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Climate Change in Common Core Policy Context: The Shifting Role of Attitudes and Beliefs

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Abstract

The success of implementing Common Core State Standards (CCSS) depends not only on the extent to which educators deeply understand the new standards but also on the expectations, values, and resources that support their readiness for making necessary instructional change. Educators' understanding of and beliefs about CCSS may largely drive their behaviors and action toward implementation. This study investigated a longitudinal dataset of teachers and principals in one large school district serving a diverse student population in California, examining the relationship between educators' beliefs and trust and the organizational climate. Findings suggest that both teachers' trust in the principal and an innovative climate play a consistent, critical role in educators' beliefs about implementing CCSS.

Keywords

educational policy, education reform, school districts, teacher–administrator relations, Common Core State Standards, educator beliefs, trust

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The implementation of Common Core State Standards (CCSS) represents significant challenges and changes for states, school districts, and especially school site educators (teachers and principals) who are on the frontline of instruction and must align their practices to the standards (Association for Supervision and Curriculum Development [ASCD], 2012; Kober & Rentner, 2012). The ultimate success of the implementation effort will largely depend on the extent to which educators understand the new standards as well as the expectations, values, and resources that support their readiness for making necessary instructional change (Sawchuk, 2012; Shanahan, 2013). However, recent national reports indicate several major challenges faced by school districts in the early implementation phase, including a general lack of preparedness and reduced efficacy beliefs of both teachers and principals (Center on Education Policy, 2014; Timar & Carter, 2017).

Research and international reports suggest that educators are the "change agents" of educational reform (Spillane, Reiser, & Reimer, 2002), and that their beliefs must not be ignored, as these beliefs are significantly linked to classroom instructional and teaching practices (Haney, Lumpe, Czerniak, & Egan, 2002; Organisation for Economic Co-operation and Development [OECD], 2009; Spillane, Hopkins, & Sweet, 2018) and student learning outcomes (Polly et al., 2013). Beliefs influence educators' attitudes, views, and values related to reform and most importantly how they act upon the change (Liou & Daly, 2018; Bandura, 1993; Spillane et al., 2018). People tend to take action according to their beliefs, which comprise their attitudes and actionable agendas (Pajares, 1992). The beliefs that educators hold regarding reform initiatives and efforts are at the core of educational change (Spillane, Shirrell, & Hopkins, 2016). As such, understanding educators' beliefs, particularly about the value of reform, is critical, as they may well be linked to their uptake and impact on reform-related activity.

Previous research has identified different categories of educator beliefs that have a strong effect on instructional change and curriculum implementation, including student learning, delivery of core content, student outcomes (Cronin-Jones, 1991), teacher autonomy and professionalism (Biesta, Priestley, & Robinson, 2015), self-efficacy (Tschannen-Moran & McMaster, 2009), and teaching methods (Shachar & Shmuelevitz, 1997), to name a few. While there is empirical evidence that these aspects of beliefs support reform-related outcomes, these studies focused solely on particular subject areas or attempted to make relatively small-scale impacts on classroom- or school-level practices. It remains unclear how educator beliefs are shaped at scale across a school district over time. Furthermore, the development of educators' beliefs is influenced by their surrounding environment, including the people with whom they work and the climate in which they work (Liou, Daly,

Brown, & Del Fresno, 2015; Bandura, 1993; Rigby, 2016). Social norms and values may be collectively established as teachers interact and collaborate with one another (Rigby, 2016); this also shapes the climate of their workplace. As such, interpersonal relationships and organizational climate are two critical aspects in shaping individual beliefs.

Over the last decade, a growing body of research has suggested that change and innovation are likely to take place when educators have strong beliefs about the reform initiatives and also perceive a trusting, collaborative, and risk-tolerant environment that allows them to seek and try new approaches to improving practices (Daly, 2010; Liou, 2016; Daly, & Finnigan, 2016; Coburn, Mata, & Choi, 2013; Coburn & Penuel, 2016; Tschannen-Moran, 2004, 2009). Since the introduction of CCSS in 2010, the community of scholars and policymakers has called for more empirical and practical evidence documenting the critical elements of reform—beliefs, relational trust, a climate of innovation and collaboration—in support of successful implementation and action around the standards (Timar & Carter, 2017). Given the relevance and importance of educator beliefs to their instructional practices, student learning, and ultimate success of reform, we investigated the beliefs of educators in one school district at multiple time points, starting from the year when CCSS was first implemented in the district. As climates of collaboration, trust, and innovation may be supportive of the formation of educator beliefs, we aim to explore the overarching research question: to what extent are educators' perceived climates (i.e., trust, innovation, and collaboration) associated with their beliefs about the value and impact of CCSS implementation over time?

Conceptual Framework

To examine educator beliefs about CCSS reform, we looked through the lens of social cognitive theory (Bandura, 1997). This body of theory posits that educator beliefs may be influenced by individual-level factors (intra-actor), human interactive behaviors (inter-actors), and the social context in which individuals reside (organizational climate; Liou et al., 2015; Fives & Buehl, 2012). Therefore, we drew from concepts of relational trust, innovative climate, and peer collaboration to understand the development of educator beliefs. In this section, we introduce the outcome variable of educator beliefs. We then discuss the notion of collective beliefs as well as the significance of relational trust, innovative climate, and peer collaboration. Within each subsection, we propose one or more hypotheses to answer our research question.

Educator Beliefs

Personal beliefs drive human behaviors (Bandura, 1977; OECD, 2009; Spillane et al., 2018) and involve a series of ongoing social learning processes (Liou, & Daly, 2018; Bandura, 1977; Coburn et al., 2013). Human behaviors are learned through interactions through which we assess and modify our cognitive processes to adapt to the surrounding environment (Bandura, 1977, 2002). Our beliefs are shaped as we make self-assessments about our abilities and the resources necessary to meet designated goals. As such, personal beliefs may be developed through social experiences from which we make decisions about whether or not to perform particular tasks (assessment on self-ability), whom we choose to interact with (assessment on social capacity), and the level of resources available to put forth cognitive effort to achieve a designated goal (assessment on contextual capacity; Bandura, 1982). In this line of argument, educator beliefs can be defined as sets of ideas that individual educators hold as related to their capacity to successfully carry out academic tasks for educational improvement, such as instructional reform practice at designated levels of engagement (Bandura, 1986, 1993; Greene, Miller, Crowson, Duke, & Akey, 2004).

A number of research studies have attempted to make sense of teachers' and educational leaders' beliefs and to connect the concept of beliefs with various social and educational processes and outcomes, such as knowledge sharing (Liou et al., 2015), student achievement (Caprara, Barbaranelli, Steca, & Malone, 2006; Fang, 1996; Siwatu, 2011), and leadership practice (Liou, 2016; Rigby, 2016). For instance, research on teacher beliefs suggests that teachers align their instructional practices with their personal beliefs, which may have a direct influence on both instructional effectiveness and student outcomes (Lee, Cawthon, & Dawson, 2013; Putman, 2012). Teachers with higher self-efficacy beliefs tend to be better teachers (Bates, Latham, & Kim, 2011).

Other studies that have investigated teacher beliefs about reform indicate that teachers' beliefs about reform approaches vary (Barlow & Cates, 2006; Czerniak & Lumpe, 1996; Enderle et al., 2014), and that their own beliefs have a direct influence on the degree of reform implementation in their classrooms (Czerniak & Lumpe, 1996). Teacher beliefs are associated with the degree to which they engage with one another to exchange advice about CCSS implementation (Daly & Finnigan, 2016). In addition, their beliefs have a direct effect on the extent to which they make an effort to take on CCSS-related initiatives, such as changes in curricula and instructional strategies (Liou, Canrinus, & Daly, 2019).

Another line of recent studies has specifically examined educational leaders' beliefs, including both district-level administrators and school principals.

For instance, Rigby's (2016) work suggests that principal beliefs about leadership are embedded in and defined by the content of their collaboration with others; such relational ties may, in turn, facilitate, reinforce, or hinder how principals perceive and approach their leadership practice. Another study indicates that the development of leader beliefs is largely associated with the extent to which leaders work with one another in sharing leadership advice as well as the extent to which they are willing to take action to carry out reform efforts (Liou & Daly, 2018). As such, leader beliefs are consequential to the degree to which they engage in reform-related change efforts such as CCSS implementation.

With all of this in mind, we contend that educator beliefs may be shaped by or associated with the extent to which they make sense of and carry out the designated tasks regarding educational reform. Executing these tasks involves interplay between individuals' exposure to and experience of interacting with others (social/inter-actor level) and perceived social context in which resources are embedded, which may influence the level of engagement one exerts to accomplish the tasks (organization level). Each of these aspects presents its unique perspective in understanding the development of educator beliefs. Thus, it is important to examine relational- and organizational-level factors such as trust, innovation, and collaboration, which may be supportive of a large-scale or districtwide educational reform. Specifically, we discuss the following key factors that are suggested to be critical in shaping educator beliefs: collective beliefs, relational trust, innovative climate, and peer collaboration.

Collective Beliefs

Personal beliefs come in two types—individually held and collectively shaped—and many of the studies mentioned above place a strong emphasis at the individual level. Some researchers have found that collective beliefs have significant effects on teacher and student outcomes (Bandura, 1993; Goddard, Hoy, & Woolfolk Hoy, 2000; Tschannen-Moran & Barr, 2004). As such, collective beliefs are of great impact. Despite the promise of both individual and collective beliefs separately, researchers have yet to take into account the influence of one construct on the other.

Social cognitive theory (Bandura, 1997) posits that individual teachers' behaviors and actions will likely be influenced not only by self-concept but also by their experience of social norms and expectations derived from school communities in which they are embedded (Bandura, 1989). Thus, it is reasonable to assume that individuals' present actions are likely influenced by their developed belief systems, which have been shaped by

previously established social norms and shared values. Therefore, we propose the following hypothesis:

> **Hypothesis 1:** The previous year's collective educator beliefs (the belief climate) about CCSS impact will be associated with the following year's individual beliefs about CCSS impact.

Relational Trust

Trust is a critical component in the success of sustainable improvement and innovation in education (Forsyth, Adams, & Hoy, 2011; Moolenaar & Sleegers, 2010; Tschannen-Moran, 2004; Van Maele & Van Houtte, 2012). As implementing reform involves educators' continuous efforts to take initiative and make changes, ongoing reform processes require building and sustaining the kind of relationships that support the work of educators. As such, investigating the relationship between sets of roles over a period of time is critical. An overall climate of trust is important but lacks the nuanced details as to which set of roles may influence educators' perceptions of reform. Thus, we focus instead on the important role of relational trust in facilitating the implementation of reform. We define relational trust as a specific set of role relationships that require synchrony in mutual expectations and obligations (Bryk & Schneider, 2002). We examine the role relationships between teachers and principal, including three types of trusting relationships: the principal's trust in teachers, teachers' trust in the principal, and teachers' trust in their teacher colleagues.

The development of trust involves an interactive and iterative process in which individuals are willing to be vulnerable to another party based on the confidence that the latter party is consistently being benevolent, competent, and respectful (Daly, 2010; Daly & Chrispeels, 2008; Bryk & Schneider, 2002; Tschannen-Moran, 2004). As such, this notion of trust involves individuals engaging in certain levels of interdependence with other parties (Rousseau, Sitkin, Burt, & Camerer, 1998) within certain types of relationship networks (Bryk & Schneider, 2002; Hoy & Tschannen-Moran, 2003). These networks are shaped by ongoing social interactions between individuals where they share and develop collective values, goals, norms, and beliefs about work, as well as about their expectations of one another (Coleman, 1990).

Studies in education have indicated that trust plays an important role in the development of social norms and relationships, innovation, collaboration, and group cohesiveness, which ultimately lead to school improvement (Bryk & Schneider, 2002; Bryk, Sebring, Allensworth, Luppescu, & Easton, 2010;

Hoy & Tschannen-Moran, 2003; Rousseau et al., 1998; Zand, 1997). For instance, teachers with higher levels of perceived trust with their faculty colleagues are more likely than those with less trust to work closely with each other and share similar values and beliefs about schoolwide instructional reform (Daly, 2010). In a similar vein, other studies have found that teachers who perceive higher levels of trust among their colleagues are more socially embedded in their school networks than teachers who perceive lower levels of trust (Moolenaar, 2010; Van Maele, Forsyth, & Van Houtte, 2014).

Studies have also indicated that teachers who have higher levels of trust in their principal are more committed to schoolwide reform initiatives, as evidenced by greater degrees of collaboration among teachers (Daly, 2010; Moolenaar et al., 2014; Van Maele et al., 2014). Moreover, principals who have higher levels trust in their teachers are more likely to engender greater faculty trust and support enhanced student outcomes (Christophersen, Elstad, & Turmo, 2011). Research suggests the greater the degree of collaborative ties between teachers through which shared beliefs are developed, the greater the likelihood of trusting relationships (Price, 2015). Given that trust may catalyze the shaping of beliefs, and given that different role relationships may bring about various outcomes, we propose three hypotheses for each role relationship:

Hypothesis 2: Principals' perceptions of trust in teachers will be positively associated with educators' beliefs about CCSS impact over time.
Hypothesis 3: Teachers' perceptions of trust in the principal will be positively associated with their beliefs about CCSS impact over time.
Hypothesis 4: Teachers' perceptions of trust in other teachers will be positively associated with their beliefs about CCSS impact over time.

Innovative Climate

The concept of *innovation* has been extensively studied over the past decades in fields like management and organization (Kanter, 1983; Knight, 1967; Van de Ven, 1986; Wolfe, 1994), but the literature does not quite converge toward a common description or definition (Sitkin, See, Miller, Lawless, & Carton, 2011). For instance, organizational innovation is suggested to be related to change (Hage, 1999), adoption (Downs & Mohr, 1976), outcomes (Whipp & Clark, 1986), and individuals' innovative qualities (Kirzner, 1979), depending on the type of organizations studied, the stages of the innovation observed, and the features of the innovation investigated (Wolfe, 1994). Because of its context-specific nature, research findings related to innovation are often found to be limited to particular settings. That is, what works in one context

may or may not work in another setting. Examinations of *organizational climates of innovation*, on the other hand, allow the opportunity to compare across settings (Moolenaar et al., 2014).

An innovative climate is considered to have a broader impact on the continuous improvement of organizations than the relatively narrow notion of innovation (Amabile, 1998; Moolenaar et al., 2014; Van der Vegt, Van de Vliert, & Huang, 2005), especially when studies take into account contextual factors in various settings. Therefore, we focus on the concept of innovative climate in a current reform context. This allows us to provide knowledge and implications that are more transferrable to other educational settings in which similar reforms are also taking place.

Innovative climate can be catalyzed through a series of iterative and cyclic processes of innovation occurring in various aspects of an organization, including norms, beliefs, behaviors, procedures, or any novel practice that departs from its original routine (Kanter, 1983). In this regard, the concept of innovative climate can be defined as the shared perceptions of organizational members concerning the practices, beliefs, and behaviors that promote risk taking and the generation of new knowledge and routines (Moolenaar et al., 2014; Van der Vegt et al., 2005). Under this definition, a climate of innovation is concerned with the development and transformation of new practices (including personal beliefs and resulting organizational routines) through collective social processes as a means to organizational change (Daft & Becker, 1978; Damanpour & Evan, 1984; Nonaka & Takeuchi, 1995; Van der Vegt et al., 2005).

Organizational members are constantly provided with multiple opportunities for interaction, input, and improvement (Calantone, Garcia, & Droge, 2003; Nohari & Gulati, 1996). The combination of ongoing communication, cooperation, and exchange of resources triggers the generation of novel ideas and approaches to change (Kogut & Zander, 1992), leading to new organizational routines and recognizable patterns of interdependent human behaviors performed by members of the organization (Cohen, 1991; Pentland & Hærem, 2015). Through active social interactions, norms and beliefs are more likely to be created (Popadiuk & Choo, 2006). As such, individual beliefs that drive action around the work of an organization are likely to be influenced and reinforced by social norms and the resulting climate.

The organizational study literature suggests a number of positive outcomes in relation to innovative climate. These include knowledge creation (Nonaka, 1994; Nonaka & Takeuchi, 1995; Polanyi, 1966), diverse connectivity (Fredrickson, 2003; Heaphy & Dutton, 2008), and emotional support in the workplace (Spreitzer, Sutcliffe, Dutton, Sonenshein, & Grant, 2005). Organizations that are more open to innovative ideas and change are more

likely to outperform those with lower propensity toward innovation (Damanpour & Evan, 1984). Individuals in climates that support risk taking are more likely to share creative ideas and access diverse resources to improve the organization (Nonaka & Takeuchi, 1995).

In schools, innovative climate can be defined as the shared perceptions of educators regarding the practices, beliefs, and behaviors that facilitate risk taking and the generation of new knowledge and routines (Moolenaar et al., 2014). Central to this definition is the notion of a collective willingness among educators to take risks in adopting new approaches to educational reforms (Moolenaar, Daly, & Sleegers, 2011; Moolenaar, 2010). As innovative climate is key to the success of organizational change (Baer & Frese, 2003; Brown & Osborne, 2012), it may be also crucial for educators to view their schools as being open to new ideas with a risk-free, safe environment.

As a result of the current CCSS reform, educators may be expected to work collaboratively with colleagues from different subject areas to exchange new ideas and approaches for instructional improvement (Cristol & Ramsey, 2014; Mazzara, 2014). A climate of innovation may be imperative for educators to be willing to reach out to others and to try different strategies to improve their instructional practice, which may potentially reshape their beliefs about the reform, reroute the norms of behaviors, and in turn reduce resistance to change. Given the important role of innovative climate in the collective action of organizational members, we propose the following hypothesis:

> **Hypothesis 5:** Educators' perceptions of the innovative climate of their school will be positively associated with their beliefs about CCSS impact over time.

Peer Collaboration

The concept of collaboration in schools has gained traction over the past few decades (Lieberman & Miller, 2008; McLaughlin & Talbert, 2001; Stoll, Bolam, McMahon, Wallace, & Thomas, 2006). Scholarship in this area has come to a common understanding that collaboration goes beyond merely a group of educators regularly meeting for discussion around instructional practice and student learning (Lieberman & Miller, 2008). Recent scholarship suggests that authentic collaboration is key to sustaining quality teaching and learning (Lieberman & Miller, 2016; Owen, 2014), as it offers ongoing opportunities for educators to learn together, share resources and responsibility, and reflect on their values and beliefs about the discourse of teaching and learning (Schön, 1983; Wenger, 1998). Successful collaboration requires a focus on learning with shared beliefs and values among professionals (DuFour, 2014).

Educators with similar beliefs and values are more likely to work toward a common goal, as they tend to develop shared languages, visions, and practices as they collaborate, which helps facilitate their sociocognitive processes (Lave, 1991; Owen, 2014). As such, collaboration is critical in the development of personal beliefs and group norms.

The benefits of effective professional collaboration among educators are well documented, including change toward more student-centered instructional practices, development of norms of continuous learning, increased self-efficacy in teaching (Battersby & Verdi, 2015), improvement in student performance (Vescio, Ross, & Adams, 2008), successful schoolwide and districtwide improvement (e.g., Lieberman & Miller, 2016; Sullivan & Westover, 2015), and teacher growth and efficacy beliefs (Battersby & Verdi, 2015). A recent report from Sullivan and Westover (2015) supports the role of collaboration in the professional growth of educators. They found that teachers perceived an increase in their confidence in meeting student needs if the collaborative activities they engaged in were self-initiated and teacher led. More collaboration is likely to occur if supporting conditions are provided for teachers to try novel ideas and initiate changes, which may reinforce norms of collaborative interaction (Baumard & Starbuck, 2005; Collinson & Cook, 2004).

Schools with supportive and collaborative environments that rely on teachers' expertise and encourage the generation of instructional norms are more likely to obtain teacher buy-in, and therefore may gradually influence teacher beliefs about instructional reform (Coburn, 2005; Spillane et al., 2002). While professional collaboration may yield many positive outcomes, studies also caution about a particular form of collaboration that may lead to contrived collegiality (Hargreaves, 1997), especially when collaboration is imposed upon educators and does not address their values and beliefs (Czerniawski, 2013). Given that effective collaboration is key to success with reform, and that collaborative culture may facilitate the development of group norms—which in turn help construct educators' beliefs—it is reasonable to propose the following hypothesis:

Hypothesis 6: Educators' perceptions of peer collaboration will be positively associated with their beliefs about CCSS impact over time.

Figure 1 presents a path diagram of the relationships between study variables. Individual educators' beliefs about the impact of CCSS are directly influenced by Level 1 factors, such as educators' perceived trust in their school principals and colleagues, their school's climate concerning innovation, and degree of peer collaboration. Their beliefs are also influenced by Level 2 factors, such as the principal's trust in teachers, whether there is a change in

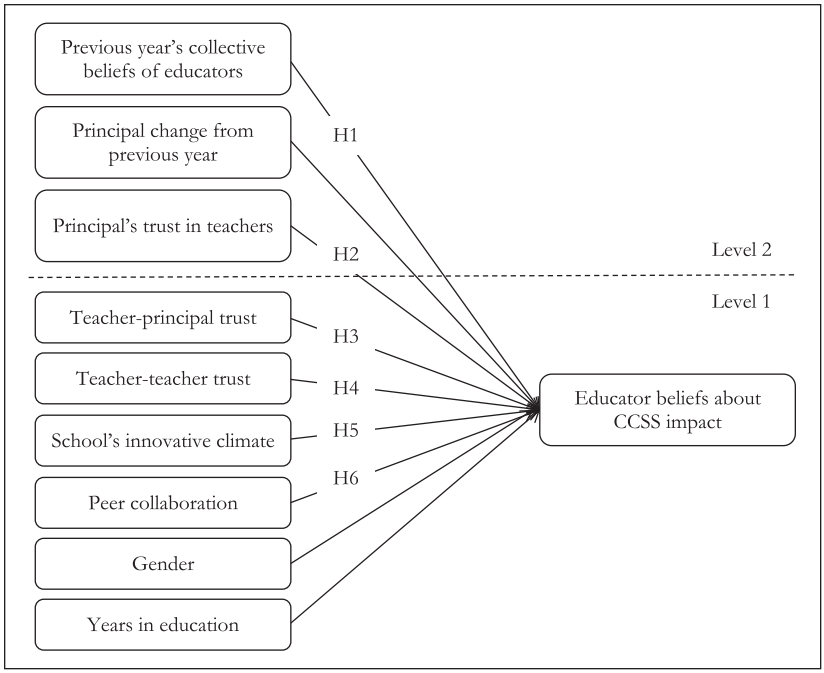

Figure 1. Hypothesized multilevel path diagram.
Note. CCSS = Common Core State Standards.

school principal during the study period, and the previous year's collective beliefs of educators (with individual gender and experience controlled).

Method

The study data come from a multiyear project that was designed to understand the alignment of a school district's effort around a districtwide reform initiative over time. We employed a repeated cross-sectional design in which we collected survey data from the same group of educators in the district each year, from 2013 to 2015. Such a study design allowed good sample representation to reduce unbiased estimate for each time point. It also allowed us to compare difference in effect between time points.

Study Context

Our study was conducted in one urban fringe school district in Southern California. The district comprised 30 schools serving nearly 20,000 PK-12

students. Across schools, 15% of students were in special education programs, 25% were English language learners, and almost 60% received free or reduced-price lunch. The majority of students were Hispanic (60%) or White (30%), with small populations of African American (4%) and Asian and Pacific Islander (4%) students.

The district had been undergoing a transformation in its leadership, mission, values, and goals, with a strong focus on building collaborative relationships among and between school/district community members in an effort to support student learning. In 2013, the district adopted CCSS. Since then, it has endeavored to align its reform efforts through collaboration. Within this context, we examined reform efforts connected to CCSS that may be related to the district's improvement progress. Specifically, we were interested in investigating educators' beliefs about the impact of CCSS over time and the extent to which their beliefs may be associated with climate factors as well as interpersonal trust. As we described earlier, research suggests that these factors may have direct impact on the ways in which teachers and principals go about their work in relation to CCSS.

Data Collection

Given our focus on districtwide reform efforts on the part of site educators, our sample included school-level certificated educators across the district, including classroom teachers and school principals. We administered a school climate survey to these educators each fall in 2013 (Time 1), 2014 (Time 2), and 2015 (Time 3). The survey was designed based on instruments from the University of Chicago Consortium on School Research that were further modified and validated by the research team to better fit the study context (see, for example, Liou et al., 2015, 2016). The survey assessed various aspects of school climate such as innovation, collaboration, trust, and personal beliefs about reform initiatives.

A total of 30 schools participated in the survey. Because we were only concerned with results from PK-12 schools, we dropped the two adult education schools in the district, leaving 28 schools in the sample. We dropped all teachers who did not have a score on the dependent variable, the Common Core impact scale (more below). To keep as many participants as possible, we utilized multiple imputation with chained equations, or MICE (Azur, Stuart, Frangakis, & Leaf, 2011), using the mi impute chained command in Stata 14. For each teacher, we generated 10 datasets with different imputed values and averaged the imputations for each missing observation in our analysis using the mi estimate command (Azur et al., 2011). We assume that

our data are Missing at Random (MAR) and running MICE with the appropriate variables conditions for the missing data and makes our missing data missing completely at random (Graham, 2009).

After conducting MICE, our sample included 701, 619, and 623 teachers and 28, 27, and 28 principals for Times 1 to 3, respectively. The teacher sample reflects a 75% average response rate. It should be noted that only 27 schools were included at Time 2 because one of the schools did not have a principal when the survey was implemented. As such, that school was not included in our analysis for Time 2.

Dependent Variable: Beliefs About the Impact of CCSS

This Common Core impact scale represents teacher beliefs about the impact that CCSS will have on education and their practice; this is the dependent variable in the study. The scale is adapted from previously validated studies (Liou et al., 2015; Fives & Buehl, 2012). It was created by taking the mean of five items in the teacher survey. Examples of items used in the scale include "I believe there is value in the Common Core Standards," "The Common Core Standards are a promising reform effort," and "The Common Core Standards will have a positive impact on my students." A higher score on the CCSS impact scale indicates a more positive view about the effect that CCSS is having on education, students, and their practices.

Principal-/School-Level Variables

Principal–teacher trust and principal change. Principal variables include principal–teacher trust as well as principal change from the previous year. The principal–teacher trust scale was adapted from the work of Tschannen-Moran (2004) and Bryk and Schneider (2002) and further modified in previous studies (e.g., Moolenaar et al., 2014). It indicates the level of trust that principals have in their teachers. It was created using eight items from the principal survey that examined not only the principal's trust in the expertise of the school's teachers, but also the level of security the principal feels in implementing new ideas at the school and the respect they feel from their teachers. Sample items include "I feel respected by my teachers" and "Teachers in my school place the needs of children ahead of personal and political interests." A higher score on this scale indicates that the principal has more trusting relationships with the faculty and is more comfortable bringing innovative ideas to the school.

To examine the relationship between leadership change and teacher beliefs about the impact of CCSS we used the variable "principal change from

previous year." At Times 2 and 3, we used a dummy variable to represent a change in principal from Time 1 (1 = *change*, 0 = *no change*). In other words, if the school had a new principal from Time 1 to Time 2, this variable equals 1.

Aggregate teacher beliefs about CCSS from previous year. This variable was created by aggregating teacher beliefs about the impact of CCSS for each school from the previous year. We used it to explore and control for the effect of school beliefs about the impact on CCSS over time. The models for Time 2 include the variable for aggregate teacher beliefs about the impact of CCSS from Time 1; the models for Time 3 include the variable for aggregate teacher beliefs about the impact of CCSS from Time 2.

Teacher-Level Variables

Teacher demographic variables. We included two demographic variables for teachers. The variable "female" is a dummy variable where 1 = *female* and 0 = *male*. We also included "years in education," which represents the number of years the teacher had been in education in any role; this ranged from 0 to 42 years across the three time points.

Teacher–principal and teacher–teacher trust. We measured trust at the teacher level using two variables: teacher trust in the principal (teacher–principal trust) and teacher trust in other teachers (teacher–teacher trust). The teacher-level trust scales were adapted from the work of Tschannen-Moran (2004) and Bryk and Schneider (2002) and further modified in previous studies (e.g., Moolenaar et al., 2014).

The teacher–principal trust scale was created from the mean of eight items on the teacher survey that measured the level of trust teachers had in the principal at their site. Items in this scale related to teachers' levels of respect for the principal, how well the principal manages the school, and ability to voice concerns to the principal. These items included "I feel respected by the principal in this school" and "I trust this school's principal at his or her word." A higher score on this scale indicates a higher general sense of trust in the principal.

The teacher–teacher trust scale was created from seven items on the teacher survey that asked participants about the general level of trust they feel in their peers. Questions ranged from perceived respect to a general sense of caring that teachers had for each other in the school. Items in this scale included "I feel respected by other teachers" and "Teachers in this school care about each other." A higher score on this scale indicates a higher level of trust felt by teachers about their peers.

Perceptions of Climate

Innovative climate. The innovative climate scale targeting school teachers was developed based on a modified version of a well-validated scale (Bryk, Camburn, & Louis, 1999; Consortium on Chicago School Research, 2003) that was further tested in our earlier work (Moolenaar et al., 2014; Liou et al., 2015). We created the scale by taking the means of eight items on the teacher survey that dealt with teachers' feelings about the level of innovation at their school, implementing new ideas, and taking risks in their practice. Items included "Most teachers in this school are really trying to improve their teaching" and "In this school, the teachers are willing to take risks to make the school better." A higher score on this scale indicates that teachers feel like innovation is welcome at their school, that their colleagues are innovative, and that their school is a safe place to take risks and try new things.

Peer collaboration. The peer collaboration scale was adapted from previous research (Consortium on Chicago School Research, 2003) and further modified and tested in our earlier work (Liou & Daly, 2017) to fit the sample and context of this study. The scale was created from the mean of six items that asked teachers about the relationships between their peers and the ability of peers to work collaboratively to improve practice and address problems. Items included "Most teachers in this school are cordial" and "Teachers at this school work together to seek knowledge, strategies, and solutions to address diverse student needs and apply this new learning to their work." A higher score on this scale indicates that teachers believe that they engage in higher levels of collaboration with their peers. Table 1 provides the reliability and factor loadings of the study variables for each time point.

Analysis

Our datasets are hierarchically organized with teachers nested within schools; information at both the teacher level and the school/principal level is used to determine teacher beliefs about the impact of CCSS. The clustering of individuals within schools violates assumptions of ordinary least square (OLS) regression. Therefore, we used a hierarchical linear modeling (HLM) technique that simultaneously estimated teacher- and school-/principal-level effects. Specifically, we estimated random intercept models, which can be expressed as two equations (Raudenbush & Bryk, 2002). First, the level of the impact of the CCSS for the *i*th teacher in the *j*th school is a function of

Table 1. Reliability (α) and Factor Loadings of Study Variables at Each Time Point.

Item	Time 1	Time 2	Time 3
Teacher–principal trust	α = .978	α = .972	α = .976
1. I feel respected by the principal in this school.	.924	.913	.910
2. This school's principal takes a personal interest in the professional development of teachers.	.913	.879	.895
3. I have confidence in the expertise of this school's principal.	.949	.939	.949
4. This school's principal places the needs of children ahead of personal and political interests.	.919	.889	.917
5. This school's principal is an effective manager who makes the school run smoothly.	.934	.923	.935
6. I trust this school's principal at his or her word.	.955	.941	.945
7. This school's principal looks out for the personal welfare of the faculty members.	.925	.921	.940
8. It is OK in this school to discuss feelings, worries, and frustrations with the principal.	.924	.915	.919
Teacher–teacher trust	α = .940	α = .939	α = .935
1. I feel respected by other teachers.	.859	.853	.839
2. Teachers at this school respect those colleagues who are expert at their craft.	.895	.865	.870
3. I have confidence in the expertise of other teachers.	.823	.829	.819
4. Teachers respect other teachers who take the lead in school improvement efforts.	.841	.851	.840
5. Teachers in this school care about each other.	.893	.873	.871
6. It is OK in this school to discuss feelings, worries, and frustrations with other teachers.	.838	.837	.832
7. Teachers in this school trust each other.	.880	.900	.886
Innovative climate	α = .938	α = .948	α = .938
1. Most teachers in this school are really trying to improve their teaching.	.825	.846	.794
2. In this school, the teachers are continuously learning and seeking new ideas.	.890	.898	.884
3. In this school, the teachers are generally willing to try new ideas.	.868	.897	.856

(continued)

Table 1. (continued)

Item	Time 1	Time 2	Time 3
4. In this school, the teachers are constantly trying to improve their leadership.	.851	.857	.840
5. In this school, the teachers have a positive "can-do" attitude.	.868	.851	.863
6. In this school, the teachers are willing to take risks to make the school better.	.875	.890	.866
7. In this school, the teachers are encouraged to "stretch and grow."	.653	.728	.708
8. In this school, the teachers are continuously developing new approaches to support instruction.	.864	.893	.887
Peer collaboration	$\alpha = .863$	$\alpha = .887$	$\alpha = .877$
1. Most teachers in this school are cordial.	.692	.655	.702
2. Teachers at this school make a conscious effort to coordinate their teaching with instruction at other grade levels.	.785	.811	.812
3. Collegial relationships exist among teachers that reflect commitment to school improvement efforts.	.844	.860	.853
4. Opportunities are provided for teachers to informally share ideas and suggestions for improving student learning.	.680	.791	.784
5. Teachers at this school work together to seek knowledge, strategies, and solutions to address diverse student needs and apply this new learning to their work.	.880	.881	.847
6. Teachers at this school collaboratively review student work to share and improve instructional practices.	.788	.819	.768

school intercepts (β_{0j}), a set of teacher-level fixed effects (βX_{ij}), and an error term (r_{ij}):

$$Y_{ij} = \beta_{0j} + \beta X_{ij} + r_{ij}. \quad (1)$$

Second, each school/principal intercept (β_{0j}) is estimated as a function of an intercept (γ_{00}), a set of school-/principal-level variables (γ_{Cj}), and an error term (u_{0j}):

$$\beta_{0j} = \gamma_{00} + \gamma_{Cj} + u_{0j}. \quad (2)$$

We examined a series of models for each time point exploring principal-/school-level (Level 2) variables of trust in teachers and principal change. Then we added teacher-level (Level 1) variables—teacher–principal trust, teacher–teacher trust, innovative climate, peer collaboration, and previous year aggregate beliefs about CCSS—while controlling for teacher-level demographic variables. We used restricted maximum likelihood (REML) to account for the fact that our Level 2 sample contained fewer than 30 schools/principals, and that our Level 1 samples were unbalanced within each school (Corbeil & Searle, 1976; Raudenbush & Bryk, 2002). We ran the models in Stata 14, using the mixed command.

Findings

Descriptive Data

Table 2 presents the metrics, descriptions, and descriptive statistics for all of the above variables at each time point. Teacher beliefs about the impact of CCSS declined each year, from 4.83 at Time 1, to 4.73 at Time 2, to 4.38 at Time 3. The same held true for the school mean level of belief about the impact of CCSS, going from 4.87 at Time 1 to 4.71 at Time 2. Principal trust in teachers declined slightly across the three time points, from 5.13 at Time 1 to 5.01 at Time 3. Forty-three percent of schools had experienced a principal change between Times 1 and 2, compared to only 13% between Times 2 and 3.

At Times 1 to 3, respectively, 77%, 80%, and 80% of teachers in our sample were women; on average, they had about 17, 17, and 16 years of experience in education. Teacher trust in principals increased overall from Time 1 (4.67) to Time 3 (4.83); however, it decreased from Time 2 (5.05) to Time 3. Teacher trust in other teachers remained relatively the same across all time points (5.08, 5.03, 5.10), while perceptions about peer collaboration (4.75, 4.83, 4.85) and innovative climate (4.84, 4.90, 4.93) increased across Times 1 to 3.

The next section presents results from our multilevel analysis to answer the study hypotheses. Tables 3 to 5 display the models for Times 1 to 3, respectively.

Hypothesis 1: The Role of Previous Year's Collective Beliefs

As our first hypothesis tests the effect of the previous year's collective beliefs on the outcome variable, this variable is introduced into the models at Times

Table 2. Sample Descriptive Statistics for Each Time Point.

Variable	Description	*M* (*SE*)			Min	Max
		Time 1	Time 2	Time 3		
Dependent variable						
Teacher beliefs about the impact of CCSS	Scale representing teacher beliefs about the positive impact of CCSS (1 = *low impact*, 6 = *high impact*)	4.83 (.04)	4.73 (.04)	4.38 (.04)	1	6
Principal/school level		$N_j = 28$	$N_j = 27$	$N_j = 28$		
Principal–teacher trust	Scale representing principal trust in other teachers (1 = *low trust*, 6 = *high trust*)	5.13 (.02)	5.09 (.02)	5.01 (.02)	1	6
Principal change from previous year	1 = *yes*, 0 = *no*	—	.43 (.02)	.13 (.01)	0	1
Previous year aggregate beliefs about CCSS impact	Scale representing average school beliefs about the positive impact of the Common Core (1 = *low impact*, 6 = *high impact*)	4.87 (.01)	4.71 (.01)	—	0	6
Teacher level		$N_i = 701$	$N_i = 619$	$N_i = 623$		
Female	1 = *yes*, 0 = *no*	.77 (.02)	.80 (.02)	.80 (.02)	0	1
Years in education	Total years spent in education	17.29 (.34)	16.99 (.42)	16.15 (.42)	0	42
Teacher–principal trust	Scale representing teacher trust in the principal (1 = *low trust*, 6 = *high trust*)	4.67 (.05)	5.05 (.04)	4.83 (.05)	1	6
Teacher–teacher trust	Scale representing teacher trust in other teachers (1 = *low trust*, 6 = *high trust*)	5.08 (.03)	5.03 (.03)	5.10 (.03)	1	6
Innovative climate	Scale representing teacher feelings about the school IC (1 = *low IC*, 6 = *high IC*)	4.84 (.03)	4.90 (.03)	4.93 (.03)	1	6
Peer collaboration	Scale representing teacher feelings about peer collaboration (1 = *low collaboration*, 6 = *high collaboration*)	4.75 (.03)	4.83 (.03)	4.85 (.03)	1	6

Note. Descriptive statistics using multiple imputation chained equations ($m = 5$). CCSS = Common Core State Standards; IC = innovative climate.

Table 3. Random Intercept HLM Models for Teacher Beliefs about CCSS Impact (Time 1).

	Model 1	Model 2	Model 3	Model 4	Model 5
Level 2—principals					
Principal–teacher trust	.173 (.096)	.183* (.088)	.063 (.099)	.037 (.097)	.038 (.098)
Level 1—teachers					
Female		.398*** (.089)	.398*** (.087)	.376*** (.086)	.375*** (.086)
Years in education		−.008* (.004)	−.009* (.004)	−.008* (.004)	−.008* (.004)
Teacher–principal trust			.103*** (.028)	.078** (.028)	.077** (.029)
Teacher–teacher trust			.216*** (.043)	.080 (.055)	.075 (.059)
Innovative climate				.225*** (.057)	.220*** (.063)
Peer collaboration					.013 (.062)
Intercept	3.961***	3.733***	2.767***	2.624***	2.610***
Level 1 Variance	.888	.870	.833	.826	.826
Level 2 Variance	.155	.122	.173	.167	.167

Note. $N_j = 28$; $N_i = 701$; standard errors in parentheses. HLM = hierarchical linear modeling; CCSS = Common Core State Standards.
*$p < .05$. **$p < .01$. ***$p < .001$.

Table 4. Random Intercept HLM Models for Teacher Beliefs about CCSS Impact (Time 2).

	Model 6	Model 7	Model 8	Model 9	Model 10	Model 11
Level 2—principals						
Principal–teacher trust	−.062 (.081)	−.045 (.074)	−.052 (.074)	−.137 (.074)	−.160* (.075)	−.159* (.075)
Principal change from previous year	−.042 (.085)	−.013 (.078)	−.033 (.079)	−.061 (.077)	−.040 (.077)	−.040 (.077)
Previous year aggregate teacher beliefs about CCSS impact		.492** (.164)	.441** (.165)	.401* (.160)	.357* (.159)	.355* (.159)
Level 1—teachers						
Female			.037 (.108)	.093 (.104)	.084 (.104)	.079 (.105)
Years in education			−.015*** (.004)	−.014*** (.004)	−.016*** (.004)	−.016*** (.004)
Teacher–principal trust				.160*** (.038)	.144*** (.038)	.140*** (.038)
Teacher–teacher trust				.171*** (.049)	.037 (.060)	.024 (.065)
Innovative climate					.233*** (.062)	.216** (.070)
Peer collaboration						.039 (.073)
Intercept	5.068***	2.571**	3.083***	1.994*	1.976*	1.963*
Level 1 Variance	.951	.948	.939	.905	.895	.896
Level 2 Variance	.117	.052	.020	<.001	<.001	<.001

Note. $N_j = 2$; $N_i = 619$; standard errors in parentheses. HLM = hierarchical linear modeling; CCSS = Common Core State Standards.
*$p < .05$. **$p < .01$. ***$p < .001$.

Table 5. Random Intercept HLM Models for Teacher Beliefs about CCSS Impact (Time 3).

	Model 12	Model 13	Model 14	Model 15	Model 16	Model 17
Level 2—principals						
Principal–teacher trust	.231* (.117)	.197 (.104)	.206* (.100)	−.005 (.103)	−.020 (.100)	−.034 (.101)
Principal change from previous year	−.110 (.169)	−.109 (.149)	−.119 (.142)	−.113 (.141)	−.086 (.136)	−.069 (.139)
Previous year aggregate teacher beliefs about CCSS impact		.618** (.208)	.555** (.202)	.569** (.196)	.487** (.189)	.497** (.193)
Level 1—teachers						
Female			.092 (.101)	.182 (.093)	.167 (.090)	.146 (.091)
Years in education			−.013*** (.004)	−.013*** (.004)	−.014*** (.003)	−.014*** (.003)
Teacher–principal trust				.205*** (.030)	.135*** (.031)	.123*** (.031)
Teacher–teacher trust				.265*** (.049)	.017 (.059)	−.080 (.065)
Innovative climate					.418*** (.061)	.310*** (.068)
Peer collaboration						.244*** (.069)
Intercept	3.230***	.499	.891	−.546	−.519	−.587
Level 1 Variance	.918	.916	.907	.834	.806	.797
Level 2 Variance	.214	.198	.182	.200	.193	.206

Note. $N_j = 28$; $N_i = 623$; standard errors in parentheses. HLM = hierarchical linear modeling; CCSS = Common Core State Standards.
*$p < .05$. **$p < .01$. ***$p < .001$.

2 and 3. Overall, our results fully support the first hypothesis. In Model 7, mean teacher beliefs from Time 1 had a positive and significant effect ($b = .492$, $p < .001$) on teacher beliefs about the impact of CCSS at Time 2. This means that a one-unit increase in the mean teacher belief about the impact of CCSS increased individual teacher beliefs about the impact of CCSS by .492. In other words, if teachers at a school site collectively had a more positive view of the impact of CCSS in the previous year, this is related to an increase in individual teacher beliefs about the impact of CCSS the following year. In Model 8, the previous year aggregate teacher belief about the impact of CCSS maintained a positive and significant relationship ($b = .441$, $p < .001$) to individual teacher beliefs about the impact of CCSS. Previous year aggregate teacher beliefs about the impact of CCSS continued to be significant and maintain their direction in Model 9 ($b = .401$, $p < .05$), Model 10 ($b = .357$, $p < .05$), and Model 11 ($b = .355$, $p < .05$).

During the third year of the study, previous year aggregate teacher beliefs about the impact of CCSS continued to make a significant and positive impact on individual teacher beliefs about CCSS impact. As at Time 2, in Model 13 (at Time 3), the variable maintained its positive direction and significance ($b = .618$, $p < .001$) to individual teacher beliefs about the impact of CCSS. This means that a one-unit increase in teachers' collective beliefs about the impact of CCSS at Time 2 resulted in a .618 increase in individual teacher beliefs about the impact of CCSS at Time 3. The same results held in Model 14 ($b = .555$, $p < .01$), Model 15 ($b = 569$, $p < .01$), Model 16 ($b = .487$, $p < .001$), and the final model ($b = .497$, $p < .01$). This means that during the third year of the study, a one-unit increase in teachers' collective beliefs about the impact of CCSS from the previous year increased individual teacher beliefs about the impact of CCSS by almost one half of a unit.

Hypotheses 2 to 4: The Role of Relational Trust

In general, results across the years of the study supported our hypotheses on relational trust. In particular, teacher–teacher trust maintained its consistent significance and direction over time. Principal trust in teachers was not significant in Model 1. However, it became positive and significant ($b = .183$, $p < .05$) in Model 2 when we introduced the demographic variables. In Model 3, we introduced the trust variables and found that both teacher trust in the principal ($b = .103$, $p < .001$) and teacher trust in teachers ($b = .216$, $p < .001$) were positively related to teacher beliefs about the impact of CCSS; principal trust in teachers was no longer significant in Model 3. While reduced in Model 5, the coefficient for teacher trust in the principal was still

significant and positively related ($b = .077, p < .01$) to teacher beliefs about the impact of CCSS.

In most models at Time 2, the principal variables—principal trust in teachers and principal change from the previous year—did not have a significant impact on teacher beliefs about the impact of CCSS. For principal change, this means that whether or not schools were run by a new principal in the following year did not result in a significant effect on teacher beliefs about CCSS impact. When adding the trust variables in Model 9, both teacher trust in the principal ($b = .160, p < .001$) and teacher trust in teachers ($b = .171, p < .001$) were significant and had positive relationships to teacher beliefs about the impact of CCSS (as at Time 1). Interestingly, principal trust in teachers became significant and negative ($b = –.160, p < .05$) in Model 10, and teacher trust in teachers was no longer significant. In Model 11, principal trust in teachers once again had a significant and negative relationship ($b = –.159, p < .05$) with teacher beliefs about the impact of CCSS; teacher trust in principal also remained positive and significant ($b = .140, p < .001$) in this model.

At Time 3, results on trust variables were similar to those at Time 2. The principal variables were introduced in Model 12, and we found that for every one-unit increase in principal trust in teachers, teacher beliefs about the impact of CCSS significantly increased by .231 ($p<.05$). In Model 13, when we introduced previous year aggregate teacher beliefs about the impact of CCSS, principal trust in teachers was no longer significant. When we controlled for teacher demographic variables in Model 14, principal trust in teachers was again significant and positively related ($b = .206, p < .01$) to teacher beliefs about the impact of CCSS. In Model 15, we included the other two trust variables and found similar results to Times 1 and 2. That is, both trust in principal ($b = .205, p < .001$) and trust in teachers ($b = .265, p < .001$) were significant and positively related to teacher beliefs about the impact of CCSS in Model 15; principal trust in teachers was no longer significant when we controlled for these teacher-level trust variables. Teacher trust in the principal maintained its direction and significance in Model 16 ($b = .135, p < .001$) and Model 17 ($b = .123, p < .001$); however, teacher trust in teachers was no longer significant in these two models.

Hypothesis 5: The Role of Innovative Climate

Our hypothesis on innovative climate was supported across time points. This variable was introduced in Model 4 and had a positive and significant relationship ($b = .255, p < .001$) with teacher beliefs about the impact of CCSS.

This variable continued to make a significant and positive contribution to the outcome variable in Model 5 ($b = .220$, $p < .05$). This means that for every one-unit increase in positive perceptions about the innovative climate, teacher beliefs about the impact of CCSS improved .225 and .220 (in Models 4 and 5, respectively).

The same results held true at Times 2 and 3. That is, when innovative climate was introduced in Model 10 and controlled in Model 11, it remained significantly and positively related to teacher beliefs about the impact of CCSS. As at Times 1 and 2, innovative climate continued to show a significant and positive relationship to teacher beliefs about the impact of CCSS in Model 16 ($b = .418$, $p < .001$) and Model 17 ($b = .310$, $p < .001$).

Hypothesis 6: The Role of Peer Collaboration

Our hypothesis on peer collaboration was only supported by the results from Time 3. At Time 1, in Model 5, we introduced peer collaboration, which did not have a significant relationship with teacher beliefs about the impact of CCSS. At Time 2, in Model 11, peer collaboration was controlled and proved not to be significant. In Model 17, at Time 3, we included the peer collaboration variable; in this model, peer collaboration was significant ($b = .244$, $p < .001$) and positively related to teacher beliefs about the impact of CCSS.

The Role of Demographic Variables in Educator Beliefs About CCSS Impact

We controlled for gender and work experience in our models, with each contributing differently to the outcome variable. At Time 1, female teachers on average reported .398 ($p < .001$) higher beliefs about the impact of CCSS than their male counterparts. This significance of gender effect holds with similar magnitude in Models 2 to 5 at Time 1. At Times 2 and 3, however, gender did not have a significant impact on teacher beliefs about the impact of CCSS. As for education experience, years in education consistently had a significant and negative relationship to teacher beliefs about the impact of CCSS across the years of this study. This indicates that a one-year increase in teachers' work experience in education continued to lead to a certain degree of decrease in their beliefs about the impact of CCSS over time.

In summation, over the three time periods, higher teacher trust in principals and more positive feelings about the school's innovative climate were consistently significant and related to an increase in teachers' positive beliefs about the impact of CCSS. The number of years a teacher spent in education

was consistently significant and related to more negative teacher beliefs about the impact of CCSS across the time points. At Times 2 and 3, the positive mean teacher belief about the impact of CCSS from the previous year was consistently significant and related to improved individual beliefs about the impact of CCSS.

Discussion and Implications

In response to the national call for more empirical evidence to support the understanding of policy implementation (Center on Education Policy, 2014, 2017; Gwynne & Cowhy, 2017), this study not only adds to the existing knowledge base on educator beliefs but also sheds new light on potential factors that may influence implementation of reform. In this section, we offer several points of discussion to illuminate the study contributions. In particular, we focus on the important roles of teacher-principal trust, innovative climates, collective teacher beliefs, peer collaboration, and teacher gender and experience level.

Significant Role of Teacher–Principal Trust Over Time

Corroborating with a large body of previous studies on relational trust (e.g., Daly & Chrispeels, 2008; Bryk & Schneider, 2002; Tschannen-Moran, 2004), our findings indicate a significant positive relationship between teachers' reported trust in their principal and their beliefs about a positive impact of CCSS on their teaching and student learning over time. In other words, the more teachers trust their principal, the greater they believe in a positive impact of CCSS. This suggests that to obtain teachers' buy-in to large-scale policy initiatives, it is critical to develop a trusting bridge between them and their principal. This underscores the important role of principal leadership, particularly the relational aspect of leadership, in shaping teacher beliefs. Trust is relational as it involves the iterative social process in which individuals' interactions with others affect the degree of interdependence and trustworthiness they assess (Bryk & Schneider, 2002; Rousseau et al., 1998). Ongoing social interactions—and the resulting interdependence—facilitate the development of relational networks in which people share and develop social norms, beliefs, and expectations.

Over the years of this study, the district in our study has continued to embrace core values centered on collaboration and trust building; it also acts on these values by creating sets of networked communities—across the district as well as between and within schools—that aim to improve professional

development and student learning. These communities include districtwide leadership team meetings, principal workshops on school data, informal principal networks, and sitewide learning teams for developing strategies for target areas. In particular, principals are also encouraged to form schoolwide leadership teams to guide school reform processes. The development of such schoolwide communities may help shape relationships between and among principals and teachers and further actualize the district's core value of trust and collaboration. These collaborative efforts may have created a norm of sharing and a climate of focused interaction and exchanging of ideas for leadership and learning. In turn, such a climate may cultivate mutual dependency, strengthen group norms, and further close the discrepancy between educators' understandings of and beliefs about reform implementation such as CCSS.

Previous studies suggest that principals who are able to provide resources and support to their teachers are likely to earn their trust (Price & Moolenaar, 2015; Van Maele et al., 2014), and that teachers with more trusting relationships with their principals are more committed to schoolwide initiatives (Moolenaar et al., 2014). As the district continues to nurture a supportive climate for principals and teachers, it is likely that mutual trust will develop and this will have a positive influence on individual educators' beliefs over time. Our work suggests a more consequential role for relational trust of the principal and a less consequential role for both principal–teacher and teacher–teacher trust in the long-term development of teachers' personal beliefs.

Significant Role of Teacher Beliefs about Innovative Climate Over Time

Our findings across three time points suggest that innovative climate is a consistent, significant, and positive predictor of individual teachers' personal beliefs about CCSS impact. This finding not only corresponds to previous studies on innovative climate and its relationship with one's behavior and beliefs (Liou, Moolenaar, & Daly, 2016; Moolenaar et al., 2014), but also suggests that cultivating a school climate of innovation is consequential to shaping teacher beliefs about reform initiatives such as CCSS.

CCSS represents a relatively new policy shift that requires leaders and educators to approach their work in different and innovative ways. This means that school members need to be willing to take risks in testing new ideas and trying out new approaches. The inclination toward innovative behaviors requires trusting relationships; educators must be willing and able to step out of their comfort zone and to put themselves at risk of failing in

their innovative efforts. A climate of innovation can promote risk-taking behaviors, and teachers will be more likely stretch themselves by carrying out new approaches and further transform their knowledge, practice, and personal beliefs about change initiatives (Nonaka & Takeuchi, 1995; Van der Vegt et al., 2005).

In addition, the development of an innovative climate requires ongoing opportunities for organizational members to engage in diverse social interaction (Calantone et al., 2003). This allows members to exchange novel ideas and resources and further improve individual and collective practice (Popadiuk & Choo, 2006), leading to new organizational routines driven and reinforced by the norms, behaviors, and beliefs of members of organization (Pentland & Hærem, 2015). Individuals who are immersed in an innovative climate can enhance their positive emotional state (Spreitzer et al., 2005), meaning that they will feel more energetic and enthusiastic about their work. Over the years of this study, the district in our study has been promoting various social interactions to encourage innovation through formal (e.g., a sitewide learning team for developing personalized learning) and informal meetings (e.g., happy hours for both districtwide and sitewide leadership teams), as discussed in the principal trust section.

Finally, despite all the efforts for innovation and positive climate, one should be cautious about the downsides of innovation. Some studies suggest that too many innovations can lead to negative team mood, more task conflicts (Anderson, de Dreu, & Nijstad, 2004; DeChurch, Mesmer-Magnus, & Doty, 2013), and lower team performance (González-Romá & Hernández, 2016). Schools and district central offices need to be aware of the undesired consequences of innovation overload; they must prioritize areas that are most in need of innovation, rather than promote the quantity of innovations implemented. The perception of an innovative climate and a risk-free, safe, and trusting environment is important for educators if they are to question the status quo and seek new approaches to implementing new standards.

Significant Role of Collective Teacher Beliefs Over Time

Our findings from Times 2 and 3 indicate that the previous year's collective belief about the impact of CCSS serves as a significant predictor for individual educators' beliefs about the impact of CCSS. These findings correspond to a number of previous studies on teachers' collective beliefs (e.g., Buehl & Beck, 2015; Tschannen-Moran, Salloum, & Goddard, 2014), particularly around their important role in developing and shaping the norms and behaviors of teachers (Goddard & Goddard, 2001). This part of the findings is not surprising; there is abundant empirical evidence supporting the fact that

individuals' behaviors are largely driven by their own individual beliefs and the collective beliefs of their social groups (Bandura, 1997). Building on earlier results, our findings further suggest the consistent, significant, and positive role of teachers' collective beliefs and their predictive relationship with individual teachers' future beliefs.

It is important to keep in mind that teachers' belief systems are not static, but rather are subject to change based on their contextual experiences, such as social influence by colleagues (Tschannen-Moran et al., 2014). This means that teacher beliefs are shaped through interactive social processes; collective norms and behaviors grow out of these interactions, which in turn reinforce individual teacher beliefs (Bandura, 1993, 1997). Since 2012, the school district in this study has placed a strong focus on setting a deliberate tone, engaging schools in key meetings to get them ready for the next wave of districtwide instructional reforms, such as CCSS. The school principals and their teachers have been exposed to CCSS-related information and programs and have been provided with opportunities for conversation, curriculum development, and experimentation. All of this has been consequential to the development of conditions that are supportive, risk free, and CCSS focused. For districts conducting such large-scale reform, it is critical to cultivate a norm of cohesive perception about potential value and impact among school administrators and teachers. In doing so, individual behaviors toward and beliefs about change are more likely to be driven by collective beliefs.

Role of Peer Collaboration, Gender, and Experience in Teacher Beliefs

Our study reveals several interesting findings around peer collaboration, gender, and years of experience in education. First, peer collaboration did not significantly contribute to teacher beliefs about CCSS impact until Time 3. The district has been emphasizing the value of collaboration since the early stages of CCSS implementation—for example, setting up conditions and opportunities for vertical and horizontal meetings. Although meetings are important and sometimes necessary for achieving successful team work, it may take a year or two for peer collaboration to play a significant role in influencing individual teachers' personal beliefs. As such, its significance at Time 3 may indicate that this work has paid off over time. Thus, although peer collaboration did not play a significant role in personal beliefs in each study year, it may have been important in facilitating group norms that drove personal beliefs by the end of the study period (DuFour, 2014; Wenger, 1998).

This may suggest the critical role of planned collaboration in early phases of reform implementation.

Our findings indicate that gender only made a significant contribution to individual teacher beliefs at Time 1, and its effect disappeared in the subsequent two years. This means that in the early stage of CCSS preparation and implementation, female educators, compared to their male counterparts, were more likely to report positive beliefs about the impact of CCSS. However, such gender differences waned, with collective beliefs coming into play in the development of personal beliefs about CCSS impact. It could be that the combination of collaborative work, sharing and trying novel approaches with others, and collective norms reduced the gap in beliefs between genders, despite the fact that a large proportion of our sample was female.

Finally, we found that when teachers had more experience in education, this consistently led to lower personal beliefs about CCSS impact. Schools and districts should be aware of this experience effect; more effort needs to be made to cultivate a climate in which more experienced and less experienced teachers can work together to build trusting relationships and to shape a collaborative and risk-free environment. Taken together, education communities need to pay more attention to the important role of schoolwide collective beliefs, teacher–principal trust, and innovative climates in setting the direction of teachers' personal beliefs for reform. In the absence of these preconditions, it may be hard for reform to happen.

Limitations

This multiyear, cross-sectional study is unique in the U.S. education space. We explored frontline educators' beliefs about a large-scale educational policy over the 3 years from a complete set of districtwide participants. We empirically investigated the interplay between school- and teacher-level variables and individual teacher beliefs about the impact of CCSS. Our main findings suggest a number of significant factors at play in shaping teachers' individual beliefs about the impact of CCSS over time. These include collective beliefs about the impact of CCSS from the previous year, teacher–principal trust, the school's innovative climate, and years of experience in education. While our work makes several contributions to policy and reform-related practices, we acknowledge several limitations and provide suggestions for future studies to address them.

In this study, we attributed individual teachers' personal beliefs to a select number of variables (i.e., teacher–principal trust, schoolwide innovative climate, collective beliefs, and demographics). We acknowledge that the

development of personal beliefs can be influenced by a wider range of factors such as personality traits (Decker & Rimm-Kaufman, 2008), degree of social interactions (Moolenaar et al., 2012; Liou et al., 2016), and level of work engagement (Salanova, Llorens, & Schaufeli, 2011; Simbula, Guglielmi, & Schaufeli, 2011), as well as other school-level factors like school size, average socioeconomic status, and quantity and quality of schoolwide programs that are currently in place to support professional development and student learning. We encourage future studies to explore broader sets of variables to address this complex, context-related phenomenon.

As this study took place in one school district in California, the study findings may or may not be transferable to other settings with similar contextual backgrounds and thus may have limited generalizability. We encourage scholars to conduct future studies in many other types of school districts to expand the existing knowledge base about educators' belief systems and associated factors. In addition, while this study's repeated cross-sectional design may be less likely to subject to sample attrition during the years of the study, it did not allow us to examine intrapersonal change over time, nor did it allow for comparisons and contrasting beliefs between teachers who stayed, left, or were new to the district. We encourage future studies to address this study limitation by employing a longitudinal study design to follow the same group of participants over time.

As with many studies, our ultimate goal is to contribute to the improvement of student learning. While we did not include student achievement outcome measures in the present study, we hope through the understanding of teachers' personal beliefs about instructional reform, this may have a direct impact on their work performance, which can lead to student success. We encourage future studies to take into account CCSS-aligned measures on student performance and its association with the work of teachers.

Conclusion

Changing the climate of organizations requires time, support, resources, and collective efforts—as does cultivating a climate in which educators are committed to schoolwide reform and are willing to try out innovative approaches. Our work highlights the importance of teachers' trust in their principals, schools' innovative climates, and schoolwide collective beliefs in the shaping of individual teacher beliefs about the impact of CCSS. As each of the variables made a significant contribution to the shaping of educator beliefs during the implementation period, school districts should think systematically and holistically about how these components work together to facilitate the development of teacher beliefs in support of districtwide reform efforts.

Failure to take advantage of these critical components may work against systematic improvement.

School districts should prioritize strategies to build widespread buy-in to schoolwide reform early and often. One fundamental approach to accomplishing this important goal is to draw on the powerful influence of social norms to cultivate a climate that is filled with positive beliefs about the reform. For teachers who are early in their careers—and whose beliefs tend to be more pliable than those of more experienced teachers—schools can create opportunities to establish new social norms so that the resulting climate in which they are immersed can further shape their beliefs (Tschannen-Moran et al., 2014). In changing organizational climate, educational leaders may need to possess a proactive mind-set and be sensitive to intangible cues like underlying norms and beliefs as well as tangible artifacts such as physical structure, time, and resources that are necessary for change to take place.

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