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Authority, Autonomy, and Agency in Mathematics Education Research: A Systematic Review of Conceptualizations

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ABSTRACT

In this systematic review, we examine the conceptualization and historical grounding of the terms authority, autonomy, and agency within mathematics education research. These constructs are central to understanding power dynamics and fostering equitable participation in mathematical learning environments. Our review includes 36 empirical studies published up to 2021, analyzing their definitions, theoretical foundations, and intertextual references. Through a taxonomic and domain analysis, we identify seven distinct domains: mathematical authority, authority structures, authority relationships, autonomy as choice, sociomathematical autonomy, agency of the self, and agency through racial identities. Findings highlight the field's reliance on foundational theories, such as Weber's framework of authority, Piaget's developmental perspectives on autonomy, and Bandura's conceptualization of agency, often without deep engagement with their implications for contemporary educational contexts. While these constructs are frequently invoked, their inconsistent definitions and overlapping usage create conceptual ambiguity. Our analysis underscores the need for greater theoretical clarity and attention to the collective dimensions of autonomy and agency, which remain underexplored. We call on researchers to critically engage with the historical and epistemological roots of these constructs, explore their intersections, and prioritize equity-focused research. By offering a detailed taxonomy, this review provides a foundation for advancing theoretical precision and practical application in mathematics education.

Keywords: Authority, autonomy, agency, term analysis

Introduction

In mathematics education, relationships of power profoundly shape who is seen as knowledgeable, competent, and capable of autonomous action (Langer-Osuna & Esmonde, 2017). These dynamics influence classroom interactions within the broader development of learner identities which are constructed moment-by-moment and over time (Dunleavy, 2015; Gresalfi & Cobb, 2006; Gresalfi et al., 2009). Addressing these relationships requires an understanding of how power is distributed, negotiated, and contested within mathematics classrooms. To this end, researchers have explored power dynamics from diverse theoretical and methodological perspectives, including positional analyses (e.g., Wagner & Herbel-Eisenmann, 2014a; Wood, 2016), narrative approaches (e.g., Langer-Osuna, 2016), and interactional perspectives (e.g., Gresalfi & Cobb, 2006; Gresalfi et al., 2009).

Central to these discussions are the constructs of authority, autonomy, and agency, which have substantial implications for understanding power in mathematics education. These constructs are frequently central to efforts to design equitable learning environments. For instance, the National Council of Teachers of Mathematics' *Catalyzing Change* series (NCTM, 2018; 2020a; 2020b) explicitly calls for fostering student agency and shifting authority in ways that support equitable participation. However, despite their widespread use, authority, autonomy, and agency are often poorly defined within the research literature. Their overlapping conceptualizations, frequent interchangeable usage, and lack of clarity contribute to theoretical ambiguity and impede the development of actionable frameworks for understanding and addressing power in mathematics education.

This gap in clarity and precision highlights a pressing need to critically examine how these constructs have been defined, theorized, and operationalized over time. By tracing their histories and identifying their epistemological and ontological underpinnings, researchers can gain a deeper understanding of the assumptions that shape current scholarship and practice. Moreover, clarifying these constructs is essential for advancing equity in mathematics education, as vague or inconsistent definitions risk reinforcing, rather than challenging, existing power hierarchies.

In this paper, we seek to illuminate the histories, conceptualizations, and theoretical groundings of authority, autonomy, and agency in mathematics education. Using a systematic review of 36 empirical studies, we analyze how these three constructs have been defined and employed in the field. By categorizing these studies and identifying patterns across time and contexts, we aim to provide clearer distinctions and definitions that can guide future research and practice.

Aim of the Paper and Research Question

This paper aims to provide a systematic review of the math education research literature to illuminate the specific histories, traditions, and approaches to authority, autonomy, and agency in mathematics education research. By analyzing how these constructs have been conceptualized over time, we seek to clarify their definitions, theoretical groundings, and the implications for understanding relationships of power in mathematics education.

Research Question

We center our review on the research question: *How have authority, autonomy, and agency been conceptualized in mathematics education research over time?*

Through this systematic review, we define the varying conceptualizations of authority, autonomy, and agency, highlighting distinctions and overlaps across empirical studies. Additionally, we report on the epistemological underpinnings of each construct and explore their implications for research on power dynamics in mathematics education.

Methods

Literature Search Procedures

To conduct this systematic review, we adhered to the guidelines of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA; Alexander, 2020). We searched five primary academic databases: Academic Search Complete, Education FullText, ERIC, JSTOR, and ProQuest. These databases were selected to ensure comprehensive coverage of mathematics education research while maintaining focus on high-quality, peer-reviewed sources. Academic Search Complete, Education FullText, and ERIC were chosen based on Alexander's (2020) recommendations to ensure saturation of the literature. JSTOR was used to supplement these databases as it houses key journals in mathematics education (e.g., *Journal of Research in Mathematics Education, Educational Studies in Mathematics,* and *For the Learning of Mathematics*). ProQuest was intentionally included to capture published dissertations and expand the dataset beyond traditional journal articles.

We included studies published up to 2021, as our goal was to capture the historical development of the terms "authority," "autonomy," and "agency" in mathematics education research. The search was conducted using these terms as keywords, requiring their presence in the title, abstract, or keywords of the identified studies. While books, theoretical/philosophical articles, and conference proceedings were not included in the empirical dataset, their contributions to the conceptual framing of authority, autonomy, and agency are acknowledged in the discussion section of this paper. The exclusion of these sources was guided by the focus of this review on empirical studies that provide direct evidence of how these constructs are conceptualized in educational practice. We discuss this more in the following section.

Inclusion/Exclusion Criteria

In selecting studies for this review, we developed clear criteria to ensure our analysis remained on the constructs of authority, autonomy, and agency in mathematics education research conceptualized and operationalized in empirical research. Our primary inclusion criteria was whether these terms were explicitly central to the study. Thus, a study must place one or more of these constructs at the center of its research questions, design, or analysis. We included only empirical studies that provided sufficient methodological detail (e.g., on data collection, study context, and analytic approach) to allow for systematic comparison and synthesis across studies.

To maintain a coherent and methodologically rigorous dataset, we excluded non-empirical sources, such as theoretical or philosophical papers, policy documents, and conceptual essays. These works, while often important for understanding the constructs in question, do not offer the kind of empirical grounding required for our domain and taxonomic analysis. However, because many of these texts are frequently cited within the 36 empirical studies, we will highlight select non-empirical works in our discussion to support the conceptual framing of our findings. In this way, our engagement with non-empirical sources is more interpretive, since they were not included in the analysis of the dataset. Yet, we drew upon select non-empirical works to help situate the patterns across empirical studies within broader theoretical conversations.

We also excluded studies that only referenced authority, autonomy, or agency in passing. For example, when some articles only mention the constructs within their implications or conclusions, without meaningfully engaging with constructs as part of their analytic focus. In addition, we chose to exclude conference proceedings, given the variability in their peer review standards, and instead focused on journal articles and dissertations to ensure high-quality methodological rigor.

Finally, while our search was limited to studies written or translated into English, and was focused primarily on journal articles and dissertations, we applied no restrictions based on grade level, population, or geographic location. These parameters allowed us to capture a wide range of learning contexts, including studies involving children, teachers, and families, to reflect the diverse settings in which these constructs are often negotiated in mathematics education.

Dataset Construction

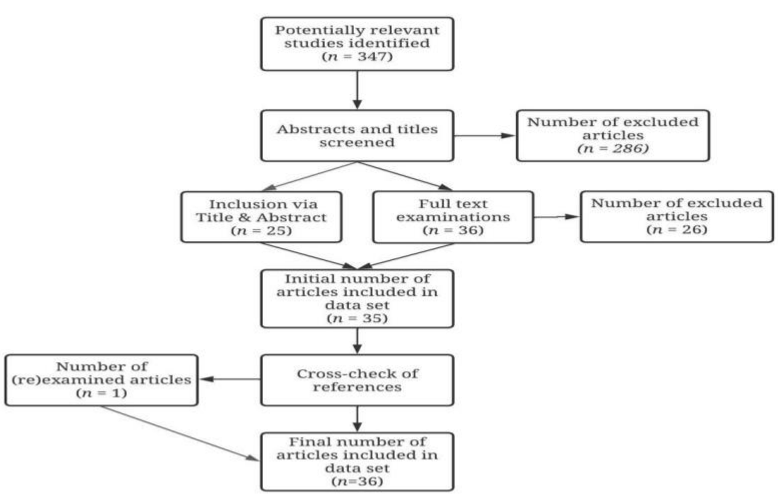
Our initial search, guided by the inclusion/exclusion criteria outlined above, identified 347 studies as potential candidates for this systematic review. These studies were screened in multiple stages to ensure alignment with the research question and focus of this review. Figure 1 outlines the step-by-step construction of the final dataset.

In the first stage, we screened the titles and abstracts of all 347 studies. At this stage, 286 studies were excluded for not meeting one or more of the inclusion criteria, such as the absence of an explicit focus on authority, autonomy, or agency. This process resulted in a subset of 61 studies deemed potentially relevant. The second stage involved a more detailed review of the abstracts of these 61 studies, with particular attention to whether authority, autonomy, or agency was central to their focus. This step identified 25 studies in which one or more of these constructs were explicitly discussed in the title or abstract. These 25 studies were immediately included in the final dataset. For the remaining 36 studies, we conducted a full-text review to determine their alignment with our inclusion criteria. This deeper examination resulted in the inclusion of 10 additional studies that explicitly addressed authority, autonomy, or agency, bringing the total to 35 studies.

To ensure saturation and mitigate the possibility of overlooking key studies, we cross-checked the reference lists of these 35 articles. This cross-referencing process identified one additional study that met the inclusion criteria, which was then added to the final dataset. This step also helped confirm that no major studies within the scope of this review were missed. The final data set comprised 36 articles. Through this process, we ensured that the final dataset reflects the empirical research explicitly centered on authority, autonomy, or agency in mathematics education. The rigorous screening and cross-referencing process provided confidence in the comprehensiveness of the dataset, while also highlighting key works outside the inclusion criteria that contribute to the conceptual understanding of these constructs, which are discussed in subsequent sections.

Figure 1

Flow diagram of study selection process



Logic of Analysis

To explore how authority, autonomy, and agency have been conceptualized in mathematics education research, we adopted a multi-faceted ethnographic research perspective (Green et al., 2015). This approach allowed us to examine published articles as artifacts, or textual representations of the theoretical and methodological choices made by researchers. By positioning ourselves as "readers-as-ethnographic-analysts," (Green et al., 2015, p. 27) we sought to uncover the epistemological roots, theoretical orientations, and conceptual frameworks embedded within these studies. This perspective guided our analysis, enabling us to trace the histories and relationships that underpin the conceptualizations of these three constructs.

Our analysis began with a categorization of studies, grouping them by their primary focus on authority, autonomy, or agency. This initial step provided a foundation for organizing the literature and identifying patterns of emphasis within the field. We then turned to the temporal dimension, constructing a timeline of the included studies, as suggested by Green et al. (2015). Mapping these studies chronologically revealed how the conceptualizations of authority, autonomy, and agency have evolved over time, as well as how certain ideas have shaped, intersected, or diverged across the literature.

To deepen our understanding, we conducted a line-by-line analysis of each article, drawing on Green's (1983) domains to systematically examine key elements such as the study's purpose, definitions, settings, theoretical orientations, and methodologies. This process allowed us to engage closely with the text, uncovering both explicit and implicit ways these constructs were defined and operationalized.

A critical component of our analysis was intertextual mapping (Baron, 2019), which we used to better understand the over-time conceptualization of authority, autonomy, and agency in mathematics education. This method, rooted in the work of Bloome and Egan-Robertson (1993), refers to the juxtaposition of texts, words, and phrases, such as citations or quotations, that appear within and across documents to construct meaning. In academic writing, intertextuality is most literally visible in how authors cite, build upon, or challenge one another's work. We traced these relationships across the dataset by systematically documenting who cited whom, in what ways, and for what purposes. This process allowed us to uncover the interconnections between studies, revealing how constructs were taken up, defined, and evolved across time.

Through mapping, we were able to identify which studies functioned as seminal conceptual anchors, which were cited most frequently for definitional purposes, and how newer studies extended or contested earlier work. Intertextual mapping helped us determine the influence of individual studies and the patterns of conceptual borrowing and alignment that shaped the field's understanding of authority, autonomy, and agency. This lens enabled us to visualize the development of these constructs as an unfolding dialogue rather than a set of isolated contributions, adding depth to our analysis of how meanings have been constructed and sustained over time. Our maps are provided as figures in the following sections.

To identify and analyze across the many conceptualizations of authority, autonomy, and agency within the constructed dataset, we employed a domain and taxonomic analysis following Spradley's (1979/2016) ethnographic methods. Central to this approach is the logic of semantic relationships; we particularly used the relationship of strict inclusion ("X is a kind of Y") to structure each domain within the taxonomies. Domains were constructed through an iterative, recursive, and abductive logic (Agar, 2006), grounded in close textual engagement with each article. As we read across studies, we attended to the language researchers used to name, define, and distinguish constructs and examined the semantic boundaries that authors set between related terms. This analytic approach allowed us to systematically trace how specific conceptualizations of each construct (e.g., social authority or sociomathematical autonomy as a domain) were languaged by researchers within to fit within broader conceptual taxonomic categories (i.e., authority, autonomy, or agency). To identify the specific boundaries authors used to differentiate one form of a construct from another, we posed the same questions for each text: What kind of authority is being described? What are its attributes? How is it situated in relation to other forms of the construct? Through comparative reading, we noted where constructs overlapped, diverged, or evolved across contexts and time.

From these questions and comparative insights, we developed taxonomies to capture the internal organization of each construct and highlighted how conceptual distinctions were constructed, maintained, or refigured within the literature. This process reflects an emic, text-centered logic of inquiry grounded in our ethnographic stance, one that privileges the conceptual language and distinctions visible in the field's own discourse and honors how scholars have come to define authority, autonomy, and agency in mathematics education research.

By combining these analytic approaches, we were able to construct a comprehensive and nuanced picture of the field's engagement with these constructs. This multi-layered process illuminated the epistemological and theoretical underpinnings of the studies to provide insights into how these ideas have been shaped by and have contributed to broader discussions within mathematics education research.

Findings

The findings are based upon the analysis of the 36 reviewed studies. We organized findings around the three main constructs, authority, autonomy, and agency, as conceptualized in the field of mathematics education. We use both the plural and singular "they" when referring to authors of the included studies.

Taxonomy 1: Authority in Mathematics Education

Of the 36 included studies, 21 studies focused on researching and understanding authority as it relates to mathematics education. Based on a domain and a taxonomic analysis, we identified three kinds of authority domains: Mathematical Authority, Authority Structures, and Authority Relationships. Table 1 outlines the included studies within each domain. In the following section, each domain is described, and the characteristics of the findings are articulated.

Table 1

Authority Taxonomy

Taxonomy	*Domain*	*Studies*
Authority	Mathematical Authority	Wilson & Lloyd (2000)
		Hamm & Perry (2002)
		Inglis & Ramos (2009)
		Depaepe et al. (2012)
		Wagner & Herbel-Eisenmann (2014b)
		Dunleavy (2015)
		Kinser-Traut & Turner (2020)
		Solomon et al. (2021)
	Authority Structures	Herbel-Eisenmann & Wagner (2010)
		Wagner & Herbel-Eisenmann (2014a)
		Tatsis et al. (2018)
		Andersson & Wagner (2019)
		Ng et al. (2021)
	Authority Relationships	Amit & Fried (2005)
		Gerson & Bateman (2010)
		de Freitas et al. (2012)
		Langer-Osuna (2016)
		Langer-Osuna (2018)
		Langer-Osuna et al. (2020)
		Langer-Osuna et al. (2021)
		Lai & Baldinger (2021)

Intertextual Mapping of Authority Taxonomy

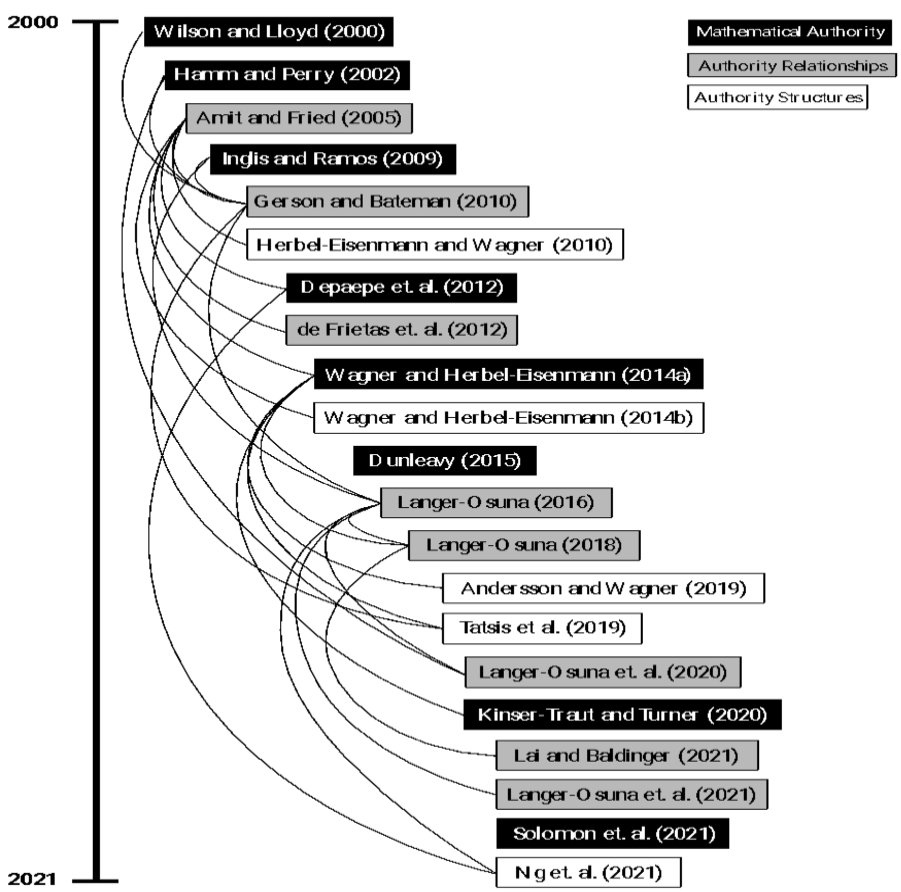
Intertextual mapping of studies made visible several findings of the authority taxonomy. Figure 2 outlines the ways studies intertextually drew on earlier conceptualizations of authority through citations. In the subsequent sections, we outline the specific domains that make up this taxonomy; however, there are several findings that are of interest to the entire taxonomy. Through tracing the citations of studies included in the taxonomy, a clear influence from a single theoretical conceptualization can be seen that has governed how authority has been defined, conceptualized, and studied. That dominant influence is the work of the prominent sociologist Max Weber. Of the 21 studies included in this taxonomy, seven studies directly and indirectly build on Weber's (1947) traditional authority definition. Although sometimes this is identified as a direct citation (i.e., Amit & Fried, 2005; Gerson & Bateman, 2010; Kinser-Traut & Turner, 2020; Langer-Osuna et al. 2020) in other studies Weber's influence can be traced indirectly through citing Pace and Hemmings (2007) for a definition of authority (Herbel-Eisenmann, 2010; Wagner & Herbel-Eisenmann, 2014a, 2014b).

Pace and Hemmings' (2007) study is a review of literature and the direct citation from their paper is in reference to Metz (1978), who summarizes Weber (1947). In Weber's (1925/1947) types of authority, legal authority refers to the rules or laws established through some sort of bureaucratic system. Traditional authority is characterized by social foundations people occupy and from which authority can issue commands (i.e., parent, teacher, mentor). Charismatic authority, in contrast, rests on followers' devotion to the exceptional sanctity, heroism, or exemplary character of an individual leader, granting legitimacy through personal magnetism rather than established rules or tradition (Weber, 1925/1947). Except for Amit and Fried (2005) and Gerson and Bateman (2010), the majority of studies on authority in mathematics education do not explicitly reference a particular type of Weber's authority upon which they are building, such as legal, traditional, or charismatic. Through tracing the definitions, we found that authors in the field of mathematics education most commonly build on Weber's concept of traditional authority.

While only seven studies were explicitly traced to the work of Weber, utilizing the intertextual tracing provided further implications of note. Specifically, the web of citations is vast within this taxonomy, most notably being influenced by Amit and Fried (2005). Only a few studies can be noted as not being influenced by the work of Weber on authority (Hamm & Perry, 2005; Inglis & Mejia-Ramos, 2009; Wilson & Lloyd, 2000). With most studies in this taxonomy being traced back to the work of Weber, understanding how these conceptualizations have adopted and extended Weber's concepts of authority is important and also addressed in the next section. Later, we return to the influence of Weber in the implications of this paper.

Figure 2

Authority Taxonomy Mapping



Mathematical Authority Domain

The domain of mathematical authority encompasses 8 studies of the 21 in the Authority taxonomy. This domain represents studies which have conceptualized authority as a constant in mathematics education; in other words, authority is viewed as something that is delegated (Dunleavy, 2015), shared (Kinser-Traut & Turner, 2020; Wilson & Lloyd, 2000), granted (Depaepe et al., 2012; Hamm & Perry, 2002; Inglis & Mejia-Ramos, 2009), or devolved (Solomon et al., 2021). Within this conceptualization, authority is viewed as a pedagogical tool that teachers utilize as part of their daily mathematical instruction. Authority is a unilateral exchange between teacher and students. In this domain, the teacher is perceived as a constant source of authority, and the focus of these studies trace how authority is distributed to students as a singular entity.

Beginning with Wilson and Lloyd (2000), the focus on mathematical authority centralizes around the process of distributing authority from teacher to students. The concept of distributing authority dictates that authority is ultimately held by the teacher, as both a position and a content expert (Wagner & Herbel-Eisenmann, 2014b). Dunleavy (2015), citing Gresalfi and Cobb (2006) (which was not included in the dataset due to being non-empirical), further articulates this process of distributing authority to focus on the degree to which students are given opportunities to make mathematical contributions within the learning of mathematics. A key distinction in this domain is that students are referred to and operationalized as a group that is viewed as subservient in their relationship to the teacher. Routinely cited in this domain, students occupy a position of receivers of knowledge (e.g., Depaepe et al., 2012). Because of this distinct relationship and conceptualization of authority, the underlying goal of studies in this domain is to examine how authority moves from the teacher to the students. For example, Hamm and Perry (2002) focus on how teachers often hold students "accountable for their mathematical ideas" (p. 135) through the process of distributing authority by inviting students to explain their ideas or thinking during lessons. Similarly, Kinser-Traut and Turner (2020) examine how one teacher began to distribute authority to students by including student-based instructional practices and approaches more frequently than teacher derived ones in whole-class discussions.

Authority Structures Domain

This literature review encompasses five studies for the domain of authority structures. This domain represents studies which have conceptualized authority as structures present in the mathematics classroom with established rules and norms for determining authority between teachers and students. these studies use positioning theory (Davies & Harré, 1990) to determine how people in mathematics classes are positioned as *in authority* or as *an authority* (Skemp, 1979). Wagner and Herbel-Eisenmann (2014a) articulate the distinctions between "being *an* authority because of one's content knowledge and being *in* authority because of one's position" (p. 872). In this domain, authority is again viewed as a constant in classroom-based mathematics, but the goal is to understand how it is structured (Herbel-Eisenmann & Wagner, 2010) and the ways specific authority structures are made visible and influenced by the discursive patterns of the teacher.

This domain builds from the work of Herbel-Eisenmann and Wagner (2010) and their study of lexical bundles in the classroom-based discourse of secondary mathematics educators. Herbel-Eisenmann and Wagner examined what they called stance bundles, or three or more words that frequently occur together in a similar register (e.g., I want you to, I'm going to do, you are going to do) that teachers discursively use to communicate feelings, attitudes, directions or judgments, to their learners. Based upon their analysis, they categorized four types of authority structures in classroom-based mathematics: *personal authority*, *demands of the discourse as authority, more subtle discursive authority*, and *personal latitude*. In their 2010 study, which they subsequently elaborated upon (Wagner & Herbel-Eisenmann, 2014a, Wagner & Herbel-Eisenmann, 2018), the different structures were defined through the lens of the positioning theory and the linguistic cues that illuminate the different structures in the classroom. *Personal authority* describes the ways teachers used personal pronouns (building from Fairclough, 2001) to position students to follow a specific perceived obligation or act in the classroom. Teachers relied on some sort of *personal authority* (as *in* or *an* authority) to provide directives for students to follow with no further justification offered. Indicators of this personal authority structure are evidenced when people follow directives of another without explicit reasoning (Herbel-Eisenmann & Wagner, 2010).

Demands of the *discourse as authority* are marked by the times that an external authority (other than the teacher) is referenced in the exchange between teachers and students. Some examples are visible when a teacher uses the personal pronoun, *we,* in statements such as *we are going to have to.* In later work (Andersson & Wagner, 2019; Tatsis et al., 2018; Wagner & Herbel-Eisenmann 2014a), this kind of authority was referred as *discourse as authority*, to note the explicit strong obligations for students within mathematics classrooms. In the *more subtle discursive authority*, stance bundles were marked as the times teachers were "thinking ahead, but this was a special kind of forward thinking, giving the sense that the speaker knows what will happen" (Herbel-Eisenmann & Wagner, 2010, p. 56). For example, a teacher might reference a test that will happen or reference a future event that a specific mathematics skill might be needed. Later, Wagner and Herbel-Eisenmann (2014a) updated this structure to *discursive inevitability,* to capture language that suggests an inevitable outcome despite the speaker being unaware of the probability of its occurrence. There is no underlying obligation; instead, this structure highlights that the upcoming actions are simply bound to occur. In a sense, there are no decisions to be made. The authority in this structure rests outside of the singular interaction between teacher and student. Finally, Tatsis and colleagues (2018) built upon *personal latitude* which refers to the situations in mathematics classrooms wherein people recognize they and others can make decisions about their actions. These situations are marked by open-ended questions or invitations for additional mathematics ideas or choices.

Authority Relationships Domain

The domain of *authority relationships* encompasses eight studies. This domain represents studies that conceptualized authority as a socially constructed relationship between people in mathematics classrooms. Within this domain, authority is viewed less as a constant; but instead, is examined through the different relations that develop among teachers and students as well as among students during collaborative learning endeavors. The focus of these studies remains within the interactions of people in mathematics classrooms; thus, much of this work involves analysis of particular social positionings. In essence, the *authority relationships* domain represents studies that examine who possesses authority in interactions and the ways authority influences different opportunities for learning mathematics.

Much of this domain stems from the work of Amit and Fried (2005) and their investigation of an eighth-grade mathematics classroom. Their analysis represents the first time in mathematics education research that authority was referred to as a social relationship constructed within the classroom settings. They also provide the most in-depth discussion of authority in educational settings of any of the included studies in this taxonomy. Because of their early work, studies in this domain shift from studying authority as "domination and obedience to negotiation and consent" (Amit & Fried, 2005, p. 164). This shift reconceptualized students from simple receivers of mathematical information to being co-participants in a community of learners who shape and develop different relationships of authority. Gerson and Bateman (2010) build upon this conceptualization from Amit and Fried (2005) to further denote that authority relationships encapsulate three axioms. First, authority is made visible through a relationship between two or more people. Second, authority relationships are illuminated by a change in behavior of one person based upon the actions of another. Third, the person with authority must maintain some sort of legitimacy that is recognized in the interaction.

Lai and Baldinger (2021) also build from Amit and Fried (2005) and their assertion of modeling authority relationships as *expert* or *shared*. According to Lai and Baldinger (2021), expert authority can take the form of teachers who expect to be treated by students as the final arbitrator of what work is produced and whether it is correctly done. Expert authority can also take the form of students who look to teachers to be told what to believe (Lai & Baldinger, 2021). Lai and Baldinger (2021) further note that "in contrast, shared authority leaves open the possibility that students can learn to be effective and legitimate arbiters of what mathematical work to take up and whether the reasoning holds" (p. 26). Much of the focus here, and the work that has built upon Amit and Fried (2005) is the relation between the students and the teacher during mathematics instruction. Lai and Baldinger (2021) even state that "authority relationships become visible in the ways students and teachers talk with one another" (p. 27).

Of the eight studies in this *authority relationships* domain, four are the work of Langer-Osuna and colleagues, which explicitly focus on the authority relationships among student peer interactions. Three studies (Langer-Osuna, 2016, 2018; Langer-Osuna et al., 2020) directly build from the *influence framework* (Engle et al., 2014) wherein the conceptualization of authority is further articulated to describe two specific types of authority: social and intellectual. Langer-Osuna (2016) first defines social authority as "the authority to issue directives to peers in the management of group dynamics" (p. 109) and later refines the definition in terms of relations between people. *Social authority* relations are enacted through interactions that position students as having the right to issue directives to their peers" (Langer-Osuna et al., 2020, p. 337). Langer-Osuna (2016) defines intellectual authority, through the lens of positioning theory (Davies & Harré, 1990), as "the positioning of students as credible sources of information pertinent to the particular task at hand" (p. 109). They further conceptualize this type of authority to again focus on relations between and among people by articulating that "intellectual authority relations are enacted through interactions that position students as credible sources of mathematical information" (Langer-Osuna et al., 2020, p. 337).

Clearly, much of the focus of authority relationships examines human interactions within classroom spaces. However, de Freitas and colleagues (2012) also assert that specific classroom-based objects might also exhibit authority in classrooms (e.g., the textbook, whiteboard, or anchor charts). While this addition of inanimate objects to the conceptualization of authority is briefly mentioned here, the inclusion of objects as authority do not reappear in other studies within this domain, revealing a present gap in understanding.

Taxonomy 2: Autonomy in Mathematics Education

Of the 36 studies included in this analysis, 7 explicitly highlight autonomy as it relates to mathematics education. Based upon a domain and a taxonomic analysis, two kinds of autonomy domains were made visible: autonomy as choice and sociomathematical autonomy. Table 2 outlines the included studies within each of the domains. In the following section, each domain is described, and the characteristics of the findings are articulated.

Table 2

Autonomy Studies Taxonomy

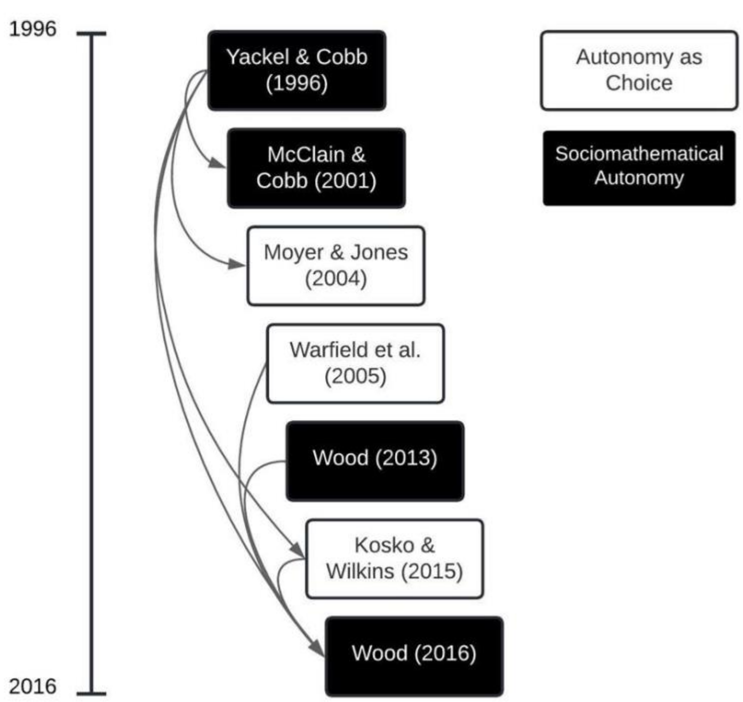
Taxonomy	*Domain*	*Studies*
Autonomy	Autonomy as choice	Moyer & Jones (2004)
		Warfield et al. (2005)
		Kosko & Wilkins (2015)
	Sociomathematical autonomy	Yackel & Cobb (1996)
		McClain & Cobb (2001)
		Wood (2013)
		Wood (2016)

Intertextual Mapping of Autonomy

Through the intertextual mapping of the included studies in the autonomy taxonomy, we uncovered that this subfield of mathematics education research is relatively small and not recently explicitly studied. In fact, with the exception of Wood (2016), studies in this autonomy taxonomy branch from one study that explicitly researched autonomy: Yackel and Cobb (1996). Figure 3 displays the intertextual citations in this taxonomy.

Figure 3

Autonomy Taxonomy Mapping



Autonomy as Choice

The domain of *Autonomy as Choice* encompasses three studies (Kosko & Wilkins, 2015; Moyer & Jones, 2004; Warfield et al., 2005). This domain represents authors whose studies conceptualized autonomy as giving students choice in their pursuits to do mathematics. These studies approach autonomy through the lens of freedom for the students in the classroom. For example, Kosko and Wilkins (2015) defined autonomy through students' individual "sense of control in the manner one engages in doing mathematics, while maintaining a sense of freedom in their engagement with mathematics" (p. 371). These studies focused on creating opportunities for students to freely engage in mathematics content, specifically that of whole class discussions. Warfield et al. (2005) focused on acts that were determined to be *autonomous,* or acts wherein a person senses that choices are free of outside influences. Meanwhile, Moyer and Jones (2004) focused more on shifting control from mathematics teachers to offer opportunities for students to self-select or choose preferred mathematics manipulatives during learning activities. In essence, the studies in this domain maintained that autonomy is creating opportunities for students or teachers through choices in their mathematical learning endeavors.

Sociomathematical Autonomy Domain

The domain of sociomathematical autonomy encompasses four studies (McCain & Cobb, 2001; Wood, 2013; Wood, 2016; Yackel & Cobb, 1996). This domain represents and builds on studies wherein authors conceptualize autonomy as being co-constructed through the practices of students and their teacher through mathematical learning opportunities. Here, autonomy is conceptualized as more than simply providing students choice in their use of manipulatives, representation procedures, or even correct answers. Instead sociomathematical autonomy maintains that students must also possess the freedom to decide and construct what counts as mathematics (Yackel & Cobb, 1996) and what it means to do mathematics (Wood, 2013, 2016).

Beginning with Yackel and Cobb (1996), autonomy is characterized in two ways: *social* and *intellectual*. Yackel and Cobb (1996) do not fully define social autonomy; instead, social autonomy is briefly mentioned as a benefit of inquiry-based approaches to teaching mathematics. By tracing cited studies (i.e., Cobb et al., 1991), we depended on Cobb and colleagues' chapter on radical constructivism, where we were able to define social autonomy. Here, social autonomy is conceptualized through Piaget's (1948/1973) notions of autonomous actions of children, namely the freedom to explore and experiment with the world around them. Thus, Yackel and Cobb (1996) conceptualize social autonomy as the freedom to interact with mathematics, peers, and mathematical tools.

Likewise, Yackel and Cobb's (1996) study is devoted to the development of what they refer to as intellectual autonomy. Yackel and Cobb (1996) cite Kamii (1985) to define and conceptualize intellectual autonomy as:

The conception of autonomy as a context-free characteristic of the individual is rejected. Instead, autonomy is defined with respect to students' participation in the practices of the classroom community. In particular, students who are intellectually autonomous in mathematics are aware of, and draw on, their own intellectual capabilities when making mathematical decisions and judgements as they participate in these practices (Kamii, p. 473).

Building on conception of intellectual autonomy from Yackel and Cobb (1996), Wood (2016) asserts that the definition of autonomy "reemphasizes the need for autonomous activity to include a decision about truth and untruth" (p. 331). They further ground the conceptualization of autonomy in the work of Piaget (1948/1957), in asserting that "intellectual autonomy is more than having a choice and more than having an answer. It is the student's process of reasoning about mathematical ideas by herself" (Wood, 2016, p. 331). Wood (2016) also presents autonomy through a communication lens as a students' intellectual autonomy in how they "wrestle with truth and untruth" (p. 332) of mathematical narratives in the classroom. Wood (2013) asserts that intellectual autonomy is crucial in students being able to communicate is more than the simple revoicing of their peers' or classroom teachers' thinking. Simply stated, intellectual autonomy is focused on students making decisions and communicating about what it means to do mathematics and for what purposes.

Agency in Mathematics Education

Of the 36 studies included in this review, eight explicitly focus on agency as it relates to mathematics education. Based upon our analysis, we made visible two kinds of autonomy: agency of the self and agency and racial identity. Table 3 outlines the included studies within the two autonomy domains. In the following sections, we outline the intertextual mapping, describe each domain, and articulate the characteristics of the findings.

Table 3

Agency Studies Taxonomy

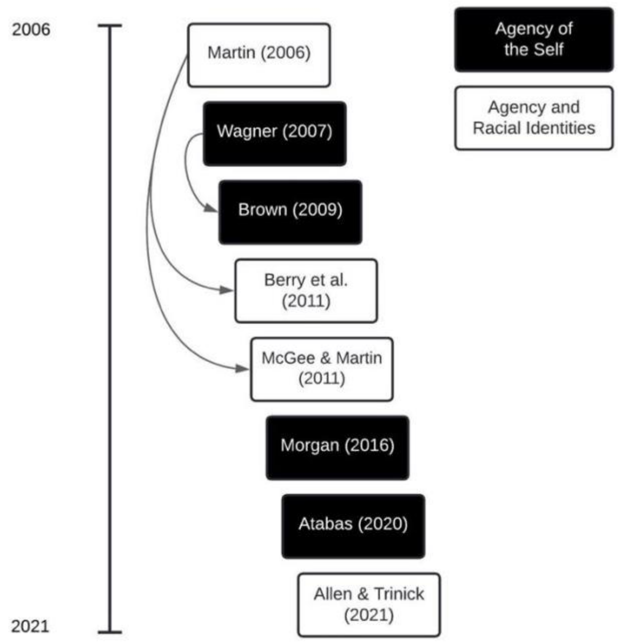
Taxonomy	*Domain*	*Studies*
Agency	Agency of the self	Wagner (2007)
		Brown (2009)
		Morgan (2016)
		Atabas et al. (2020)
	Agency and racial identities	Martin (2006)
		Berry et al. (2011)
		McGee & Martin (2011)
		Allen & Trinick (2021)

Intertextual Mapping Agency in Mathematics Education

The intertextual mapping of studies included in this agency taxonomy makes clear how disconnected the field is in terms of citations and connecting to prior work that explicitly researches agency in mathematics education. Figure 4 displays the studies included in this domain. Of the eight included studies in this literature review, only three studies explicitly cite prior work in this domain, furthering evidence of the isolated nature of studies that explicitly research agency. The domains of agency of the self and agency and racial identities are discussed below.

Figure 4

Agency Taxonomy Mapping



Agency of the Self

The domain of *Agency of the self* encompasses four studies (Atabas et al., 2020; Brown, 2009; Morgan, 2016; Wagner, 2007). Studies were included in this domain because they conceptualized agency through philosophical investigations of the *self* within mathematics classrooms. These studies view mathematics as a social institution that is made visible and constructed through discourse; thus, constructing the *self* is as much an individual as it is a discursive process within the larger mathematical culture for learning. Here, *self* refers to the individual within the larger space of the classroom. However, the individual is not understood as a singular person, but instead as a person who interacts and constantly develops through and with their peers.

Wagner (2007), Brown (2009) and Morgan (2016) view the *self* as individual awareness of how a singular student begins to understand their role within larger classroom discourses. Wagner (2007) and Morgan (2016) refer to this kind of agency as *human agency*. While both Wagner (2007) and Morgan (2016) use the term *human agency,* they each build from different theoretical groundings. Wagner (2007) uses the work of Pickering (1995). Wagner (2007) asserts the guiding question for conceptualizing agency, "who is said to be making things happen?" (p. 37). Morgan (2016) instead focuses on the "philosophical debates on the nature of mathematical discovery" (p. 123), and if mathematics is viewed as a human act. Here, Morgan referred to the understanding of *human agency* as it relates to how mathematical discoveries are conceptualized in school mathematics. Morgan (2016) questioned, where the *self* is in discussions of the origins of mathematical discoveries in school mathematics. While, Wagner (2007) and Morgan (2016) use the term *human agency,* Brown (2009) builds on a different concept of the *self*. Brown (2009) draws on the work of Cobb and Hodge (2002) when discussing agency. Brown (2009) focuses on how students begin to understand their abilities to be aware of the "social positions" (p. 182) students navigate while doing mathematics. Brown (2009) directly builds from Wagner (2007) when describing the importance of pronouns (i.e., I, me, you, her, we) to identify shifts in students' views of themselves in relation to the classroom community. Brown (2009) denoted how students view themselves as both mathematicians and as individuals who contribute and use a community of learners to know and do mathematics.

Similarly, Atabas et al.'s (2020) article is included in this domain, because the research focuses on the *self* through middle school students in classroom-based mathematics and the ways they understand their role within larger mathematical discourses. While still included in this domain, Atabas et al.'s (2020) study remains separate from the other three studies, because it approaches agency differently from the other studies. Atabas et al. (2020) researched agency through the concept of authority and autonomy, which is particularly troublesome due to a lack of clear theoretical grounding of either. Below, we include Atabas and colleagues' (2020) definitions of agency to illuminate their conceptualization as defined through other researchers.

Disciplinary agency (in the context of mathematics), involves the use of established procedural skills for computing the solution to a problem (Cobb et al., 2009; Grootenboer & Zevenbergen, 2007; Hull & Greeno, 2006). When the teacher is the authority, students may be provided few opportunities to reason mathematically to make sense of problems. Students instead must rely on the methodologies. Provided by the teacher—they are engaging only in disciplinary agency. (Atabas et al., 2020, p. 3)

Note that Atabas and colleagues (2020) use all three terms, authority, agency, and autonomy, when defining conceptual or disciplinary types of agency, which will be discussed in more detail in the Discussions and Implications section. In intertextually tracing their definition, we note that Cobb et al. (2009) categorize agency as *conceptua*l or *disciplinary* in nature. *Conceptual agency* involves student autonomy in which students are responsible for developing their own understanding of relationships between concepts (Cobb et al., 2009; Grootenboer & Zevenbergen, 2007). When authority is shared with students, students are positioned to understand when and for what purposes to use disciplinary tools to solve problems (Boaler & Greeno, 2000). In the following section, the second domain findings from the agency domain are described.

Agency and Racial Identity Domain

This second domain of agency encompasses four studies (Allen & Trinick, 2021; Berry et al., 2011; Martin, 2006; McGee & Martin, 2011). Studies were included in this domain because they have conceptualized agency through the lens of racial identities in mathematics education. In this domain of agency and racial identity, three of the studies explicitly focus on African American (Martin, 2006) and/or Black students (Berry et al., 2011; McGee & Martin, 2011). The fourth study focuses on the Indigenous Māori people of Aotearoa, New Zealand (Allen & Trinick, 2021). Except for Allen and Trinick (2021), the authors included in this domain did not formally define or conceptualize agency; instead, they used the term "agency" to describe specific actions of African American parents (Martin, 2006) and Black students (Berry et al., 2011; McGee & Martin, 2011). Beginning with Martin (2006), from which Berry et al. (2011) and McGee and Martin (2011) directly build, agency is used as way to articulate behaviors associated with individual actions to promote positive African American/ Black identities in mathematics education. To better understand this kind of agency, we traced the intertextual references to Martin (2000). All studies referenced Martin's (2000) book when describing agency in their studies (Berry et al., 2011; Martin, 2006; McGee & Martin, 2011). Martin's (2000) book, *Mathematics success and failure among African-American youth,* was not included in our review based on our inclusion criteria of only scholarly articles.

In Martin's (2000) book, agency is referenced in relation to the work of Bandura's (1986) Social Cognitive Theory. According to Bandura (1986), agency is the ability to influence the course of events of which one is a part. In this domain, agency is used to document those times that individuals influenced the course of events as they relate to their learning of mathematics. In conceptualizing agency through racial identities, agency is presented through the larger social, cultural, and racial contexts that affect historically excluded populations under investigation. For example, Martin (2006) researched African American parents' ability to demonstrate agency and the ways they negated particular racial influences (e.g., dominant white narratives in mathematics education) to maintain positive identity development for their African American children and community.

After tracing the intertextual references of agency cited in the studies within the domain, we noted that Allen and Trinick draw on Barker (2005) to state "concepts of agency involve an individual's capacity to act of their own free will to make autonomous choices" (p. 334). Barker's (2005) book *Cultural Studies: Theory and Practice* outlines several conceptions of agency from multiple sources (e.g., Bandura, Bourdieu, Foucault, Marx), making it difficult to determine which view of agency Allen and Trinick (2021) most rely upon in their study. They, Allen and Trinick (2021), explicitly build on the work of Bourdieu (1986) and the view of structure-agency, or the way groups of people take on and construct specific ways of interacting and being as part of belonging to a specific group. Thus, Allen and Trinick (2021) define agency through the lens of the entire Māori population and the ways the group develops their own free will and autonomous choices in opposition to largely white and western views of mathematics education.

Discussion and Implications

In this systematic review of literature, we used ethnographic perspectives to explore how authors have conceptualized and studied authority, autonomy, and agency in the published literature in the field of mathematics education. In the following section, we outline several points for the field to consider in reflecting upon existing mathematics education research and in moving forward with future studies.

Kinds of Authority, Autonomy, and Agency

One of the major contributions of this study is the illumination of the different domains of authority, autonomy, and agency concepts used within the field of mathematics education. Most studies reviewed for the current study did not clearly articulate their conceptualization of authority, agency, or autonomy, which contributes to a lack of understanding and clarity surrounding these terms and sometimes misuse amongst studies. Through our review of literature, we categorized a multitude of ways or domains that authority, autonomy, and agency have been used and could be used for future studies. Overall, theses thin conceptualization have led to multiple, differing definitions of the same term or even interchangeable, but fuzzy synonyms, without full understanding of the term used or its historical foundations. The current study demonstrates how each term has a rich history with particular denotations from prior work and connotations within the sociocultural contexts the studies take place. Because the field of mathematics education holds so many varying conceptualizations, a single definition for authority, for autonomy, or for agency cannot capture the essence of what each of these terms has come to mean in mathematics education. Therefore, Tables 4a and 4b are presented to capture the various conceptualizations of Authority, Autonomy, and Agency in mathematics education research gleaned from the current study.

Table 4a

Conceptualizations of Authority

Term	*Domain*	*Definition*	*Attributes*
Authority	**Mathematical authority**	Authority as a constant in mathematics education and viewed as something that is delegated, shared, granted or devolved between the teacher and students, as a collective.	Findings focus solely on the ways authority flows from the teacher to the students. Findings point to the importance of including students in the process of learning mathematics. Teachers employ strategies to distribute authority to students within every day mathematical learning.
	Authority structures	Authority as structures present in the mathematics classroom with established rules and norms for determining authority between teachers and students.	These studies use positioning theory (Davies & Harré, 1990) to determine how people in mathematics classes are positioned as *in authority* or as *an authority*. Characterized by the use of Herbel-Eisenmann and Wagner's (2010) authority structures. Studies focus on linguistic cues found within mathematics classrooms and the implications of authority structures between teachers and students.
	Authority relationships	Authority as a socially constructed relationship between people in mathematics classrooms.	Authority is viewed less as a constant but is examined through the different relations that develop among teachers and students as well as among students during collaborative learning endeavors. Findings are focused on how specific classrooms come to share authority, or the ways legitimacy is gained in different constructions of authority.

Table 4b

Conceptualizations of Autonomy, and Agency

Term	*Domain*	*Definition*	*Attributes*
Autonomy	**Autonomy as choice**	Autonomy as giving students choice in their pursuits to do mathematics.	Autonomy through the lens of freedom for the students in the classroom. These studies focused on creating opportunities for students to freely engage in mathematics content, specifically that of whole class discussions. Findings point to a constant thread of teachers giving choice for students to make decisions during mathematical learning opportunities is present.
	Sociomathematical autonomy	Autonomy as being co-constructed through the practices of students and their teacher through mathematical learning opportunities	Autonomy is more than choice but maintains that students must also have freedom to decide and construct what counts as mathematics. Autonomy is co-constructed between students and teachers in classrooms. It is focused on ways students develop autonomous actions and ways teachers can hinder autonomous actions. Yackel and Cobb (1996) can be credited as the first study in this domain.
Agency	**Agency of the self**	Agency through philosophical investigations of the *self* within the mathematics classrooms.	Mathematics as a social institution that is constructed through discourse; thus, constructing the *self* is as much an individual as a discursive process within the larger mathematical culture for learning. Findings show ways students view themselves in mathematics or ways teachers can support agency in their classrooms.
	Agency and racial identities	Agency through the lens of racial identities in mathematics education.	Findings show agency as both an individual endeavor and a collective stance in the face of oppressive mathematics education practices. Findings focus on the ways individuals and groups navigate oppressive educational systems. Studies offer supports to radically reconceptualize mathematics education.

Attending to Groundings of Authority, Autonomy, and Agency

This systematic review has illuminated the complexities inherent in conceptualizing authority, autonomy, and agency in mathematics education. Our findings reveal that while these constructs are widely discussed, their historical, epistemological, and ontological groundings are often insufficiently examined. This lack of sustained engagement with their theoretical roots has resulted in fragmented and occasionally ambiguous conceptualizations. For instance, while Weber's (1947) framework of authority, Piaget's (1948/1973) developmental theories on autonomy, and Bandura's (1986) work on agency are frequently cited, these foundational contributions are often engaged with only at a surface level, without deeper interrogation of their implications for contemporary educational contexts.
Furthermore, understanding how the constructs of authority, autonomy, and agency have been conceptualized in mathematics education research requires attention to the intellectual histories that have shaped the field. Foundational theories such as Weber's (1947) typology of authority, Piaget's (1948) developmental framing of autonomy, and Bandura's (1986) social cognitive theory of agency have provided essential starting points for examining classroom dynamics, learner identity, and participation. These frameworks have long guided efforts to make sense of students' roles and relationships in mathematics learning, offering conceptual language for describing influence, independence, and action within educational settings.

For instance, Weber's (1947) account of traditional authority has framed analyses of hierarchical structures in classrooms, while Piaget's (1948) focus on autonomy as a developmental milestone has supported understandings of individual mathematical reasoning and independence. Bandura's (1986) emphasis on agency as the capacity to act with intentionality has served as a foundation for identifying agentic moments within instruction.

While these frameworks remain influential, as our findings demonstrate, it is equally as important to note, they emerged from specific sociopolitical and historical contexts that differ from contemporary, dialogic, and culturally diverse views of classrooms. As we, as researchers, increasingly attend to the complex, situated, and relational nature of learning, it becomes necessary to explore theoretical perspectives that build upon, and also critically expand upon these early foundations. For example, Weberian accounts of authority may not fully capture the distributed or negotiated power structures that characterize many student-centered or collaborative learning environments (see Edelen et al., 2023; Edelen et al., 2024; Edelen et al., 2025). Similarly, Piagetian (1948) views of autonomy may overlook the ways that students co-construct classroom norms or collectively define what counts as legitimate mathematical reasoning. And individualist framings of agency may obscure how structural, cultural, and institutional constraints shape students' opportunities to act with power, particularly for those from historically marginalized communities.

Other frameworks offer complementary tools for reimagining these constructs. Foucault's (1977) theorization of power as relational and enacted through discourse enables researchers to trace how authority is constantly negotiated through language and interaction. Fairclough (2001) similarly shows how discourse both reflects and reproduces social power, making visible how language might legitimize or constrain different forms of mathematical reasoning. We also note that Bourdieu's (1986) concept of habitus and social fields directs attention to how authority, autonomy, and agency are structured by social positioning and access to cultural capital. These additional perspectives invite us, as mathematics education researchers to foreground the institutional, cultural, and discursive dimensions of classroom life.

In particular, we find distinctive value in ethnographic epistemological approaches to understanding authority, autonomy, and agency. Ethnographic approaches prioritize emic, insider perspectives and illuminate how learners themselves make sense of their roles, relationships, and learning experiences (Skukauskaitė, 2023). Ethnographic orientations offer a generative stance for tracing how children enact and contest power within everyday activity systems, allowing for a layered analysis of how constructs like authority, autonomy, or agency unfold over time, across settings, and within communities (Edelen & Skukauskaitė, 2025; Skukauskaitė & Green, 2023). By placing foundational and contemporary theories in dialogue mathematics education research can better account for the sociocultural, historical, and interactional complexities of classroom life. This kind of theoretical layering supports conceptual clarity and moves to advancing equity by attuning research to the diverse ways students come to exist, participate, and learn in mathematics classrooms for whom and for what purposes.

When theoretical roots are insufficiently explored, it constrains the development of new insights, limiting how these constructs can be operationalized and studied. For example, autonomy and agency have traditionally been framed as individual endeavors, reflecting the developmentalist focus of their origins. Such framings often fail to capture collective dimensions of these constructs, where groups or communities might act autonomously or agentically within mathematics classrooms. Although emerging work, such as Allen and Trinick's (2021) study of collective agency, begins to challenge this individualist paradigm, much remains unexplored about how shared agency and autonomy function in mathematics education.

Engaging deeply with the histories of these constructs is a necessary step in advancing their utility. By revisiting the foundational definitions and examining their evolution, researchers can better understand the assumptions that underlie current studies. For example, authority is frequently conceptualized as a unidirectional flow from teacher to student. This perspective often neglects how authority can be co-constructed or contested within classroom interactions. Similarly, the emphasis on autonomy as choice overlooks the sociomathematical dimensions of autonomy, where students make choices as well as negotiate the very definitions of what counts as mathematics.

The field must also critically evaluate how these constructs intersect. Authority, autonomy, and agency are not isolated phenomena as they are interrelated dimensions of classroom life. For instance, shifts in authority structures, such as when teachers share authority with children, may simultaneously impact how autonomy and agency are experienced and enacted. Understanding these intersections requires researchers to articulate the specific kinds of authority, autonomy, or agency they are studying and to consider how these constructs influence and shape one another.

Future Directions

To advance the study of authority, autonomy, and agency, we propose several critical directions for future research. First, researchers must engage more explicitly with the histories of these constructs, building on or contesting their foundational theories to generate new insights. This includes exploring underexamined dimensions such as collective agency and sociomathematical autonomy, as well as questioning how these constructs operate within evolving pedagogical and sociopolitical contexts. Deepening theoretical engagement across time and traditions will support more nuanced understandings of how power, participation, and identity are structured in mathematics education.

Second, the field must strive for greater conceptual clarity. Our review demonstrates that ambiguous or interchangeable uses of these terms have led to a lack of coherence across studies. Researchers must define these constructs with precision, specifying their attributes, boundaries, and implications for classroom practice. Such clarity strengthens individual studies, which in turn fosters cumulative knowledge-building that can guide both research and reflective practice. While the goal of this review was to clarify the conceptual terrain, the implications of this work extend beyond definitional precision. The three taxonomies developed here offer researchers a foundation for future empirical studies to investigate how these constructs are enacted in classroom teaching, teacher professional learning, and educational leadership. For example, researchers might examine how teachers navigate tensions between authority structures and student autonomy, or how sociomathematical autonomy is fostered through particular instructional practices. Similarly, teacher educators could use these conceptualizations to support preservice and in-service teachers in reflecting on their roles in constructing equitable mathematics learning environments. At the policy level, future research might explore how institutionalized definitions of authority and agency influence curriculum design, teacher evaluation, and broader accountability structures.

Finally, we urge researchers to continue investigating how authority, autonomy, and agency contribute to more equitable learning environments. Future research should include examining how these constructs operate within diverse cultural and social contexts, particularly for historically marginalized groups. By attending to the ways that authority, autonomy, and agency intersect with issues of identity, power, and access, the field can better address the complexities of teaching and learning mathematics.

Limitations

Our study is limited by its focus on mathematics education, a deliberate choice to allow for depth of analysis within a specific field. While this narrow focus provided rich insights into the conceptualizations of authority, autonomy, and agency, it also limits the generalizability of our findings to other disciplines. Future research could extend this work by examining these constructs in broader educational contexts, such as science education or interdisciplinary studies.

Additionally, we note the concentrated influence of a small group of scholars in shaping these constructs within mathematics education. While their work provides a strong foundation, it may also narrow the diversity of perspectives represented in the literature. Additionally, this review was limited to studies published in English, which constrains the cultural and linguistic diversity of perspectives represented in our analysis. Future research should also attend to how authority, autonomy, and agency are conceptualized across global and multilingual educational contexts, where cultural norms, policy, and institutional logistics may shape these constructs in distinct ways. Expanding the field to include voices from global contexts, interdisciplinary approaches, and underrepresented groups, especially childrens' voices, is essential for fostering a more inclusive and comprehensive understanding of these constructs.

Conclusions and Call to Action

As mathematics education continues to grapple with calls for more equitable and inclusive pedagogical practices, the field must respond with precision and intentionality. Authority, autonomy, and agency are powerful constructs with the potential to transform teaching and learning, but their utility depends on how clearly these constructs are defined and operationalized. This review offers a starting point for this critical work, providing taxonomies that map existing knowledge and highlight gaps for future exploration.

Moving forward, researchers must critically engage with the histories, theoretical underpinnings, and intersections of these constructs. By doing so, the field can move beyond surface-level engagement to generate deeper, more meaningful insights. This work advances scholarship by equipping educators with the tools they need to navigate and transform the power dynamics of mathematics classrooms.

Ultimately, the goal is to foster learning environments that equitable and empowering, where children and teachers alike can exercise authority, autonomy, and agency in ways that enrich their mathematical experiences. With greater transparency, clarity, and intentionality, the field of mathematics education can rise to meet this challenge, ensuring that these constructs move beyond theoretical ideals to practical realities in classrooms around the world.

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