Social Psychology of Education (2024) 27:2883–2899
https://doi.org/10.1007/s11218-024-09948-6

S.I.: GROWTH MINDSET

Instructor mindset beliefs and behaviors: How do students and instructors perceive them?

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Received: 14 November 2023 / Accepted: 23 July 2024 / Published online: 11 September 2024

Abstract
Advances in growth mindset scholarship now recognize the role of instructors' mindsets in shaping classroom mindset culture. In the present paper, we synthesize the newly developing instructor mindset literature and report on a dataset that includes student ($N=765$) and instructor ($N=44$) reports of instructor mindset beliefs and behaviors. We organize our paper around four key questions: (1) What teaching behaviors signal instructors' mindset beliefs to students? (2) What teaching behaviors are associated with instructors' mindset beliefs? (3) Do students and instructors in the same classroom agree about instructors' beliefs and behaviors? (4) Where should researchers target interventions aimed at promoting growth mindset cultures? We then discuss three problems that instructors might encounter when trying to create growth mindset cultures—when instructors inconsistently engage in growth mindset behaviors, when instructors unwittingly communicate a fixed mindset to students, and when students fail to notice instructors' growth mindset behaviors—and potential solutions to these problems. We end with implications for instructor-focused interventions, which include both encouraging instructors to engage in growth-focused behaviors and to state clearly *why* their behaviors communicate a belief in student growth.

Keywords Growth mindset · Instructors · College students · Beliefs · Behaviors

1 Introduction

Mindset beliefs refer to people's beliefs about the changeability of human traits, such as intellectual ability (Dweck, 1999). More than 30 years of research has found that students who endorse *growth mindset* beliefs (i.e., beliefs that intellectual ability can grow and develop) have better psychological, motivational, and educational

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outcomes compared to students who endorse *fixed mindset* beliefs (i.e., beliefs that intellectual ability is fixed and unchanging; see Dweck & Yeager, 2019). Until recently, most mindset research focused on the mindset beliefs of individual students. However, newer research has shifted to understanding mindset as a *dynamic system*, wherein the mindset beliefs of individuals within a classroom context (e.g., instructors[1], students) mutually influence and reinforce one another, culminating in a *mindset culture*. Murphy et al. (2021) describe mindset culture as a shared meaning system within a classroom that comprises instructors' intentions (i.e., an instructor's beliefs and plans), instructors' implementation (i.e., an instructor's actual behavior), and students' perceptions (i.e., students' classroom experiences; see Fig. 1). Notably, as leaders in the classroom context, instructors are powerfully positioned to shape their classroom's mindset culture. Instructors can foster a growth mindset culture by implementing practices and policies that support student learning and development; conversely, they can foster a fixed mindset culture by valuing flawless performance and identifying and praising only those they deem to be the most intelligent students (Hecht, Murphy, et al., 2023; Kroeper, Muenks, et al., 2022; Kroeper, Fried, et al., 2022; Sun, 2018; Trzesniewski et al., 2021).

Recent empirical work has examined how instructor beliefs and behaviors contribute to mindset cultures and how mindset cultures relate to students' academic, psychological, and emotional outcomes (e.g., Brown & Cross, 2020; Canning et al., 2019, Canning et al., 2022; Heyder & Brunner, 2018; Kim, 2023; Kroeper et al., 2024; LaCosse et al., 2021; Lou & Noels, 2020; Muenks et al., 2020, 2021a; Rattan et al., 2012, 2018; Schmidt et al., 2015; Yeager et al., 2021). Some of this research focused on the "instructors' intentions" aspect of the Murphy et al. (2021) model, asking instructors to report their *own* mindset beliefs. This work demonstrates that when instructors endorse growth (vs. fixed) mindset beliefs, their students experience better psychological and academic outcomes in their courses (Canning et al., 2019; Heyder et al., 2020; Heyder & Brunner, 2018). Other research focused on the "students' perceptions" component of the Murphy et al. (2021) model, asking students to reflect on their instructor's mindset beliefs. This work shows that when students *perceive* instructors to endorse growth mindset beliefs, students have better psychological, motivational, and academic outcomes in those instructors' classes. But when students perceive instructors to endorse fixed mindset beliefs, students feel psychologically threatened and demotivated, and ultimately perform worse (Canning et al., 2022; Fuesting et al., 2019; Hecht et al., 2022; Kroeper et al., 2024; LaCosse et al., 2021; Lou & Noels, 2020; Muenks et al., 2020; Muenks, Yan, et al., 2021; Muenks et al., under review; Rattan et al., 2018).

To create growth mindset cultures, however, it's critical to also understand the third component of the Murphy et al. (2021) model: "instructors' implementation[2]." What do instructors who endorse growth mindsets do differently than instructors who

[1] The generic term "instructors" is used throughout to refer to leaders in a classroom context who teach, including (but not limited to) teachers, faculty, professors, lecturers, etc.

[2] In addition to instructors' implementation, students' implementation of their own mindset beliefs also shapes classroom experiences and outcomes (see Dweck & Yeager, 2019, for review). The present paper, however, focuses on mindset cultures: how instructors create them (and how students perceive them). A detailed discussion of student implementation is beyond the scope of this paper.

endorse fixed mindsets? And, does this affect whether students *perceive* their instructors as having growth vs. fixed mindsets? The present paper takes a unique approach by reviewing and synthesizing the current literature, but also uses new data to answer theoretical questions regarding how instructor behavior communicates instructor mindset beliefs to students. This hybrid review-empirical approach allows us to focus the paper on key questions that have important implications for instructors, while also sharing some data that addresses these questions empirically. Specifically, we ask: (1) What teaching behaviors signal instructors' mindset beliefs to students? (2) What teaching behaviors are associated with instructors' mindset beliefs? (3) Do students and instructors in the same classroom agree about instructors' beliefs and behaviors? Finally, (4) Where should researchers target interventions aimed at promoting growth mindset cultures?

We organize this paper by first starting with Questions 1 and 2, reviewing current literature that addresses these questions. We then introduce the dataset that we will be using to answer Questions 2–4, and report findings from the dataset that speak to each of these questions under their own sections called "Findings from our Dataset." We end with problems that instructors may encounter when trying to promote growth mindset cultures, potential solutions to these problems, and implications for instructor-focused interventions and teaching practice.

2 Question 1: What teaching behaviors signal instructors' mindset beliefs to students?

Instructor mindset beliefs are important to student outcomes (Brown & Cross, 2020; Canning et al., 2019; Fuesting et al., 2019; Haimovitz & Dweck, 2017; Hecht et al., 2022, Hecht, Murphy, et al., 2023; Heyder et al., 2020; Heyder & Brunner, 2018; Kroeper et al., 2024; LaCosse et al., 2021; Lou & Noels, 2020; Muenks, Canning et al., 2020; Muenks, Yan, et al., 2021; Rattan et al., 2012, 2018; Rissanen et al., 2019; Sun, 2018; Yeager et al., 2021). But students cannot simply read their instructors' minds. Instead, students must infer instructor mindset beliefs through behavior.

Recent work, much of it published in the past five years, has sought to identify some of the teaching statements, policies, and practices that signal instructor growth mindsets to students (Campbell et al., 2020; Fuesting et al., 2019; Hecht et al., 2022; Kroeper, Muenks, et al., 2022; Kroeper, Fried, 2022; Muenks et al., under review; OECD, 2021; Rattan et al., 2012; Yu et al., 2022). For example, experimental research has manipulated aspects of instructors' verbal and written messages, finding impacts on students' perceptions of instructors' mindset beliefs (Fuesting et al., 2019; Hecht et al., 2022; Muenks et al., 2020; Rattan et al., 2012). For example, Rattan et al. (2012) asked undergraduates to imagine receiving a low grade in a hypothetical math course, and then receiving either comfort feedback (e.g., "You are a talented student…it's just not the case that everyone is a 'math person'") or strategy feedback (e.g., "I want you to change your study strategies and consider working with a tutor"). Students in the comfort feedback condition perceived their instructor as significantly more fixed-minded than students in the strategy feedback condition. Similarly, other experimental research finds that when instructors explicitly use growth

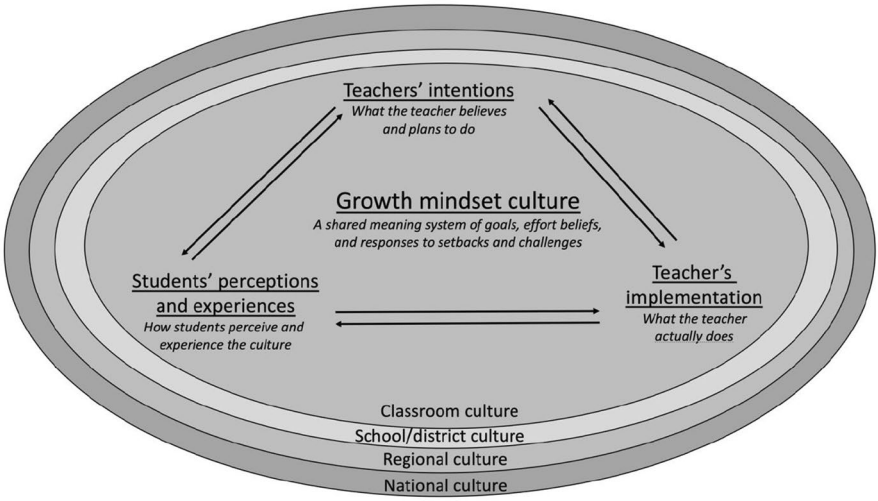

Fig. 1 Depiction of growth mindset cultures from Murphy et al. (2021)

mindset ("These assignments are designed to help you improve your skills") or fixed mindset language ("In this course, you either know the concepts and have the skills, or you don't") students perceive instructors as more growth- or fixed-minded, respectively (Fuesting et al., 2019; Hecht et al., 2022; Muenks et al., 2020).

Researchers have also explored how behavior communicates instructor mindset to students in non-experimental, naturally occurring academic contexts. Based on teaching observations, Rissanen et al. (2019) identified aspects of a growth mindset pedagogy, which included behaviors like supporting students' individual learning processes (e.g., student-tailored scaffolding), while promoting mastery orientation (e.g., prioritizing learning over performance; avoiding self-other comparisons), persistence (e.g., honesty and constructive feedback for skill gaps), and process-focused thinking (e.g., praising risk-taking, productive strategies, and effort). Building on this, Kroeper, Muenks et al. (2022) conducted focus groups with undergraduates, asking them what behaviors signaled instructors' fixed or growth mindset beliefs. Then, in a different undergraduate sample, Kroeper, Muenks, et al. (2022) measured students' perceptions of instructor mindset beliefs and behaviors. They found that when instructors place value on student learning and development, state explicitly that mistakes are part of the learning process, provide many opportunities for practice and feedback, and provide extra support to struggling students, their students perceive them as having stronger growth mindsets (see also Kroeper, Fried, et al., 2022; OECD, 2021). Further, Muenks, Yan, et al. (2021) found that providing students opportunities to engage in active, elaborative learning strategies such as group work (vs. lecturing) was also associated with students' perceptions of instructors' growth mindset beliefs.

In sum, researchers have identified several teaching behaviors that, from the student's perspective, signal that instructors hold either growth or fixed mindsets, including specific verbal or written messages that signal a potential (or not) for growth,

teaching practices that do (or do not) focus on growth, and policies or assessment practices that do (or do not) allow students to demonstrate growth. However, student perception only tells part of the story. We next turn to the instructor perspective: How do instructors' self-reported growth or fixed mindsets relate to their teaching behaviors?

3 Question 2: What teaching behaviors are associated with instructors' mindset beliefs?

Instructors may have higher growth mindset endorsement than the general population (Dweck et al., 1995; Gleason, 2016). But, to what extent do instructors' teaching behaviors align with their mindset beliefs? Several studies have used observational or survey methods to identify instructor behaviors, and then categorized them based on growth mindset frameworks. For example, Geist (2021) interviewed 16 high-achieving instructors with teaching awards at a public research institution. All of them engaged in behaviors associated with a growth mindset, including emphasizing personal connections with students, monitoring and communicating progress, offering feedback and multiple opportunities for improvement, and providing opportunities for active learning (Campbell et al., 2020; Kroeper, Muenks et al., 2022). Similarly, French (2019) interviewed eight STEM faculty at a highly selective institution, finding that they generally engaged in practices reflective of a growth mindset, including using differentiated instruction (e.g., individualized learning activities and assessments); encouraging intellectual risk-taking, making mistakes, and asking questions; and providing feedback (see also DeLuca et al., 2019). Other empirical work has linked teachers' growth mindset beliefs with the use of mastery-oriented practices (Deemer, 2004; Matteucci et al., 2017). Thus, it seems many instructors use teaching practices that are consistent with growth mindset theory.

However, other recent studies examining the "false growth mindset" phenomenon suggest that associations between instructor growth mindset beliefs and behaviors are not entirely clear-cut (Barger et al., 2022; Dweck & Yeager, 2019; Patrick & Joshi, 2019). The "false growth mindset" occurs when individuals (including instructors) claim to have a growth mindset because they know this mindset is socially desirable; however, they have only a surface-level understanding of what a growth mindset is and, therefore, enact behaviors that are inconsistent with a growth mindset. For example, Patrick and Joshi (2019) found that some instructors misunderstand growth mindset as just being positive or having high aspirations ("false growth mindset") instead of reflecting the belief in students' ability to grow intellectually with hard work, flexibly adopting useful learning strategies, and receiving instructor support ("true growth mindset"). Instructors with false growth mindsets even engage in fixed mindset behaviors, such as praising perfection, that ultimately lead to worse academic outcomes for students (Buttrick, 2020). Thus, it's important to not assume instructors' behaviors align with their professed mindset beliefs.

3.1 Introducing the dataset

To answer the questions posed in this and the following sections, we need information about instructors' self-reported mindset beliefs and behaviors *and* students' perceptions of instructors' mindset beliefs and behaviors. Previous research has typically only reported one perspective (i.e., either students or instructors). Therefore, we collected a dataset consisting of self-reports from 44 STEM instructors (59.1% male, 34.1% female, 6.8% did not report gender; 68.2% White, 11.4% Asian, 6.8% Hispanic, 4.5% Multiracial, 9.1% did not report race/ethnicity; M_{age} = 46.1 years) at a large, public Midwestern university, and 765 undergraduate students (33.6% male, 65.2% female, 0.5% other, 0.7% did not report gender; 70.6% White, 3.5% Black, 3.4% Hispanic, 9.4% Asian, 11.6% Biracial/Multiracial, 0.7% other, 0.8% did not report race/ethnicity) who were enrolled in one of their courses. Both instructors and students reported on: (a) instructors' engagement in 13 growth mindset teaching behaviors that were sourced from qualitative research with college students (Kroeper, Muenks, et al., 2022; $\alpha = 0.71$ for instructors and $\alpha = 0.90$ for students)[3], and (b) instructors' mindset beliefs (for students, this was a 6-item scale with $\alpha = 0.90$; for instructors, this was assessed with a single item used in prior mindset research; see Supplemental Materials for more details). Thus, we were able to link student and instructor reports of instructor mindset beliefs and behaviors.

3.2 Findings from our dataset in response to Question 2

Regarding the question of alignment between instructor behaviors and instructor beliefs, we found that from the *student* perspective, perceptions of instructor growth mindset behaviors were moderately associated with perceptions of instructor growth mindset beliefs, $B = 0.38$, $p < .001$ (see Fig. 2 for visual depiction; and see Supplemental Materials for more details about all reported analyses). This was unsurprising, as the particular set of growth mindset teaching behaviors we examined came

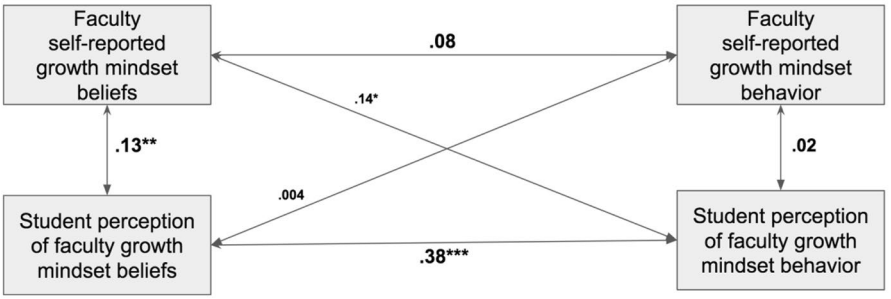

Fig. 2 Standardized associations among variables controlling for students' personal mindset beliefs. This conceptual diagram displays simple relations among variables; statistical significance is noted: *$p < .05$, **$p < .01$, ***$p < .001$

[3] See Supplemental Materials for exact items and response scales (Table S1) and results of a principal components analysis (pp. 9–11, Tables S3-S4 and Figure S2).

from *student-led* focus groups—that is, these behaviors were identified by students as communicating instructors' growth mindset beliefs (Kroeper, Muenks, et al., 2022). These behaviors included explicit messages that everyone can succeed, placing value on student learning and development, providing many opportunities for practice and feedback, and providing extra help to struggling students. However, from the *instructor* perspective, there was no detectable association between their self-reported growth mindset beliefs and behaviors, r=.08, p=.61. In other words, instructors who reported stronger growth mindset beliefs did not necessarily report engaging in teaching behaviors that signal growth mindset beliefs to students.

This finding suggests that for students, there may be a coherent mindset *meaning system* framework (Dweck & Yeager, 2019; Molden & Dweck, 2006; Murphy et al., 2021) that brings together a set of beliefs, goals, and behaviors, leading students to perceive their instructors who engage in this set of behaviors as having stronger growth mindset beliefs (e.g., Gentry et al., 2002; Kunter & Baumert, 2006; Wagner et al., 2016). However, consistent with the actor-observer phenomenon (Jones & Nisbett, 1971), instructors—as the actor (not observer) in the classroom—may conceptually organize their own messages and behaviors differently from students (as the observers). Instructors may not view this *particular* set of behaviors (identified by students) as being related to their growth mindset beliefs. In other words, this set of behaviors does *not* yet form a coherent mindset meaning system for instructors—though perhaps with instruction and explanation, it could. It is also possible that instructors' beliefs only predict certain dimensions of their behaviors (or specific behaviors) and not others. Importantly, our measure of growth mindset behaviors did not include all possible growth-oriented behaviors that instructors could engage in, nor did it separate these behaviors into specific dimensions or categories.

In conclusion, although some literature suggests that instructors with growth mindsets tend to engage in growth mindset teaching behaviors, other literature (and data we collected) suggest this may not always hold true. Instructors endorsing growth mindset beliefs do not always engage (or, at least, *perceive* themselves as engaging) in the particular behaviors that signal growth mindsets to students, either because these instructors lack knowledge of the particular behaviors that are meaningful to students or because they have misconceptions about what a growth mindset means (e.g., a "false growth mindset").

4 Question 3: Do students and instructors in the same classroom agree about instructors' beliefs and behaviors?

If instructors report endorsing growth mindset beliefs and engaging in growth mindset teaching behaviors, do their own students also perceive them as having these beliefs and engaging in these behaviors? This question is critically important to examine, because disconnects between instructors' reports and students' perceptions could mean that instructors are missing opportunities to communicate growth mindset messages (or unwittingly communicating fixed mindset messages) to their students.

No studies to our knowledge have explored instructor-student disconnects with respect to mindset beliefs and behavior. However, when exploring instructor-student

disconnects broadly, researchers find only low to moderate correspondence between instructors' self-reported behaviors and students' perceptions of instructor behaviors (e.g., Bardach et al., 2018; Barger, 2018; Desimone et al., 2009; Feldlaufer et al., 1988; Fisher & Fraser, 1983; Fraser & O'Brien, 1985; Ryan et al., 1998; Wagner et al., 2016). Indeed, one of the more robust findings in the education literature is that instructors tend to evaluate their own behavior more favorably than do their students (e.g., Fisher & Fraser, 1983). Thus, it is reasonable to expect that instructor self-reported mindset beliefs and behaviors will be somewhat inconsistent with students' perceptions of them.

4.1 Findings from our dataset in response to Question 3

In our dataset of 44 instructors and the 765 students enrolled in their classes, we found a small, positive association between instructor-reported growth mindset beliefs and students' perceptions of instructor growth mindset beliefs, $B=0.13$, $p=.01$ (see Fig. 2). That is, students tend to *agree* (somewhat) with their instructors' self-reported mindset beliefs. However, we did not detect any association between instructor-reported growth mindset behavior and students' perceptions of instructor growth mindset behavior, $B=0.02$, $p=.82$. That is, students tend to *not* agree (but also not disagree) with their instructors' self-reported mindset behavior. The modest student-instructor agreement in beliefs suggests that there is *some* communication of beliefs occurring in the classroom. Students are picking up on whether their instructor endorses stronger growth or fixed mindset beliefs. However, because there was no detectable student-instructor match for mindset *behavior*, instructors may be communicating their mindset beliefs via other types of behaviors not captured in these data. It is also possible that behavior is perceived differently from the actor (vs. observer) perspectives; instructors may report on their behavior in more nuanced ways that consider their specific role and the situation or context—whereas students report more holistically on instructor behavior. Or, perhaps, instructors are sending mindset-relevant messages that students are detecting but instructors are unaware of.

5 Question 4: Where should researchers target interventions aimed at promoting growth mindset cultures?

These instructor-student disconnects lead to another important question that we could explore with our data. When trying to understand what *best* predicts students' perceptions of instructor mindset beliefs, what emerges as the most important factor? Is it what the instructor says they believe (instructor-reported mindset beliefs), how the instructor says they behave (instructor-reported behaviors), or how students perceive the instructor to behave (students' reports of their instructor's behaviors)? This question has theoretical and practical implications for interventions aimed at creating growth mindset classroom cultures (Murphy et al., 2021). For example, if instructors' self-reported mindset beliefs are most predictive of students' perceptions, it would suggest that interventions should focus on helping instructors adopt more growth-minded *beliefs*. If instructors' self-reported teaching behaviors are most predictive, interventions should focus on help-

ing instructors change their *behaviors*. However, if the strongest predictor are *students' perceptions of instructor behaviors*, then intervention efforts may be best spent on: (a) educating instructors about the teaching behaviors that students *perceive* as diagnostic of instructor mindset beliefs, (b) helping them enact the behaviors most likely to influence students' perceptions, and/or (c) helping students better perceive instructors' growth mindset implementation.

Previous research suggests that student-reported instructional practices are generally a stronger predictor of student motivation than corresponding instructor-reported practices (e.g., Lauermann & Berger, 2021; Schiefele & Schaffner, 2015), though no study has examined this question in the mindset domain. For example, in the domain of autonomy support, Lauermann and Berger (2021) found a moderate association between teacher- and student-ratings of teacher autonomy support; however, it was students' *perceptions* of teacher autonomy support that were ultimately most strongly related to students' emotional, behavioral, and cognitive engagement. Further, researchers have found that when students perceive more transparency about their instructors' teaching and learning practices, including why their instructors are structuring learning activities in a particular way (e.g., using the transparency in learning and teaching or TILT framework), they demonstrate better academic outcomes (Winkelmes et al., 2016).

5.1 Findings from our dataset in response to Question 4

So, we again turned to our dataset of 44 instructors and their 765 students. We found that students' perceptions of instructor behavior were indeed the strongest predictor of students' perceptions of instructor mindset, $B=0.40$, $p<.001$. Neither instructors' self-reported growth mindset beliefs, $B=0.07$, $p=.06$, nor instructors' self-reported growth mindset teaching behavior, $B=-0.02$, $p=.66$, were discernibly related to students' perceptions of instructor mindset (see Table 1). This finding is consistent with previous research showing that it is what students *perceive* instructors as doing in class, and not just what instructors *self-report* doing, that most strongly predict students' outcomes (e.g., Lauermann & Berger, 2021; Schiefele & Schaffner, 2015; though see Park et al., 2016). Thus, intervention efforts may be best spent on educating instructors about the behaviors students *perceive* as communicating instructors' growth mindset beliefs; helping them enact the behaviors most likely to influence student perceptions; and/or helping students better perceive instructors' growth mindset implementation.

Table 1 Student and instructor beliefs and behaviors predicting students' perceptions of instructor mindset beliefs

	B	SE	95% CI	*p*-value
Intercept	4.82	0.04		<.001
Students' personal mindset beliefs (covariate)	0.34	0.04	0.26, 0.42	<.001
Instructors' self-reported growth mindset beliefs	0.07	0.04	−0.01, 0.15	.056
Instructors' self-reported growth mindset behavior	−0.02	0.04	−0.10, 0.06	.664
Students' perceptions of their instructor's growth mindset behavior	0.40	0.04	0.32, 0.48	<.001
R^2	0.30			

Note. B = standardized coefficient (effect size); SE = standard error; CI = confidence interval

6 Implications and future directions

Mindset scholarship has shifted to understand mindset as a *dynamic system*, in which instructors' intentions, instructors' implementation, and students' perceptions (Murphy et al., 2021) influence and feed off each other to create a mindset culture. Here, we synthesize this developing literature, and answer key theoretical questions with a unique dataset that includes student and instructor reports of instructor mindset beliefs and behaviors. It is helpful to understand the teaching behaviors that are theoretically associated with instructor growth mindsets (and growth mindset cultures), but this is not enough. We also must understand how instructor growth mindset is signaled in real classrooms and the extent growth mindset behaviors are enacted and perceived as such by students. There are many ways that these processes can break down; understanding these potential problems can provide important insights for teaching practice and intervention development.

6.1 Problem 1: Instructors with growth mindsets are inconsistently engaging in growth mindset behaviors

Current research suggests instructors' growth mindset beliefs may not always be translated into growth mindset behaviors (Barger et al., 2022; Buttrick, 2020; Patrick & Joshi, 2019). As discussed, there are several potential reasons for this disconnect. First, instructors may hold inaccurate or under-developed ideas about what growth mindset is, and thus not engage in behaviors consistent with a true growth mindset (e.g., Buttrick, 2020; Patrick & Joshi, 2019). Second, instructors may lack a coherent meaning system about the teaching behaviors that signal growth mindsets, and instead see their behaviors as isolated or distinct, rather than interconnected and building toward a growth mindset culture (consistent with the present data). Future intervention efforts could help instructors form a more coherent meaning system through a deeper understanding of a "true" growth mindset and the teaching behaviors that authentically follow.

6.2 Problem 2: Instructors are unwittingly communicating a fixed mindset to students

Even when instructors engage in behaviors that are theoretically consistent with growth mindset beliefs—like explicit messages that everyone can succeed, placing value on student learning and development, providing ample opportunities for practice and feedback, and providing additional support to struggling students (Kroeper, Muenks, et al., 2022; Kroeper, Fried, et al., 2022)—their behaviors may be misperceived by *students* as communicating a fixed mindset (consistent with the present data). For example, frequent quizzing is theoretically a growth-oriented practice, as it allows for students to have lots of low-stakes practice and opportunities to improve their knowledge or skills (e.g., Yang et al., 2021). However, *students* may perceive this as more of a fixed mindset practice designed to weed out weaker students. Thus, it seems important for instructors to both understand how their teaching behaviors might be perceived by students (and recognize that this may differ from their own interpretations) and to clearly explain *how* certain theoretically-consistent practices (like frequent low-stakes quizzing) promote growth and development, so that students perceive the practice as growth-oriented.

6.3 Problem 3: Students fail to notice instructors growth mindset behaviors

Another problem occurs when instructors engage in growth mindset behaviors, but their students simply do not notice.[4] Many growth mindset teaching behaviors could go under-the-radar, occurring without student awareness. This may be especially true for verbal and written growth mindset messages, as sometimes students are not paying attention in class or fail to read emails closely (or at all) and thus miss these messages. Thus, there is potential for these messages to get "lost." One possible solution is for instructors to incorporate consistent growth mindset messages into all aspects of teaching (e.g., the syllabus, emails, lectures, one-on-one meetings with students, and so on), creating a coherent growth mindset culture that together signals to students that the instructor believes students can learn and develop.

However, even the most enthusiastic growth mindset instructor may slip up and communicate a fixed mindset message from time to time. This could lead to "mixed mindset messages" which could come in several forms—either via explicit messages that communicate both growth and fixed mindsets at the same time (Muenks et al., under review) or via explicit messages that do not match policies (i.e., growth messages with fixed policies or vice versa; Hecht et al., 2022). One potentially interesting area of future research is to explore how students' personal beliefs serve as a lens through which they interpret what instructors are saying and doing in class, such that ambiguous behaviors are interpreted as growth-oriented by students who have more of a growth mindset but as fixed-oriented by students who have more of a fixed mindset (Muenks, Yan, et al., 2021). It also could be that students' personal mindsets differentially orient students' attention and influence what students attend to, encode, and remember instructors saying or doing in class—resulting in a confirmation bias of sorts (Dweck & Yeager, 2019; Muenks, Yan, et al., 2021; Murphy et al., 2021). Since students' personal growth mindset beliefs relate to their perceptions of instructor growth mindset beliefs, it is possible that one way to intervene with students is to help them develop stronger growth mindset beliefs themselves. Another possible student-level intervention could focus on helping students better understand the science of learning, to show them how certain instructor behaviors (that they may currently perceive as ambiguous or even fixed-minded, like frequent quizzing) are meant to help them learn and grow.

6.4 Implications for mindset culture interventions

To change students' perceptions of their instructor's mindset beliefs, researchers must understand and consider students' perceptions of what instructors are saying and doing in class—which may be different from what instructors *think* they are saying and doing and, perhaps, what they are objectively saying and doing. While it still may be useful to intervene on instructor beliefs and behaviors directly—that is, by helping instructors develop stronger growth mindset beliefs (e.g., Heyder et al., 2023) and engage in

[4] Although students might also fail to notice fixed mindset behaviors on the part of their instructors, we do not consider this a problem because such fixed mindset perceptions are associated with a host of negative consequences for students, like decreased motivation and performance (Muenks et al., 2020). Rather, the bigger issue arises when instructors are trying to create a growth mindset culture, but students fail to perceive their efforts.

behaviors that communicate these beliefs (e.g., Canning et al., 2024; Hecht, Bryan, et al., 2023)—instructors should know that what their students perceive them to do matters too. As mentioned above, one approach could be to target students themselves, helping them make more growth-oriented attributions of their instructors' behavior, particularly those behaviors that may be ambiguous to students or that may tend to be (incorrectly) perceived as being fixed-minded. However, we argue that it would be ideal to pair student-level interventions with instructor-level interventions to ensure that instructors are, in fact, engaging in growth-oriented behaviors and also making efforts to clarify the meaning of these behaviors and practices to their students (Canning & Limeri, 2023).

Researchers and practitioners working on institutional change at the *instructor* level should focus efforts on (a) helping instructors understand the role their mindset beliefs play in student performance (e.g., Canning et al., 2019); (b) more intentionally signal growth mindset beliefs to their students; and (c) help instructors disambiguate potentially vague or ambiguous mindset messages so that students detect them as intended (Muenks et al., under review; Kroeper, Fried, et al., 2022; Ozier, 2023). To achieve these goals, perhaps instructors could gauge what their students are perceiving by directly asking students about their perceptions. Instructors could also make their growth-minded intentions explicit to students, clarifying that the reason they engage in certain behaviors or have particular classroom policies is because they want to support student learning and growth—and this approach may be particularly useful for behaviors that are more vague or ambiguous. This approach would be in line with transparency in learning and teaching (TILT) methods that encourage teachers to explain why they are engaged in specific behaviors in class (revealing teachers' meta-cognitive processes to students; Winkelmes et al., 2016). The more instructors can explain that what they say and do in class is meant to help students learn and grow, the more they will be perceived by students as having a growth mindset.

Developing and rigorously evaluating the efficacy of such instructor-focused intervention strategies is needed, and we do not want to minimize the very real challenges of implementing and scaling instructor-focused interventions across diverse schooling contexts (see Hecht, Bryan, et al., 2023, for example). In many educational contexts, instructors are already overstretched and burnt out (Marken & Agrawal, 2022). The above-mentioned recommendations—to gather student perceptions about instructor mindset and increase transparency by making growth-minded intentions explicit—may feel like yet another task to add to an already extensive list. Additionally, there may be added challenges to instructor implementation when instructors and students come from different backgrounds and have different experiences (Cohen et al., 1999; Yeager et al., 2014). More research is needed to determine when, where, and how instructor-focused interventions work best and these interventions will need to be developed and tested within authentic educational settings (Bryan et al., 2021). However, our data offer preliminary evidence that if instructors can intentionally engage in growth-oriented teaching practices, it may communicate to students that they endorse more growth mindset beliefs which have been linked to students' motivation, engagement, and achievement (e.g., Canning et al., 2019; Fuesting et al., 2019; Hecht et al., 2022, Hecht, Bryan, et al., 2023; Heyder et al., 2020; Heyder & Brunner, 2018; LaCosse et al., 2021; Lou & Noels, 2020; Muenks et al., 2020, Muenks, Yan, et al., 2021; Rattan et al., 2018; Schmidt et al., 2015).

Supplementary Information The online version contains supplementary material available at https://doi.org/10.1007/s11218-024-09948-6.

Acknowledgments We would like to acknowledge Dorainne Green, Elise Agbadu, and Heidi Williams for help designing the surveys and assisting with data collection. Thank you to Benjamin Oistad and Shahana Ansari for leading data collection efforts, and to the undergraduate research assistants in the Mind and Identity in Context Laboratory at Indiana University, who assisted with data collection. Thank you to Julie Sievers who provided comments on an earlier draft. This research was supported by NSF grants (DRL-1450755 and HRD-1661004) awarded to M.C.M.

Declarations

Conflicts of interest There are no conflicts of interest to report. Institutional Review Board (IRB) approval was obtained prior to data collection. All participants gave informed consent.

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