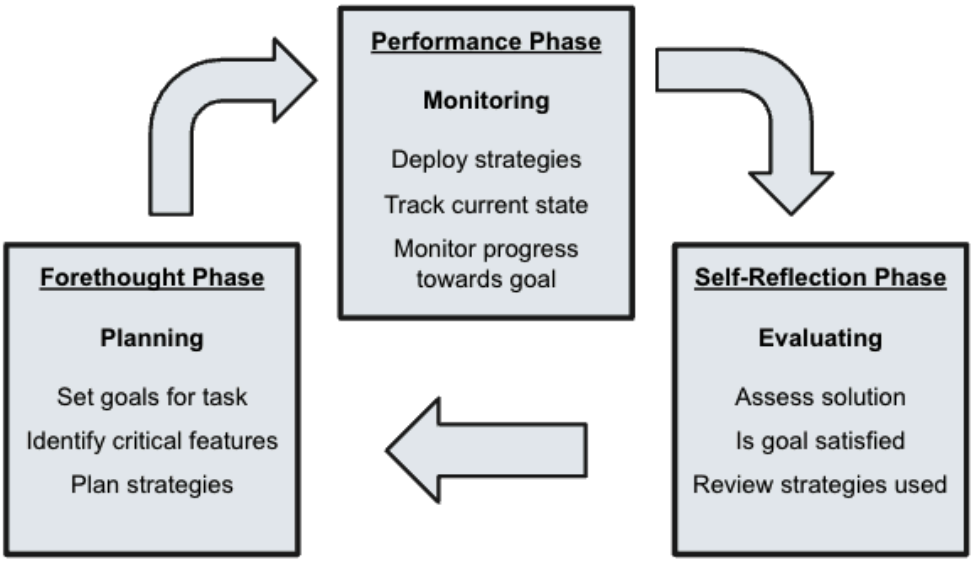
A student's ability to adapt problem-solving behaviors to different academic tasks and feedback is critical for successful learning and achievement. This ability, also referred to as self-regulated learning (SRL), has been defined as a set of interrelated skills and motivations that control learning (Boekaerts & Corno, 2005; Efklides, 2011; Winne, 1995; Zimmerman, 2001, 2011). Theories of SRL hypothesize that both metacognitive skills (e.g., planning, monitoring, and evaluation) and student motivation (e.g., beliefs, goals, and dispositions) interact to determine strategies used and learning outcomes.

Metacognition is our thinking about thinking, or in other words, our knowledge and self-awareness of our cognitive processes (see Dinsmore et al., 2008 for a review of definitions). When students utilize metacognition to improve learning outcomes, they deploy adaptive behavioral strategies that bolster these internal processes. For example, a student might reflect on how a previous exam went, taking note of the types of questions or material that they struggled

with, and then use that information to create a study guide for the next exam. Prior studies show this type of thinking pays off, with students who display or report more metacognitive activity performing better on tests, class grades, and having higher GPAs as well as being more likely to stay enrolled in college, progress in a timely manner, and eventually graduate (Dinsmore et al., 2008; Donker et al., 2014; Ellis et al., 2014; Theobald, 2021).

Generally speaking, metacognitive skills are divided into three phases: planning, monitoring and evaluating. Depending on the task at hand, strategies from one, two or all three phases may be used. Over the longer-term, such as over the course of a project, unit or even an entire academic class, students may obtain the best results if they cycle through these phases multiple times, incorporating lessons learned along the way. For instance, while taking an exam, a student might begin by reviewing the entire exam and identify which questions can be answered easily and which may require more thought. This is an example of **planning** where students are identifying the task components and managing their time by answering questions that require the least amount of effort first. While taking the exam, the student then **monitors** their progress by keeping track of their current state and progress moving toward their ultimate goal of doing well on the exam. This may reveal that they are moving too quickly through the "easy" questions, resulting in misreading questions and ultimately making mistakes. After the exam is complete, the student then reflects and **evaluates** how they did on the exam and which strategies worked best for them. Perhaps they realized they kept making the same mistake with a particular type of problem, or mixing up two related concepts. This evaluation can lead to planning for the next exam - seeking help from the professor, joining a study group, making flashcards, etc. Advanced metacognitive learners are able to sustain a certain level of self-awareness and engagement, and will be able to move themselves through these phases in a

continuous cycle, constantly building on their existing knowledge. Below is a table summarizing some of the metacognitive processes involved in the three phases.



Zimmerman, 2000, 2011; Zimmerman & Campillo, 2003

In sum, metacognition is an extremely valuable skill. It helps students analyze new situations, identify which resources and strategies are useful in this situation, determine how to best apply them, and then assess and adjust as necessary, often leading to better academic outcomes (Conley, 2014).

Metacognitive Interventions

To best understand what aspects of metacognitive instruction are most impactful for college students more generally, and for BLI-LI students more specifically, we conducted a review of the metacognitive literature, focusing on interventions that were designed to enhance students' metacognition. This review lead us to identify four main themes of metacognitive

interventions in a college setting: First are **specialized courses** taken for credit or academic support programs that met regularly over a semester or year (Bail et al., 2008; Stanich et al., 2018; Patterson et al., 2014; Tuckman, 2003). These interventions involved direct instruction on self-regulated learning including metacognitive strategies. They often offered structured feedback and provided small group or peer mentoring. The second intervention theme identified was given within a **content area course** (i.e., an introductory Biology course) and included direct instruction on self-regulated learning strategies including metacognition throughout the course. These often used formative assessments and feedback as critical components (Bernacki et al., 2020; Cogliano et al., 2020; Hudesman et al., 2013; Zimmerman et al., 2011). A third commonly used intervention is what we are calling **metacognitive training modules**. These often were a workshop or seminar-style format, lasting anywhere from 1 to 7 sessions. Typically, each session was between 30 and 90 minutes long. These trainings provide an overview of metacognition, and sometimes learning theory more broadly, and may or may not offer opportunities for application (Biwer et al., 2020; Carpenter et al., 2020; Çubukçu, 2008; Grunschel et al., 2018; Rasmussen & Stewart 2018; Saenz et al., 2019). Lastly, some interventions were more **reflective** and designed to provide additional structured opportunities within an otherwise standard college course for students to reflect on their learning. Frequently this reflection intervention was paired with a training intervention (Bellhauser et al., 2016; Broadbent et al., 2020; Dorrenbacher & Perrels 2016; Fabriz et al., 2014).

Metacognitive Specialized Courses

Among the interventions reviewed herein, those that involved direct instruction on metacognition and metacognitive strategies, as well as opportunities for students to apply these strategies and receive feedback, paired with small group or peer-to-peer mentoring, reported the

most gains for students. This matches prior results of meta-analyses that interventions that address multiple aspects of metacognition have larger effect sizes (Dignath et al., 2008; Donker et al., 2014). One study using this type of intervention examined 79 sophomore students in an academic support program who enrolled in a supplementary SRL course (two different sections) and were matched with 78 of their peers in the academic support program who did not take the SRL class (Bail et al., 2008). Students in the academic support program had to either be a first-generation college student or eligible for need-based financial aid.

The supplementary course introduced the theory behind SRL, as well as provided instruction on goal setting, note taking, planning papers, prepping for exams, stress management, and help seeking. Students would practice the strategies and receive feedback on their attempts. The course made use of small group discussions, as well as peer conferences online where students would share their experiences using the SRL strategies in other courses and get feedback from a peer. The study found that students who took the SRL course had a higher GPA and were 13 times more likely to graduate compared to their matched peers.

Another study examined the efficacy of an SRL course by race and ethnicity (Patterson et al., 2014). The researchers analyzed outcomes for students who completed an SRL course versus those who did not between fall 2000 and fall 2010 at the University at Buffalo, a large state university in New York. Students in the SRL course met twice a week for traditional lectures. Students were also assigned a peer monitor with whom they met weekly. During these meetings, students would discuss their metacognitive strategy use across all of their classes and receive feedback from the student monitor (Patterson et al., 2014). The study found that across all students, 50.6% of self-identified Native American students at the college were still enrolled or graduated within 5 years. However, for those who completed the SRL course that percentage

grew to 85.7%. Additionally, across all students, 18.8% of Native American students graduated in 4 years and 34.2% within 5 years. For those who completed the SRL course, those percentages increased to 42.9% and 71.4% respectively, essentially doubling the graduation rate for these students (Patterson et al., 2014). Similarly, promising results were found for African American and Hispanic participants who were 1.6 and 1.8 times more likely to graduate than their same race peers within 5 years (Patterson et al., 2014).

Metacognitive Content-area Courses

Studies that incorporated metacognitive instruction within a content-area course also saw benefits for students including in remedial college mathematics (Hudesman et al., 2013; Zimmerman et al., 2011), introductory biology and college algebra (Bernacki et al., 2020) and an education course (Cogliano et al., 2020). Two sets of related studies had professors model strategy use in a think-aloud process and provide opportunities to students for practice with feedback (Hudesman et al., 2013; Zimmerman et al., 2011). For example, the professor would make note of the types of errors commonly made by students, then work through a similar problem set in class while narrating his thought process step-by-step (Hudesman et al., 2013). Students in these courses saw higher exam scores, higher course completion rates, higher placement scores, and increased likelihood of going on to enroll in more advanced courses as compared to a set of matched control peers (Hudesman et al., 2013; Zimmerman et al., 2011).

Another approach taught students metacognition and self-regulation strategies through a module within a course called “Learning to Learn” and offered opportunities for practice and feedback through a learning management system (LMS) (Bernacki et al., 2020). The module itself followed the same metacognitive principles it was instructing students in, which served to reinforce the strategies being taught. For example, as the module progressed, students would

restate in their own words what they had just learned and also developed a plan for how they would implement certain strategies in the future, helping them monitor and evaluate their learning. Students who participated in the intervention were more likely to use online resources, such as practice quizzes and lists of learning objectives, than the control group. Students in the experimental condition also had higher course quiz and exam scores than control students.

Finally, one study provided direct instruction in a specific strategy pairing: retrieval practice and monitoring accuracy (Cogliano et al., 2020). Research has shown that practicing recall of information (retrieval practice), such as taking practice exams, is a very impactful study strategy (Roediger & Karpicke, 2006), yet many students do not use this skill to its full effect (Cogliano et al., 2020). Cogliano and colleagues (2020) surmised that this could be because many students are not accurate in judging their own progress and performance (Grimaldi & Karpicke, 2012; Rawson & Dunlosky, 2007). Thus, the intervention both introduced students to the concept and practice of retrieval while also training them to better monitor the status of their learning. The students in the intervention group were more likely to utilize practice exams as a strategy, and in turn had better monitoring accuracy, which in turn predicted better exam performance (Cogliano et al., 2020).

Although the two prior studies summarized are shorter in duration, they were structured and tailored to a content-specific course and included applied practice, feedback, and reflection opportunities. It is also worth noting that the outcomes measured in these studies tended to be course exams or content-area placement exams, and so it is unclear whether this type of intervention would impact outcomes beyond the course, such as a GPA or graduation rates.

Metacognitive Training Modules

Most likely due to the amount of resources required to conduct the more intensive interventions discussed thus far, the bulk of the intervention studies we reviewed were conducted as a short, supplemental training module. Many of these interventions were designed in 3 parts to address the three metacognitive stages of planning, monitoring and evaluating. Depending on the theoretical framework motivating each study, the trainings varied in terms of specific topics covered, method of delivery (online modules, lectures, or through a text-book), and whether opportunities for application, feedback, and or reflection accompanied the instruction .

For the training sessions, it is difficult to know for sure the impact of these interventions as most of these studies did not directly test for improved academic performance, but rather for increased strategy use, which did tend to improve (Biwer et al., 2020; Carpenter et al., 2020; Çubukçu, 2008; Grunschel et al., 2018; Rasmussen & Stewart 2018; Saenz et al., 2019). For example, Saenz and colleagues tested whether instruction in five different metacognitive strategies would improve student performance prediction (2019). Prior research has suggested that students with poor performance are less aware of their weaknesses or gaps in their knowledge and tend to be overconfident in their performance (Neitfeld, Cao & Osborne 2005). Thus, metacognitive training should improve students' performance prediction, which in turn would improve their actual academic performance. Saenz et al. (2019) found that salient feedback and motivation warning interventions did increase performance prediction, but the study did not attempt to link this to course performance.

Metacognitive Reflections

A number of the training studies also included conditions where students kept reflection diaries (Bellhauser et al., 2016; Broadbent et al., 2020; Dorrenbacher & Perrels, 2016; Fabriz et al., 2014). The diaries consisted of surveys that students completed daily. Some were designed as likert scales (Fabriz et al., 2014), some were designed as surveys with closed questions, meaning response categories were provided by the survey (Broadbent et al. 2020), while others asked more open-ended questions about study plans, levels of motivation and specific skills students planned to use (pre) and what skills they actually used and how they felt about their performance (post) (Bellhauser et al., 2016). Overall, diaries on their own were not found to be beneficial for students. The most efficacious intervention conditions in this vein included diaries paired with a training session, similar to the modules described above.

There were also a number of interventions that focused primarily on reflection activities. In one such study, students were guided through a self-reflection regarding their study strategies after an exam and then asked to outline a new study plan for the next exam (Stanton et al., 2015). Results from this study indicated that the self-reflection intervention did not improve student outcomes. In another study, students received one lecture describing metacognition before being given reflection questions after an exam intended to help students evaluate their performance (what the authors called "exam wrappers,") but participation was optional (Carpenter et al., 2020). Those students who completed the exam wrapper and were also newer students (completed less than 30 academic hours) had increases in their course grade (Carpenter et al., 2020). In the words of the authors, "prompts are not enough" (Stanton et al., 2015). These findings, paired with the learning diary-only conditions of the training interventions, seem to

indicate that simply reflecting is not enough, and direct instruction and/or modeling is essential to a successful metacognitive intervention.

Summary of Metacognitive Interventions

This indicates that for many college students, their knowledge of metacognition and specific learning strategies needs to be developed. The most impactful interventions paired direct instruction with opportunities for practice as well as receiving and utilizing feedback in an ongoing process (Bail et al., 2008; Bernacki et al., 2020; Carpenter et al., 2020; Cogliano et al., 2020; Hudesman et al., 2013; Patterson et al., 2014; Zimmerman et al., 2011). However, such ongoing interventions are also more resource intensive.

The typical impactful intervention followed this schema: 1) Students received instruction in self-regulated learning including metacognition, 2) Students were given a chance to apply or practice what they learned, 3) Students received feedback on their attempts, and 4) Students reflected and adjusted their approach accordingly. We identified two particular learning strategies that were central to these types of interventions: first, students were instructed in (or it was modeled for them) how to use feedback to inform future efforts (Bail et al., 2008; Bernacki et al., 2020; Carpenter et al., 2020; Cogliano et al., 2020; Hudesman et al., 2013; Patterson et al., 2014; Zimmerman et al., 2011) and secondly, students learned how to accurately judge their own knowledge so that they could study more effectively and efficiently by focusing on gaps in their understanding (Biwer et al. 2020; Cogliano et al. 2020; Çubukçu, 2008; Saenz et al. 2019; Zimmerman et al., 2011).

Metacognition and BLI-LI Success

Of the 21 studies reviewed, eight included significant BLI-LI populations, defined as at least 35% of the sample of any one of our target populations. However, none of these interventions were specifically created and tailored to BLI-LI students; thus, more research for tailored interventions is needed to draw conclusions about the effectiveness of metacognitive interventions by specific populations.

Of the eight studies that include significant BLI-LI students, the majority fell under the first two intervention types: metacognitive specialized courses (Bail et al., 2008; Stanich et al., 2018; Patterson et al., 2014) and metacognitive content-area courses (Hudesman et al., 2013; Zimmerman et al., 2011; Bernacki et al., 2020; Cogliano et al., 2020). One study was primarily a reflection intervention (Carpenter et al., 2020). Regarding the race and ethnicity of the samples, one intervention only served low-income or first-generation students as a by-product of pulling its sample from within the school's academic support program (Bail et al., 2008). A second study was conducted at an MSI (Carpenter et al., 2020) and a third and forth study were conducted at a self-described "urban" technical college where 90% of students were from a racial or ethnic minority group, about half of which were students for whom English was not their first language (Hudesman et al., 2013; Zimmerman et al., 2011).

Despite none of these interventions being specifically designed for BLI-LI students, significant gains in test scores, GPA, and graduation rates were found for study samples that included BLI-LI populations across interventions (Bail et al., 2008; Bernacki et al., 2020; Carpenter et al., 2020; Cogliano et al., 2020; Hudesman et al., 2013; Patterson et al., 2014; Stanich et al., 2018; Zimmerman et al., 2011). Several studies did report that the size of the effect did not differ across student groups (Bernacki et al., 2020; Stanich et al., 2018).

In a unique retrospective design, the Patterson et al. (2014) study examined data on 4,661 students who had completed a freshman year SRL course and voluntarily reported their race/ethnicity. Drastic effects were found for all racial/ethnic groups, with Native American, African American and Hispanic students seeing huge gains compared to their matched peers; these gains were particularly notable among Native American students. 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).

Conclusions

Common themes

Several shared themes emerged across the collected sense of belonging and metacognitive intervention literature regarding BLI-LI populations: one, the importance of peer interactions; two, direct instruction and repeated application; and three, building confidence through overcoming adversity.

Peer Interactions

One theme that emerged from both sets of literature was the significant link between peer interactions and sense of belonging and metacognition for BLI-LI students. Within the sense of belonging literature, the inclusion of peer interactions was most notable for the interventions that foster classroom community through the use of peer learning communities, mentoring, and

teaching assistants (Ballen et al., 2017; Stanich et al., 2018; Wilton et al., 2019). Within the metacognitive literature, all three of the interventions designed as metacognitive courses included a significant peer component including peer feedback conferences (Bail et al., 2008), peer mentors (Stanich et al., 2018), and peer monitors (Patterson et al., 2014). Peer monitoring was found to help alleviate the sense of isolation and boost academic self-esteem (Patterson et al., 2014).

Furthermore, studies outside of this review have also spoken about the importance of peers. Demonstrated correlations have been found between improved sense of belonging and perceived peer academic support through informal discussions, study groups, and learning communities (Hoffman et al., 2002; Hurtado & Carter, 1997, Johnson et al., 2007; Maestas et al., 2007), interactions with diverse peers in class, on campus, and in residential life (Duran et al., 2020; Hussain & Jones, 2019; Johnson et al., 2007; Locks et al., 2008; Maestas et al., 2007; Oxendine & Taub, 2021; Strayhorn, 2008), and participation in campus groups, such as religious or social groups (Duran et al., 2020; Hurtado & Carter, 1997). As we have previously established the link between student success and sense of belonging, these results indicate peer interactions are a significant part of the college success story; as a result, we argue that the connections across sense of belonging, metacognition, and peer interactions warrant further investigation.

Direct Instruction and Repeated Application

For both sense of belonging and metacognition, the interventions with most impactful results included a combination of exposure/instruction paired with applied practice and/or a well-developed reflection activity. For example, Walton and Cohen (2007) presented students with qualitative summaries from an upper-year survey in which students of all ethnicities expressed doubts and how they overcame them (i.e. the “exposure”); students were then

prompted to write reflective essays and created video recordings to deliver their essay to future students (the "reflection"). Similar formats can be found across sense of belonging interventions that normalized adversity and doubt (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). Among metacognitive interventions, those that contained either direct instruction, training, or modeling were more beneficial than interventions that contained only reflections (see Stanich et al., 2015).

Additionally, the metacognitive interventions that modeled the iterative, cyclical nature of being a meta-learner were more impactful (Bail et al., 2008; Bernacki et al., 2020; Cogliano et al., 2020; Hudesman et al., 2013; Zimmerman et al., 2011). While the sense of belonging literature did not test ongoing or repeated interventions, a small handful of studies were more intensive, course-long interventions that had mostly positive impacts on student success (Ballen et al., 2017; Stanich et al., 2018; Wilton et al., 2019; What Works Clearinghouse, 2022). These intensive interventions were less common as they required greater resources in terms of time and money. However, the more intensive interventions for both sense of belonging and metacognition appeared to have greater and longer-lasting results (Ballen et al., 2017; Stanich et al., 2018; Wilton et al., 2019 Bail et al., 2008; Patterson et al., 2014; Hudesman et al., 2013; Zimmerman et al., 2011). More research is needed on longitudinal results for both metacognitive and sense of belonging interventions.

Based on these results, we recommend future interventions aimed at addressing both sense of belonging and metacognition for BLI-LI students to include both direct instruction paired and repeated application over a semester or longer to have the biggest impact.

Building Confidence through Overcoming Adversity

Overcoming adversity and doubt was a major theme in the sense of belonging literature. Students were often exposed to stories of adversity and doubt from upper-class peers then given an opportunity to reflect on these stories and apply them to their lives, noting how they can or did overcome adversity faced on campus and doubt about their belonging (What Works Clearinghouse, 2020). As the inverse of doubt is confidence, we argue that there is a potential link between overcoming adversity and doubt and greater self-confidence in abilities (or self-efficacy) as students are given opportunities to achieve success and confidence in a classroom setting.

This potential link has been indicated in sense of belonging interventions that measured subject-specific self-efficacy alongside sense of belonging measures. These studies found that both sense of belonging and subject-specific self-efficacy increased as a result of the intervention, which in turn led to improved performance (Ballen et al., 2017; Stanich et al., 2018). Additionally, performance monitoring judgements (see also prior discussion of self-evaluation) have been linked to self-efficacy in several studies (Nietfield et al., 2006; DiFrancesca et al. 2016). A meta-analysis found an average effect size of .73 of metacognitive self-assessment on academic self-efficacy (Panadero et al 2017).

Based on these demonstrated links between feedback, self-assessment, sense of belonging, and self-efficacy we hypothesize that overcoming adversity and doubts with support from targeted metacognitive and sense of belonging interventions will lead to improved sense of belonging and self-efficacy.

Gaps in the Literature

We also want to point out three major themes of gaps in the literature, where there is a lack of empirical evidence and opportunity for future research for these populations. These gaps include a lack of empirical evidence for emerging student success models, interventions specifically tailored to individual populations within the BLI-LI grouping and the institutional context of these individual groups, and interventions that have long-term impacts on BLI-LI students.

Evolution of Student Success Models

Over the last decade, the student success literature has shifted to models that center on cultural wealth and integrity. This emerging research shifts the focus onto the campus environment, rather than the attributes or behaviors of the student, recognizing the value and strengths of cultural capital BLI-LI students bring as opposed to focusing only on a deficit in knowledge or experience (Aronson et al., 2002; Gonzoles et al., 2015; McDaniel & Graham, 1999; Mosholder et al., 2016; Museus et al., 2017; Romo et al., 2020; Yosso, 2006). In other words, we should be asking how the college can fit the student, rather than how the student can fit the college.

Being a relatively new area of research, there is not much empirical data to report on the impact of cultural wealth and integrity; however, some early research indicates that access to culturally engaging campus environments is related to a sense of belonging and, in turn, college success outcomes (Museus et al., 2017). More research is needed in this area to further clarify and quantify these links between BLI-LI student success, including sense of belonging and metacognition, and models of cultural wealth and integrity.

Lack of Studies on Individual BLI-LI Populations

As mentioned previously, some of the identified metacognitive interventions included BLI-LI populations in their research but were not specifically designed for BLI-LI students and their unique perspectives and challenges. More research is needed to draw conclusions about the effectiveness of metacognitive interventions for this group as a whole, as well as individual populations under the BLI-LI umbrella. In contrast, most of the sense of belonging interventions did include BLI-LI populations and were designed with those populations in mind. However, these individual groups are usually treated as a monolith rather than individual groups with their own unique views of belonging. There is minimal sense of belonging intervention research that focuses on individual Black, Latino, Indigenous, or low-income groups. Some of the correlational research indicates that while there are many similarities between these different groups, when studied separately, some distinctions emerge. For example, measures of campus involvement for continuing generation Black students had no positive correlations to their sense of belonging, while it did for other BLI-LI identities, both continuing and first-generation (Duran et al., 2020). Studies on intersectional identities (or identities that cross these subgroups; for example, Afro-Latino students or low-income Indigenous students) are also lacking. It stands to reason that differences between subgroups and intersectional groups would be of note in the sense of belonging intervention research as well.

One population that particularly has a dearth of meaningful empirical research in this regard is the Indigenous student population - not only are these students not called out separately in any of the identified interventions but there is also little quantitative research in general identifying statistically significant correlations for student success measures. Due to the low population numbers of Indigenous students in many institutions, much of the research on this population is qualitative.

Another population that would benefit from more research is the low-income population. Much of the literature did not focus specifically on this cohort of students; more common, but closely related groups studied included students of low socioeconomic status (SES), low social class, and first-generation students, which primarily included low-income students across all racial and ethic groups. There was scant literature focusing on correlations between these groups and sense of belonging and metacognition; instead, much of the literature focused on the links between these groups and persistence or retention, citing lower financial aid, higher working hours, less study time and campus involvement as contributing factors (Ostrove & Long, 2007; Soria et al., 2013; Walpole, 2003). Given the above, future research should focus on the impacts of such interventions on individual BLI-LI populations and provide more quantitative data regarding Indigenous student and low-income populations in particular.

In a related vein, given that the research cited indicates that solutions that work for one campus may not work for another due to institutional differences (Broda et al., 2018; LaCosse et al., 2020), it stands to reason that the same would apply to individual populations of BLI-LI students within those institutions. Factors to consider before designing interventions of this nature include the racial or ethnic populations being included in the study, school demographics and status of the institution as a PWI or MSI, the income level of students or generational student status, the level of preparedness or achievement of incoming students (as there is evidence that interventions may not be as impactful for students who are already higher achievers), and student commuter versus residential status.

Issues of Time and Place

Generally, there is a lack of longitudinal studies tracking the long-term impacts of sense of belonging and metacognitive interventions in a postsecondary setting. There has been a

handful of promising longitudinal studies that suggest light touch sense of belonging interventions could have long-term effects on measures relating to student success and overall well-being years after graduation (Brady et al., 2020; Yaeger et al., 2016), but these are limited to the same data set. However, follow-up studies for other sense of belonging and metacognitive interventions have shown diminishing impacts for target populations for the following semester, after the intervention took place, and conclude that more intensive, targeted interventions that specifically address the populations' needs at that particular institution are warranted (Hausmann et al., 2009).

Interventions that require developing a new, supplemental class or completely revamping an existing course have demonstrated positive impacts on student sense of belonging, metacognition and other objective measures of success. And yet, these interventions are time and resource-intensive, requiring the development of educational content as well as the recruiting, training, and supporting faculty and/or peer mentors. Research questions that remain for these interventions include the scalability of these interventions across campus, the applicability of the interventions to other courses, the longitudinal impacts for these students throughout their college careers, and identifying the impacts on the specific needs of different populations of BLI-LI students.

Future Directions

In sum, 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 characteristics:

- Address self-efficacy by normalizing adversity and doubt, helping students recognize their strengths, and developing the skills they need to succeed.
- Target the specific needs of the unique BLI-LI populations present at different types of institutions (commuter versus residential, PWI versus MSI).
- Include both explicit instruction and dedicated reflection or practice within the intervention.
- Include social learning into the intervention with peer-to-peer collaborative instruction or mentoring.
- Be administered more than one time over the course of a semester or longer.

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