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Principal Behaviors Outside Large Metropolis School Districts: Exploring the Relationships Between Time Use and School Context

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Principal Behaviors Outside Large Metropolis School Districts: Exploring the Relationships Between Time Use and School Context

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ABSTRACT

Researchers, policy makers, and practitioners have been interested in how principals have spent their time since the professionalization of the principalship at the turn of the twentieth century. Findings across 100 years of research have suggested that modern day principals spend their time similarly to their predecessors. Despite seemingly homogeneous findings, gaps in the literature and methodological limitations, including small, unrepresentative samples and abbreviated observational periods, have warranted continued study of principal time use. The purpose of this study was to examine how principals outside large metropolis locales allocated their time and to analyze the relationships between principal time use and school context, including prior academic outcomes, school level, locale, and student demographics.

Sixty-one principals from 20 school districts in eastern Pennsylvania enrolled in the study. Participants received five randomly-timed notifications a day asking them to complete a survey on their current activity. In addition, the participants also reported the professional standard that defined the nature of their activity, their location, the stakeholders with whom they were interacting, whether the activity was anticipated, and whether they initiated the activity. The study ran Mondays through Fridays for the month of October in 2017.

Overall, the findings revealed that the sampled principals spent their time evenly distributed between instructional, organizational, and relational activities. Most often in the company of others, principals spent the highest proportion of their time in the office. Contrary to previous research, the sampled principals anticipated and initiated the majority of their activities. Two-level hierarchical linear and nonlinear growth models revealed trends in principal time use during a typical fall day, as well as differences between days of the week. School level, locale, and total student enrollment significantly explained variation across the trends in principal time

use. Improved understanding of how principals spent their time and the relationship between time and school context offered the potential to impact principal practice, principal preparation programs, and future principal time use research.

Chapter One: Introduction

Introduction

Research has indicated that principals play a critical role in school improvement (Darling-Hammond, LaPointe, Meyerson, Orr, & Cohen, 2007), yet researchers have struggled to identify how principal behaviors influence educational outcomes (Sebastian, Huang, & Allensworth, 2017). Spending the majority of the day engaged in organizational tasks (Grissom, Loeb, & Mitani, 2015; McClure, 1921), studies have documented principal attempts to improve student achievement by increasing the amount of time spent on instructional activities (Goldring, et al., 2015). However, research has offered little support to the role instructional leadership plays in increasing achievement (Grissom, Loeb, & Master, 2013; Horng, Klasik, & Loeb, 2010). Researchers have had difficulty in establishing a causal relationship between principal time and educational outcomes due to potential mediating and moderating factors. Evidence has indicated that principal effects are often indirect in nature (Heck & Hallinger, 2014). In addition, numerous contextual factors, including socioeconomic status (Lortie, Crow, & Prolman, 1983), school size (Hallinger & Murphy, 1985), and student body composition (Andrews, Soder & Jacoby, 1987) have influenced the nature of school leadership and have made research findings difficult to generalize (Leithwood et al., 2010).

Validity issues in existing principal research also limited understanding of the relationship between principal behaviors and educational outcomes. Despite the importance of contextual factors, researchers created gaps in the literature by predominantly sampling principals from large, urban school districts (Grissom et al., 2013; Krug, Scott, & Ahadi, 1990; Shellinger, 2006). Additionally, researchers gathered data over short periods of time and neglected to consider the influence of time of the year on principal behavior (Spillane, Camburn,

& Pareja, 2007). Furthermore, researchers predominantly investigated differences in behaviors between principals (Sebastian, Camburn, & Spillane, 2017). Few studies gathered data on how principal behaviors may vary during the day or over the course of a week. Gaps in the literature constrained researchers' understandings of the variability in principal behavior and the relationships between principal behavior and educational outcomes.

Through the investigation of how principals from school districts outside large metropolis areas spent their time, the purpose of this study was to build upon the existing literature investigating the relationship between principals and educational outcomes. Taking into consideration school-level contextual factors, the study examined how allocation of time in leadership activities varied both between principals and over the course of a principal's typical day and week. After first identifying how principals spent their time, the study then analyzed the relationships between principal time use and school context, including prior academic achievement.

To achieve this purpose the following chapter was organized into five sections: research background, theoretical framework, statement of the problem, purpose of the study, and research questions. First, the research background investigated the influence of principals by exploring the nature of principal effects on educational outcomes and the influence of context on principal behavior, as well as the different approaches researchers use to study principals. Next, through the discussion of samples, observational periods, data collection techniques, constructs, and statistical analyses, I identified validity issues in the canon of principal time use literature that threaten consistency in research findings. Then, from a theoretical perspective, I detailed how leadership theory reinforces the importance of context in understanding principal behaviors (Yukl, 1989). After summarizing the needs described in the research background for the

statement of the problem, I concluded the chapter with the purpose of the study and research questions.

Research Background

The influence of principals. During the past 40 years, researchers, policy makers, and practitioners reached consensus that school leaders have a measurable impact on schools (Buttram, Mead, Loftus, & Wilson, 2006). Demonstrating the potential positive and negative influences, studies explored the effect of principal leadership on school organization and culture, including on the quality of teaching and student outcomes (Day, Gu, & Sammons, 2016). In systematically examining the available evidence on the effect of school leadership, Leithwood, Seashore-Louis, Anderson, and Wahlstrom (2004) argued that leadership ranks second only to teaching among school-related factors that impact student learning. Direct and indirect effects of leadership accounted for a quarter of total school effects on student learning (Leithwood et al., 2004). Critical to school improvement, leaders contributed to student learning indirectly though their influence on other people or features of their organizations (Bryk, Sebring, & Allensworth, 2010; Elliott & Clifford, 2014).

Effects. Research indicated that principals primarily have an indirect effect on educational outcomes (Leithwood & Jantzi, 1999). Sammons, Gu, Day, and Ko (2011) argued that the effect of high expectations and academic outcomes on teachers, teaching quality, and school climate may mediate the effect of school leaders on school improvement. Heck and Hallinger (2014) found that "instructionally focused" school leaders influenced the strength of the effect of individual teachers on student learning and created conditions that lead to greater consistency across teachers. Darling-Hammond, Meyerson, LaPointe, and Orr (2009) discovered that principals' effects on teaching and learning may also stem from principals' strong influences

on teacher recruitment and retention. However, a lack of consensus on which factors have the potential to explain the greatest proportion of student learning warranted additional research investigating the relationship between principal activity and potential moderating and mediating factors (Leithwood, Patten & Jantzi, 2010).

Context. In addition to the indirect nature of principal effects, the influence of educational contexts on principals' behaviors also restricted researchers' understanding of how principals affect educational outcomes (Rowan, Dwyer, & Bossert, 1982). As an example, evidence suggested that socioeconomic factors significantly influenced principal leadership behavior. Leithwood et al. (2004) reported a significant effect of leadership actions on student learning in all schools, however "effects of successful leadership are considerably greater in schools that are in more difficult circumstances" (p.3). Similarly, Andrews et al. (1987) found that principal effects were strongest for schools with high populations of African-American students with low socioeconomic status. Significant school leader effects on educational outcomes have also been found in persistently low achieving schools (Murphy, Smylie, Mayrowetz, & Louis, 2009). Although evidence suggested educational contexts are instrumental in understanding leadership behaviors, Goldring, Huff, May, & Camburn (2008) argued that existing research proved inconclusive in understanding how context and leadership behaviors are related.

Impact. Although researchers argued that effective school leadership is contingent on social and organizational context, Hallinger and Heck (1999) contested that three meaningful leadership practices transcend context: setting directions, developing people, and building structures and social systems. First, through setting directions, principals had the power to formulate a school's mission and vision. Arguing that mission-building was the strongest

influence school leaders have over student achievement, Hallinger and Heck (2002) suggested school leaders found success in creating and communicating shared understanding of goals. Second, to motivate teachers and support instruction, successful school leaders built capacity by providing support and professional development (Lord & Maher, 1993). Principal support of teachers, whether through increased classroom supervision (Heck, Larson, & Marcoulides, 1990) or involvement in consequential problem solving (Weil, Marshalek, Mitman, Murphy, Hallinger, & Pruyn, 1984) was linked to positive educational outcomes. Finally, through the development and implementation of a strategic school improvement plan, successful school leaders created structures and social systems that empowered staff to focus on instruction (Leithwood, et al., 2004). Although literature suggested a school's purpose, people, and policies mediated the relationship between principal behavior and educational outcomes, additional research is necessary to understand the specific nature of these factors (Goldring et al., 2008).

The study of principals. In an attempt to better understand the relationships between principals and educational outcomes, a multitude of studies have been published investigating the influence of different types of leadership styles. As examples, studies revealed a positive relationship between distributed leadership and organizational change (Harris, 2008), positive and significant relationships between instructional leadership and educational outcomes in comparison to transformational leadership (Robinson, Lloyd, & Rowe, 2008), and the effect of a combination of transformational and instructional leadership to "progressively shape and layer the improvement culture in improving students' outcomes" (Day, Gu, & Sammons, 2016, p. 225). Lack of consistency in findings on the effects of leadership styles suggested that there was no one best leadership style for fostering student learning in schools. Instead, Hallinger (2011) argued leaders need to match their style to their specific educational context. However,

Leithwood et al., (2004) encouraged caution when interpreting research that used terms like "instructional", "transformation", and "strategic". Without careful consideration of constructs and methodological design, the terms may have simply captured "different stylistic or methodological approaches to accomplishing the same two essential objectives critical to any organization's effectiveness: helping the organization set a defensible set of directions and influencing members to move in those directions" (Leithwood et al., 2004, p. 4). Research exploring educational styles may have actually investigated aspects of leadership that are common across styles.

Principal time use research. In contrast to studying leadership styles, other researchers analyzed the relationship between principals and educational outcomes through the study of how principals spent their time (Horng et al., 2010; Goldring et al., 2015; Martinko & Gardner, 1983; Smith & Andrew, 1989). Hochbein, Dever, White, Mayger, & Gallagher (2017) argued "Given the responsibilities of principals, proficient use of their time offers the potential to enhance school outcomes" (p. 2). Grissom, Loeb, and Mitani (2015) suggested that time use decisions were important to study because "principals must make decisions about how to allocate their time among competing demands" (p. 2). Time use, as a "finite and valuable resource that is sometimes squandered by competing demands and conflicting priorities" (Leithwood et al., 2004, p. 57), illuminated leadership behaviors (Goldring et al., 2015; Kuehny, 1924; Peterson, 1977). Furthermore, Juster and Stafford (1985) argued "the levels of output produced by the allocation of human time to various market and nonmarket activities are contingent on the context of time use" (p. 2). The study of principal time use offered the potential for researchers to link principal behaviors to educational contexts, including prior academic outcomes, without the complications of defining leadership styles.

Since the professionalization of the role, researchers have collected time use data from principals to gain a better understanding of the demands of the job as well as study the effects of principals on educational outcomes (McMurry, 1913). General research findings have suggested that modern day principals spend their time similarly to their predecessors. McClure (1921) found that elementary principals spent the majority of their time on administrative activities. Almost 100 years later, Grissom, Loeb, and Mitani (2010) observed similar results in their sample of 234 principals from Miami-Dade County Public Schools. Despite seemingly homogeneous findings across studies, individual studies suggested variation in principal time use across schools and across years (May et al., 2012). However, gaps in the literature restricted researchers' understandings of the variability in principal behaviors. The following section investigated validity issues that threatened the consistency of principal time use findings through a discussion of sample size, data collection techniques, observational periods, constructs, and statistical analyses.

Samples. Although almost half of all United States school districts are located in rural communities (Aritomi, Coopersmith, & Gruber, 2009), principal time use researchers have overwhelmingly sampled principals from urban districts (May, Huff, & Goldring, 2012). Since 2000, 82% of published principal time use studies investigated the behaviors of urban principals (Hochbein, Mahone, & Vanderbeck, 2016). Of these studies, principal data from Cloverville, a pseudonym for a "medium" school district composed of 52 schools, accounted for 53% of the urban sample. Furthermore, 29% of published studies since 2000 sampled principals in large, urban districts with over 100,000 students, including Chicago Public Schools (Spillane & Zuberi, 2009), Miami-Dade County Public Schools (Horng et al., 2010) and Jefferson County Public Schools (Shellinger, 2006). Although there are more school districts in the United States with

fewer than 100 students than districts with more than 100,000 students (Hochbein & Harbour, 2015), researchers have largely neglected to investigate principal time use outside of large, urban districts. Sampling principals from single, large districts provided convenient, adequate sized samples, a reduction in validity threats, and evidence for the likelihood of causal relationships between principal time use and student outcomes (Grissom et al., 2013).

In addition to the over-representation of principals from large, urban districts, principal time use samples have predominantly consisted of a small number of participants (Martin & Willower, 1982; Spillane, Camburn, & Pustejovsky, 2008). Although a systematic review of principal time use studies revealed a wide range of sample sizes from one principal to 421 principals (Hochbein et al., 2016), with only six of the 55 studies' samples over 100 participants (Bates, 1925; Grissom et al., 2013; Grissom et al., 2015; Davis, 1953; Goldring, Grissom, Neumerski, Murphy, & Blissett, 2015; Koos, 1924), the median sample size was 26 principals. Small sample sizes also limited understanding of the variability in principal behavior. Horng, Klasik, and Loeb (2010) argued, "While the importance of the principal for school operations is widely acknowledged, surprisingly little is known about what principals do on a day-to-day basis and how this varies across schools" (p. 491). Despite 100 years of research, researchers have limited understanding of how principal time use may vary across educational contexts.

Observational periods. Limited observational periods also have restricted researchers' ability to generalize findings. Researchers observed principals from a range of one day (Horng et al., 2010; Weldy, 1979) to 319 days (Goldring et al., 2015), with the mode of five days and median of six days (Hochbein et al., 2016). Although longitudinal qualitative studies depicted variation in principal tasks over time (Wolcott, 1973), few published time use studies included data from different time points within the school year (Goldring et al., 2015). Furthermore,

many studies appeared to be biased towards collecting data during the spring (Blendinger & Snipes, 1996; Camburn, Spillane, & Sebastian, 2006; Morris, Crowson, Hurwitz, & Porter-Gehrie, 1982; Spillane et al., 2008). Abbreviated observational periods, limited to certain times of the school year, constrained the generalizability of principal time use findings (Martin & Willower, 1981) and limited understanding of how principal time use changes across time.

Data Collection. Data collection techniques also have limited researchers' understanding of how principals spend their time. Researchers gathered time use data predominantly through self-report and observational data collection methods (Kubey, Larson, & Csikszentmihalyi, 1996). Both methods contained advantages and disadvantages. Easily distributed to large samples, self-report data collection methods, including surveys and end-of-day logs, were plagued by poor response rates (Cohen, Manion, & Morrison, 2013). Furthermore, as researchers were unable to control the circumstances when participants completed the self-report measure, participants may have misunderstood questions or completed the questionnaire incorrectly (Baily, 1994). Perhaps most concerning, self-report methods often captured participants' perceptions of time use, rather than actual time use (Kubey et al., 1996).

Although difficult to collect data on a large number of participants, observational techniques enabled data collection across numerous settings, as well as during the extensive principal work schedule (Wolcott, 1973). However, observational techniques, such as shadowing, demanded a considerable time commitment from both the researcher and study participants to gather an accurate portrayal of principal time use (Johnson & Turner, 2003). In addition, observational techniques often required resources to fund full-time research assistants to collect the time use data. Researchers also needed to avoid the Hawthorne effect where the presence of the researcher altered the participants' behavior (Cohen et al., 2013). Even with

willing participants and sufficient resources, common limitations included the inability to generalize findings or empirically link time use to educational outcomes (Horng et al., 2010). Both self-report and observational data collection methods created challenges that limited the validity of claims in existing principal time use research (Grissom et al., 2013).

Constructs. The constructs researchers chose to categorize time use influenced the validity of research findings. Defined as the extent to which an operationalization measured the concept it was supposed to measure (Cook, Campbell, & Day, 1979), construct validity has been a concern in principal time use studies since the 1920s. In 1926, Benson theorized, "How can a definite line be drawn between supervision and administration? Clerical duties are not likely to be confused with supervisory duties, but they may not always be easily separated from administrative duties" (p. 96). In one of the first national studies on elementary principals, the National Education Association (1928) reported, "It is interesting to compare the results of this study of the distribution of the principal's time with the results from similar studies… the meaning of supervision, administration, and similar terms (are) defined somewhat differently in the various investigations" (p. 206).

Researchers used disparate definitions of terms throughout the history of principal time use research and consequently, findings were difficult to compare across studies. As an example, the National Center for Education Statistics (NCES, 2017) collected principal time use data in four categories (internal administrative tasks, curriculum and teaching-related tasks, student interactions, and parent interactions) in the same year Grissom, Loeb, and Mitani (2015) documented principal time use in six categories (administration, organization management, day-to-day instruction, instructional program, internal relations, and external relations). Some constructs, including administration, instructional, and relational time, occurred across multiple

studies (Mahone, Hochbein, & Vanderbeck, 2016). Despite construct similarities, time use findings were difficult to compare across studies because the total percent of time spent in one construct was contingent on the number and definition of the other constructs employed in the specific research designs. Although acknowledged as an issue since the early 1920s, researchers have continued to struggle with limiting threats to construct validity.

Statistical analyses. Researchers have utilized statistical analyses to study the relationship between principal time use and educational outcomes since the 1980s. Originally relying on descriptive statistics (Smith & Andrew, 1989), contemporary researchers employed more sophisticated analyses, including multi-level modeling and cluster analysis, in attempts to learn more about principal effectiveness (Grissom et al., 2013; May et al., 2012). However, many studies have been criticized for weak data analysis methods (Rousmaniere, 2013).

Specifically, critics questioned researchers' attempts to provide evidence for a causal relationship between principal time use and student achievement (Goldring et al., 2008). Despite the inability to identify a convincingly causal effect (Grissom et al., 2013), researchers studied the possible directionality of principal effects by controlling for prior student achievement (Horng et al., 2010), focusing on changes in value added to student achievement (May et al., 2012), and comparing observably similar schools in order to reduce the error caused by the influence of contextual factors (Grissom et al., 2013). Regardless, Horng et al. (2010) noted that the causal direction between principals' time use and student performance remained unclear. Few principal time use studies attempted to employ similar controls in order to examine the opposite directionality, the influence of school performance on principal time use (Goldring et al., 2008). In neglecting to adequately explore the potential influence of context on principal time use, researchers limited their understanding of the variability of principal behavior.

Furthermore, most principal time use studies that utilized inferential statistics to connect principal practice and school outcomes focused on average between-principal differences (Horng et al., 2010; Martinko & Gardner, 1983). Studying within-principal variation, how time use varied from hour to hour and day to day, may have provided a more nuanced understanding of how principal practice varied and how context may predict time use (Sebastian et al., 2017). Overreliance on descriptive statistics, the potential causal effects of time use on student achievement, and between-subjects research designs limited researchers understanding of the relationships between principal time use and school context, including academic outcomes.

Theoretical Framework

The current study was grounded in the situational theory of leadership behavior. The situational approach to leadership emphasized the importance of contextual factors on leadership behaviors (Yukl, 1989). Hersey and Blanchard (1982) argued for the need to examine the dynamic between leaders and their environments and acknowledged the presence of contextual factors that influenced leaders' behaviors and practice. Situational theorists posited that leadership style was contingent upon the factors of the situation, including the people, tasks, organization, and other environmental variables (Bolden, Gosling, Marturano, & Dennison, 2003). Salley, McPherson, and Baehr (1979) argued from a situational theoretical background when claiming:

> Principals are captives of their environments… the size of the school system, size of the school, and number of grade levels in the school are organizational variables that influence the principal's definition of his or her work… ethnic and socioeconomic characteristics play a significant part in defining the work of the principal. (p. 34-35)

Although often used as a theory to study leadership styles, situational theory offered the potential to inform research investigating how principals allocate their time. In exploring leadership discretionary practices and the relationship to leader effectiveness, previous situational theorists argued that leaders have choices in what aspects of their job to emphasize, how to allocate time, and with whom to interact (Kotter, 1982). The current study aimed to examine the conditions that shape principals' decisions to allocate their time and attention to competing demands. In exploring how principals allocated their time, the study investigated the relationship between principal time use and school context. how context may affect principal time use.

Statement of the Problem

Previous research exploring principal effects on school outcomes revealed that school leadership ranks second only to teaching among school-related factors that impacted student learning (Leithwood et al., 2004). The effects, however, were mostly indirect and little was discovered about which mediating and moderating factors influenced the relationship between principal behaviors and school outcomes (Leithwood et al., 2010). Additionally, principal behaviors may have partially been predicted by individual and school level contextual factors (May et al., 2012). In an attempt to provide additional insights into the relationships between leadership, educational outcomes, and school contexts, researchers investigated the effects of different types of leadership styles on outcomes (Hallinger, 2011). To mitigate the conflation of leadership styles with leadership behavior, others turned to collecting time use data as a representation of principal activity and behavior.

Validity issues in existing principal time use literature threatened the consistency of findings and negated researchers' abilities to generalize research findings outside the selected

samples. Sample sizes were often small and homogenous (Martin & Willower, 1982) with an overemphasis on principals located in large, urban districts (Grissom et al., 2015). Researchers employed abbreviated observational periods limiting the understanding of time use variability over the course of the school year (Horng et al., 2010). The majority of existing principal time use literature also neglected to mitigate the limitations of self-report and observational data collection techniques (Spillane & Hunt, 2010). Divergent, yet limited, constructs of principal time use restricted researchers' ability to compare findings across studies (Camburn et al., 2006). Few researchers employed statistical analyses to rigorously explore the relationship between school context and principal leadership (Sebastian et al., 2017). Future research must attend to existing gaps in principal time use literature to better understand the variability in principal behavior.

Purpose of the Study

Stressing the importance of the context's interaction with school leadership, the current study aimed to contribute to the canon of principal time use research by exploring how modal principals in the United States allocated their time. Building upon and situated within the work of Kuehny (1925), Goldring et al. (2008), and Horng et al. (2010), the study investigated how principal time use varied and examined the relationship between principal time use and school context, including prior academic outcomes. The current study responded to five specific areas of need articulated in principal time use research: samples, observational periods, data collection techniques, constructs, and statistical analyses. Employing event sampling methodology (ESM), the study collected time use data on rural, town, suburban, and urban principals for one month in the fall semester of the 2017-2018 school year. The study employed a combination of the most prevalent previously published constructs of principal time use, including organizational,

instructional, and relational time. Furthermore, the study analyzed within-principal differences by running multi-level models and incorporating school level contextual factors.

Research Questions

The purpose of this study was to investigate how non-urban principals allocated their time and to analyze the relationships between principal time use and school context, including prior academic outcomes, school level, locale, and student demographics. To achieve this purpose, I asked three research questions:

1. How do non-urban principals allocate their time?
2. How does a principal's allocation of time vary during the day and over a week?
3. How does school context predict variation within principals' allocation of time during the day and over a week?

Definition of Terms

For the purposes of this study, terms were defined as follows:

Public School: An elementary, middle, or high school that is supported by public funds and governed by a publicly elected board (Zinth, 2005). Although public schools, charter schools were excluded from the sample as the role of principal, in comparison to traditional public school principals, differed based on the independent needs of the school. The exclusion of charter schools from the sample mitigated a plausible threat to construct validity.

Principal: The highest-ranking school level administrator that shaped the academic vision and managed people, data, and processes to improve educational outcomes (Wallace Foundation, 2013).

Elementary School (ES): A school including grades Kindergarten to fifth grade.

Middle School (MS): A school including grades sixth to eighth grade.

High School (HS): A school including grades ninth to twelfth grade.

Event Sampling Methodology (ESM): A signal contingent data collection method where the participants are notified to complete a predetermined survey at random intervals throughout the day. ESM is used to collect empirical data on the frequency and patterning of daily activity, social interaction, and changes in location (Csikszentmihalyi & Larson, 2014).

Organizational Activity: An activity comprised of routine administrative duties and tasks executed to comply with state and federal regulations (Grissom & Loeb, 2009).

Instructional Activity: An activity that aimed to promote, support, and improve the implementation of curricular programs (Grissom & Loeb, 2009).

Relational Activity: An activity that related to building interpersonal relationships within the school as well as working with external stakeholders (Grissom & Loeb, 2009).

Other Activity: Any other activity that did not fall under the purview of organizational, instructional, or relational activities.

Chapter 2: Literature Review

Introduction

Attempting to bring depth and nuance to the discussion surrounding principal effectiveness, this literature review aimed to identify and review research focused on how principals spend their time. Specifically, to aid in the examination of how non-urban principals allocate their time and investigate the relationships between school context and principal time use, the review analyzed the literature as it related to the following questions: (a) How have historical and political contexts influenced the development of principal time use research? (b) What data have researchers collected on the composition of a principal's typical day? (c) What data have researchers collected on the content of principal time use? (d) What relationships have researchers discerned between principal time use and academic outcomes? (e) What evidence have researchers collected on the effect of school context and individual attributes on principal time use?

After detailing the literature selection and review methodology, I began the review by analyzing principal time use data collection techniques and exploring the historical context of principal time use research. Next, acknowledging the limited sampling structure in existing principal time use literature, I outlined principal time use findings by examining the configuration of a principal's typical day. The review continued with an exploration of the composition of principal time use, including empirical evidence on the amount of time principals spend in critical leadership domains. I also analyzed the literature that examines the relationships between principal time use and educational outcomes. Finally, the review explored the influence of context, including school location, principal role, and principal attributes, on

principal time use. The chapter concluded with a summary of the findings in order to support the need for the current study's examination of non-urban principals' time use and school context.

Literature Selection and Review Methodology

The literature selected to include in this review was identified as part of a larger research project to investigate the history of principal time use studies. A team of researchers and I conducted a systematic literature review of principal time use research. Initial attempts to identify studies for review by searching common educational databases using search terms, including "principal time use" and "principal time allocation," proved inadequate in establishing a comprehensive sample of studies. Principal time use research was categorized under many sub-headings and distributed among a larger collection of research exploring the general relationship between school leadership and student achievement. Instead, we selected articles for review through an iterative reference review process. To avoid issues of construct validity, estimations of principal time use, and perspective data gathered from indirect sources, we developed three criteria to guide the identification of studies for review.

First, the sample exclusively included principals from public schools in the United States. To attend to issues of construct validity, we excluded international studies and studies focused on principals in independent or parochial schools. In addition to divergent titles, we did not want to assume that the principal's role was consistent and comparable outside the context of the United States public school system. Second, researchers must have recorded a measurement of time. Although a substantial body of literature exists utilizing surveys to assess principal time use (NEA, 1928; NCES, 2017), in an effort to avoid estimations of principal time use we excluded any study that did not record an explicit measurement of time. This criterion also excluded studies that asked participants to provide an estimation of time use during a "typical" day or

week. All but one survey (Koos, 1924), which in practice functioned as a single day daily log, was excluded from the review. Third, a defined period of time, which could not exceed a year, bounded the time measurement. We excluded any studies that requested time use data from more than one year as these studies also relied on the perception of time use rather than actual recorded time.

Beginning with five contemporary articles focused on principal time use (Camburn, Spillane, & Sebastian, 2010; Grissom et al., 2013; Horng et al., 2010; Lee & Hallinger, 2012; May et al., 2012), we reviewed the reference lists from each article searching for publications that fit the above criteria. When a new article was identified, the reference review process continued. Once the genesis study of principal time use was located (McClure, 1920), we began the similar process of reviewing all articles that cited an identified article. As new articles were identified, the review process continued until unreviewed articles were depleted. From this process, we identified 55 studies that examined principal time use. Conducted between 1920 and 2015, the quantitative and qualitative studies were published as books, journal articles, dissertation studies, and papers presented at peer-reviewed conferences.

The Study of Principal Time Use

Data collection. Historically, researchers employed one of four data collection methods to document principal time use: one-time surveys, daily instruments, observations, or event sampling methodology (ESM) (Camburn et al., 2010). National education associations have utilized surveys to collect principal time use data since the 1920s (NEA, 1928). Currently, the National Center for Education Statistics (NCES) collects annual principal time use data through the National Teacher and Principal Survey. Although prevalent in the literature, most one-time surveys were excluded from the review to avoid estimations of time use. As an example,

according to the 2015 NCES survey, principals perceived to have spent 30 percent of their time on curriculum and teaching-related tasks (Taie & Goldring, 2017). In comparison, utilizing observational techniques, Grissom, Loeb, and Master's (2013) findings suggested principals actually spent 13 percent of their time on instructional related tasks. The NCES data on principals' instructional time use was greater than the findings in 96 percent of all the studies included in this review. The discrepancy between findings may be the result of the limitations of the one-time survey. NCES survey participants may have overestimated the amount of time they spent on instructional tasks. In comparison to actual allocation, Smith and Andrews' (1989) job analysis questionnaire revealed that principals would ideally allocate between 27 and 35 percent of their time on instructional tasks. Relying on the estimation of time use, one-time survey results may be closer in alignment with principals' ideal allocation of time.

Excluding one-time surveys, studies from the 1920s predominantly used daily instruments, such as principal diaries, to record principal time use (English, 1927; Flowers, 1927, Kuehny, 1925). This trend continued until the mid-1970s when Wolcott (1973) introduced the concept of examining principals through ethnographic study. Since then, observational methodology has dominated principal time use research and continues to be regularly used in contemporary studies (Barnes, Camburn, Sanders, & Sebastian, 2010; Buttram et al., 2006; Spillane et al., 2007).

In 1990, Krug, Scott, and Ahadi introduced ESM to the study of principals. In ESM, study participants report their exact activity, along with any other information requested by the researcher, whenever they receive a randomly-timed alert. ESM has allowed researchers to track subjects across multiple locations, avoid the influence of an observer on subjects, and limit the need for recall of activity (Csikszentmihalyi & Larson, 2014). Based on random samples of

behavior, ESM findings have been generalized outside the time frame of the study (Spillane & Hunt, 2010). In comparison to other self-report methods, ESM has provided the most detailed time data (Juster, Ono, & Stafford, 2003). Although validated through multiple studies (Camburn et al., 2010; Juster et al., 2003) and utilized in other fields to mitigate common methodological challenges of studying time use (Csikszentmihalyi & Larson, 2014; Jones & Youngs, 2012), researchers have not regularly used ESM to study principal time use.

Historical context. Although the publication of principal time use studies spanned 100 years, several high frequency time periods emerged (Vanderbeck, Mahone, & Hochbein, 2016). Beginning in 1920, seven studies were published prior to 1930. After a relative dearth of publications between 1930 and the early 1970s, 16 studies appeared between 1980 and 1989. Since 2000, 18 studies have been published. To gain insight into the impact of the studies in relationship to each other, the following section explores principal time use findings within a historical context.

1920 - 1929. In the early twentieth century, the elementary principalship was ambiguous and known for the multiple job demands and numerous teaching responsibilities (Rousmaniere, 2013). The role of principal was particularly ill-defined in rural communities where there was little delineation between the superintendent and principal. According to Hosic (1926), "the elementary principalship was not a professional position but merely 'a function' that varied 'with varying situations' (p. 30). Administrative progressives, part of the wider progressive social reform movement of the time, believed that improving the principal's status and job description, as well as the administrative structure, would improve educational practice (Beck & Murphy, 1993). Reformers imagined casting the principal as a local agent in charge of implementing central office policies (Kafka, 2009). "The prominent image of the new principal was not that of

an inspiring observer at all, but rather a rule-bound and distant bureaucrat, delivering orders and rigid evaluations from the office" (Rousmaniere, 2013, p. 42).

Six of the principal time use studies published in the 1920s focused on the elementary school principalship (Bates, 1924; Benson, 1926; English, 1927; Flowers, 1927, Kuehny, 1925; McClure, 1921). In an attempt to help clarify the principal's job description and professionalize the position, the studies created lists of principals' daily activities and tabulated the duties into broad categories of principal responsibility. Although the types of activities and categories differed across studies, all researchers during this time attempted to document a structure and common set of responsibilities across the principalship.

1930 - 1979. After 1927, only ten studies were published on principal time use in the next fifty years (Vanderbeck et al., 2016). Instead, as a result of federal mandates including Brown v. the Board of Education in 1954 and the Education for All Handicapped Children Act of 1975, research focused on the demands of an increasing and diversified student population (Hallinger, 1992). With one major exception, principal time use, activities, and behaviors were not emphasized in educational research during this time. In his seminal study, Wolcott (1973) adopted a "participant-as-observer" role to create an ethnography detailing the work of one elementary school principal. He believed that "it is only through a case study in depth of this kind that the dynamics of the system and the interactions of people within it can be seen in their functional totality" (Wolcott, 1973, p. 8). In addition to keeping detailed field notes and collecting school notices, reports, and correspondence, Wolcott recorded the activity and social interaction patterns of the principal at 60-second intervals for two hours at a time. Wolcott's study focused on both formal and informal encounters as well as the principal's daily routine.

Oft cited, Wolcott's work influenced the ethnographic principal time use studies of the 1980s (Crowson & Porter-Gehrie, 1980; Morris, et al., 1984).

1980 - 1999. Educational researchers in the 1980s realized that schools were "complex organizations in need of complex leadership strategies" (Rousmaniere, 2013, p. 134). To this end, the effective schools educational reform movement emphasized the need for strong administrative leadership through the principal communicating the school's mission and vision, building climate and culture, and leading instruction (Edmonds, 1979). "Effective Schools research introduced a notion of the principal who was not a bureaucratic administrator who managed technical tasks but an educational leader who served as a resource for teachers and developed an organizational culture of high expectations" (Rousmaniere, 2013, p. 134). At the same time, new state and federal programs were introduced that brought elements of free-market competition into public education (Olssen & Peters, 2005). Consequently, principals also had to deal with the effect of new state and federal policies on students' academic achievement (Kafka, 2009). Under the combination of these reforms, the principal served as both an educational and business leader (Goodwin, Cunningham, & Eager, 2005).

Many of the principal time use studies of this time reflected the emergent business component of the job and illuminated the leadership roles and responsibilities of the principal by utilizing Mintzberg's (1973) technique of structured observation (Berman, 1982; Kmetz & Willower, 1982; Madsen & Reyes, 1986; Martin & Willower, 1981; Sproull, 1981). Mintzberg's theoretical model of administrative behavior relied on structured observations to collect data on six general characteristics: the volume and pace of work, variety, brevity, and fragmentation, preference for verbal media, preference for live action, the network of contacts, and the blend of rights and duties (Madsen & Reyes, 1986). Direct observation provided the researcher with an

authentic sense of the realities of administrative life (Kmetz & Willower, 1982). Mintzberg used this technique to study business executives in order to create a description of the manager's role (Mintzberg, 1975). Using Mintzberg's technique, Sproull (1981) asserted:

> Expanding our empirically based knowledge of school manager behavior can serve several useful purposes. First, it is commonly asserted that school managers influence teacher and student behavior. Only by understanding what school managers actually ***do*** is it possible to determine how that influence occurs. Second, policymakers from school superintendents to the U.S. Commissioner of Education rely on school managers as key figures in any effort at educational reform. (p. 113)

2000 - 2016. The current high-stakes accountability era introduced state and federal initiatives to raise educational standards in schools and to devise new methods of assessment and enforcement. The No Child Left Behind Act of 2001 dominated the educational landscape in the 2000s. Principals were being held responsible for the performance of the entire school and their work changed in response to new district, state, and federal mandates (Kafka, 2009). Principal time use studies after 2000 featured sophisticated and complicated research designs. Whereas previous research predominantly relied on descriptive statistics to describe a principal's typical day, contemporary researchers utilized inferential statistics to validate research methodologies (Camburn et al., 2006; Camburn et al., 2010; Spillane & Zuberi, 2009) and analyze the relationship between principal time use and educational outcomes (Horng et al., 2010), as well as employed multiple forms of data collection methods in order to triangulate results (Goldring et al., 2015; Spillane & Hunt, 2010). Studies also investigated the change in time use after interventions (Shellinger, 2006; Barnes et al., 2010), researched time use in distributed leadership (Spillane et al., 2007; Spillane et al., 2008), and compared how principals in different

contexts allocated their time (Goldring et al., 2008; Horng et al., 2010).

Principal Time Use Findings

Composition. Despite the historical evolution of the role, 100 years of research revealed commonalities in the composition of a principal's typical day. By gathering data on selected administrative activities, correspondence, and contacts (Martin & Kmetz, 1982; Wethayanugoon, 1996), researchers developed a widely-accepted narrative of how principals allocated time. Regardless of data collection method, "various images of school principals' work permeate the literature including 'brief encounters', 'fire-fighting', 'lone ranger', and 'administration-bound'" (Spillane & Hunt, 2010, p. 294). Due, in part, to the widespread commonalities, researchers neglected to design studies to adequately investigate the relationship between school context and principal time use. The following findings on the composition of a principal's typical day were based on samples consisting overwhelmingly of principals from urban locales and may have been less representative of the time use of non-urban principals.

Research has consistently shown that a principal's average day consisted of a "high volume of work completed at an unrelenting pace" (Kmetz & Willower, 1982, p. 72). Peterson (1977) described the principal's day as "characterized by many activities of short duration which are highly varied in function and which change with great frequency" (p. 2). Principals participated in up to 149 activities per day (Martin & Willower, 1981). The duration of tasks usually lasted between four (Crowson & Porter-Gehrie, 1980) and nine minutes (Peterson, 1977). Demonstrating intense fragmentation, Kmetz and Willower's (1982) findings demonstrated that over 90 percent of all principal activities last less than 10 minutes. Principals also often engaged in multiple tasks at one time (Grissom et al., 2015; Stronge, 1988) and spent up to 25% of their time multitasking (Martinko & Gardner, 1983).

In addition to multiple brief tasks, findings suggested that the principal's day was also characterized by regular interruptions (Sproull, 1988). Recognizing the truncated nature of the role, Kuehny's (1925) findings showed "immediate or emergency problems" account for 19% of principals' time. Martin and Willower's (1981) evidence suggested that 50% of principals' observed activities were either interrupted or were themselves interruptions. So pervasive a finding, Weldy (1979) argued, "If a principal were to neglect planning his day, he probably would find his time totally taken up in essential tasks" (p. 6). Echoing this sentiment, Shellinger (2006) described the minute-by-minute nature of principals' days as "interrupt-driven."

Most often in the company of others (Morris et al., 1982), researchers found principals spent their days in multiple locations (Kelly, 1974; Spillane & Zuberi, 2009). Principals participated in both scheduled and unscheduled meetings during the typical day (Ariratana, 2000; Blendinger & Snipes, 1996). Multiple studies suggested that the majority of a principal's day was composed of unscheduled meetings (Kelly, 1974; Martin & Willower, 1981). Wethayanugoon's (1996) data found that principals spent 18.7%of their time in scheduled meetings in comparison to 29.3%of their time in unscheduled meetings. Morris, Crowson, Porter-Gehrie, and Hurwitz (1984) discovered that elementary principals' meetings were dominated by students, while secondary principals' meetings were more likely to involve faculty and assistant principals.

Despite a consistent narrative describing a principal's day as fast-paced and fragmented, researchers collected relatively little empirical data about the practice of school principals (Horng et al., 2010). Additionally, much of the existing literature predated the standards and accountability movement that fundamentally transformed the United States educational system (Spillane & Hunt, 2010). Instead of describing daily routine of principals working in

contextually different environments, contemporary principal time use studies focused on analyzing the content and purpose of principals' behaviors in an effort to link time use to educational outcomes in urban locales (Grissom et al., 2015; May et al., 2012). The following section outlined findings in three recent areas of interest: the content of principal time use, the outcomes associated with principal time use, and the effect of context on principal time use.

Content. Historically, studies utilized a range of constructs to classify the content of principal time use making it difficult to meaningfully compare findings. Since 2006, principal time use research featured two competing construct schemas (Mahone et al., 2016). First, introduced by Camburn et al. (2006), but later expanded by Goldring et al. (2008), 67% of time use studies published between 2006 and 2015 measured time spent in nine categories: building operations, finances, student affairs, personnel issues, instructional leadership, professional growth, community or parent relations, school district functions, and planning/setting goals. In contrast, Horng et al. (2010), the most cited contemporary principal time use article, measured six categories: administration, organization management, day-to-day instruction, instructional program, internal relations, and external relations. Although the competing schemas contained overlapping domains (i.e. instructional leadership), Camburn et al. (2006) cautioned that "inferences drawn from empirical evidence on the principalship are intimately bound up with the measures on which the evidence is based…Lacking a solid understanding of how well principal practice is measured, our understanding of how principals impact important school outcomes will be hampered" (p. 1). Differences in the task categories used to bound the constructs made comparison between different studies' findings difficult. However, researchers compared findings between studies on the most frequently utilized constructs, including organizational, instructional, and relational time.

Influenced by the definition and number of construct categories, as well as the data collection technique, principal have spent 6% (Peterson, 1977) to 39% (McClure, 1920) of their day on instructional leadership activities, with a mean of 19% (Vanderbeck et al., 2016). Since 2000, the range of time narrows to 8% (May & Supovitz, 2011) and 22% (Spillane *et al.* 2007), with a mean of 16%. The change in time principals allocated to instructional activities has varied over time, in part, due to the principal's changing role (Rousmaniere, 2013). For instance, many studies prior to 1980 considered teaching responsibilities for the principal under the category of instruction. Few contemporary principals have maintained teaching responsibilities and consequently, findings suggested that principals' total instructional time has decreased over time.

In contrast, evidence suggested that principals' time on organizational activities has remained consistent over time. Principals have spent time on administrative activities ranging from 25% (Peterson, 1977) to 64% (Buttram et al., 2006) of their day, with a mean of 47% (Vanderbeck et al., 2016). Since 2000, time has ranged from 28% (Horng et al., 2010) to 64% (Buttram et al., 2006), with a mean of 47%. In support of Spillane and Hunt's (2010) assertion of principals as "administration-bound," principals spent more time on administrative activities in comparison to instructional activities in every study included in this review.

However, not every study found that principals spent the most time on organizational activities. Peterson's (1977) findings indicated that principals spent more time on student affairs than administrative activities. Goldring et al.'s (2008) suggested that principals spent the most time on a combination of student affairs and instructional leadership. Findings across studies indicated that principals spent between 19% (Ariratana, 2000) and 35% (Morris et al., 1982) of their time on student affairs, including student discipline, guidance, and extracurricular activities.

Considering the mean findings, principals also spent around 8% of time on community relations and 5% on professional growth.

When investigating how principals spent their time, the majority of researchers focused on between-principal differences. Sebastian et al., (2017), however, researched how within-principals' time allocation varied across time. Utilizing four-level hierarchical linear modeling, the researchers examined variation in principals' days, weeks, and semesters. Although day of the week and semester predicted some variation, hour of the day was the strongest predictor of principals' variation in time allocation. As an example, principals spent the highest percentage of time on building operations from 6:00 a.m. to 8:00 a.m., with a steep decline for the rest of the day. Principal allocation of time on instructional leadership, student affairs, and personnel decisions displayed a curvilinear relationship with less time devoted early in the day, peaking around mid-day, and then dropping off again in the afternoon. Sebastian et al.'s (2017) findings suggested that principal behaviors and activities may be dependent on time of day.

Despite differing construct schemas, time use studies consistently revealed that principals spent the most time on organizational tasks (Blendinger & Snipes, 1996; Davis, 1953; Horng et al., 2010; McClure, 1920). Cubberly (1923) argued, "many principals give their time almost entirely to administrative duties and do little supervisory work, although the latter ought to be their most important function" (p. 40). Davis (1953) wrote, "the principal's time is so largely consumed by a myriad of managerial tasks and office duties that, actually, he has little opportunity to work on the patience requiring and time demanding instruction and improvement activities" (p. 351). In response to these findings, researchers, policy makers, and practitioners have argued for principals to spend more time on instructional leadership (Bates, 1925; McAbee, 1958). To explore the legitimacy of the instructional leadership argument, researchers analyzed

the relationship between instructional leadership and educational outcomes as part of a larger research focus on school effectiveness and school improvement (Robinson et al., 2008).

Outcomes. In response to the school accountability movement, researchers studied the link between principal behavior and academic achievement since the early 1980s. The vast majority of published studies, however, quantified principal activity from the perspective of a teacher or supervisor without considering how principals actually allocate their time (Horng et al., 2010). "Although a substantial amount of research on school leadership has focused on what principals may do to improve teaching and learning, little of this research has explored how principals' time spent on leadership activities may relate to and possibly affect student performance" (May et al., 2012, p. 417). Despite thirty years of research since the beginning of the school accountability movement, little has been discovered about the relationships between principal time and educational outcomes, including student achievement, growth, and teacher outcomes.

Of the studies that explored the relationship between principal time use and educational outcomes, divergent research designs made the findings difficult to compare. Researchers employed a variety of analyses to investigate the relationship, including descriptive statistics (Scott, 1990; Smith & Andrew, 1989), analysis of covariance (Martinko & Gardner, 1983), regression (Horng et al., 2010), and multilevel modeling (Grissom et al., 2013; May et al., 2012; May & Supovitz, 2011). Additionally, researchers attempted to link principal time use to different dependent variables. Four studies considered the effect of principal time use on student outcomes, including both performance and growth variables (Smith & Andrew, 1989; Horng et al., 2010; Martinko & Gardner, 1983; May et al., 2012), while only two studies considered the relationship to teacher outcomes (Horng et al., 2010; May & Supovitz, 2011).

To reduce validity threats and provide evidence for the likelihood of a causal relationship, researchers limited their samples to compare principals working in similar schools (Grissom et al., 2013). In practice, researchers sampled elementary, middle, and high school principals employed in single urban school districts (Grissom et al., 2015; Krug et al., 1990; May et al., 2012). Only two studies explored the relationship between principal time use and educational outcomes with samples of principals from multiple school districts (Martinko & Gardner, 1983; Smith & Andrew, 1989). Despite efforts to control for directionality, the causal relationship between principal time use and outcomes remained unclear (Horng et al., 2010). Significant findings may have indicated that principal time use impacted educational outcomes; however equally as likely, school context and performance may have dictated how a principal allocated time. "It is possible that the activities lead to differences in performance, but it is perhaps more likely that differences in performance lead to differences in leadership activities" (May et al., 2012, p. 431). By only sampling principals employed in urban locales, published studies neglected to adequately explore the relationship of principal time use and outcomes in diverse school contexts. School level, location, and student composition may have moderated the relationship between principal behavior and educational outcomes (Ogawa & Bossert, 1995). The lack of variability in the research limited understanding of the effects of how principals spent their time.

Despite limitations in existing research designs, findings suggested principals in higher-performing schools may emphasize some leadership activities. However, results have not been consistent (Martinko & Gardner, 1983; Smith & Andrew, 1989). Utilizing descriptive statistics, Smith and Andrew (1989) compared time use data from 21 purposively sampled strong instructional leaders to previously collected time use data from 1,000 principals. Identified

through nominations from staff and performance on an instructional leadership measure, strong instructional leaders spent less time engaged in student-related activities in comparison to the average principal. Strong instructional leaders also spent almost twice as much of their day on curriculum and instructional activities. Smith and Andrew argued that strong instructional leaders implement "discretionary time in such a way that they codify, on a day-to-day basis, the ideals or values of the average principal. They spend the greatest amount of time on educational program improvement activities" (1989, p. 37).

In contrast, Martinko and Gardner's (1983) findings suggested few significant relationships between principal time use and performance level. Based on the assumption that the performance of the principal reflected the performance of the school, Martinko and Gardner employed five criteria (actual versus predicted performance on student competency exams, student achievement test scores, superintendent rank of schools, superintendent rank of principal, three year tenure) to identify a sample of 25 high and 19 moderate performing principals. After running an analysis of variance, the researchers found few significant relationships between principal time use and performance level. However, the researchers argued that high performing principals exert more control over their time and the small sample size likely lacks the power to identify significant differences between the groups.

Differences in the amount of time that high- or low-performing principals spent on leadership activities between schools did not necessarily lead to gains in student achievement. Although Smith and Andrew's (1989) findings suggested high-performing principals spent more time on day-to-day instruction, Horng et al. (2010) found day-to-day instruction activities to be marginally, if at all, related to improvement in student performance. Whereas Smith and Andrew (1989) used descriptive statistics, Horng et al. (2010) employed regression analyses and

compared one day of time use data from 65 Miami-Dade County School District principals to a range of school outcomes, including student achievement on state standardized tests. Horng et al. (2010) discovered a statistically significant positive relationship between time spent on organizational management tasks and both student performance and gains in student performance. May, Huff, and Goldring (2012) also used inferential statistics to explore the relationship between principal time use and student achievement. May et al. found a 10 percentage point increase in the percent of time spent on finance and personnel issues was associated with an increase in student achievement, while a 10 percentage point increase in the percent of time spent to Planning and Setting Goals and Instructional Leadership was associated with a decrease in student achievement. Although other researchers have not replicated these specific findings linking finance and personnel issues with student achievement, increased organizational time has been linked to improved educational outcomes (Horng et al., 2010). May et al.'s findings also indicated that changes in principals' leadership activities across a 3-year period were not related to changes in their schools' value added to student achievement.

Whereas the previously described research explored the relationship between principal time spent in broad leadership domains and student achievement, Grissom, Loeb, and Master (2013) differentiated day-to-day instruction to analyze whether specific activities predict student achievement gains. Consistent with earlier results (Horng et al., 2010), overall instructional time use was not significantly associated with any difference in student achievement or school improvement. However, specific instructional categories were associated with significant differences in school performance. More time spent coaching teachers, evaluating teachers, and developing educational programs predicted greater student math achievement growth and increases in math achievement growth. Grissom, Loeb, and Master (2013) also found that time

principals spent on classroom walkthroughs was negatively associated with school achievement growth. Employed by a majority of principals in the study as the primary source for information on teachers, this finding should be interpreted cautiously as Grissom, Loeb, and Master derived data for the study from one day observations. The observational data collection technique may have led to an inflated rate of walkthroughs.

Few studies investigated the effects of principal time use on outcomes outside of student performance and growth. Two studies (Horng et al., 2010; May & Supovitz, 2011) explored the relationships between principal time use and teacher effects. Horng et al. (2010) found that the time principals spent on organizational management was positively associated with teachers' assessments of the school's educational environment. May and Supovitz (2011) demonstrated that the time principals spent on instructional leadership was predictive of increases in the variability in instructional change across teachers within a school. These findings indicated that principal time use may influence outcomes not previously explored in the literature. Further research is needed to better understand the relationships between principal time use and other educational outcomes, including teacher effects and school context. Furthermore, mediating factors, such as trust between teachers and principals, and academic press offered the potential to provide insights into the relationship between principal time use and academic outcomes (May et al., 2012).

Divergent research designs limited researchers' potential understanding of the relationship between principal time use and educational outcomes. Researchers employing different analytical approaches, utilized a variety of dependent variables making comparison across studies difficult. Additionally, homogenous samples limited the ability to generalize the findings to other locales. Although some evidence supported a significant relationship between

principal time use and specific categories of activity, findings were not substantiated or replicated. In addition to an insufficient volume of studies, results may not have been replicated due to the influence of school context, including location, level, and student composition, on principal time use. Moving forward, researchers must analyze variables of school context to better understand the relationship between principal time use and educational outcomes.

Context. Driven by a desire to improve schools, principal time use researchers attempted to identify principal behaviors that led to improved performance and academic growth (Horng et al., 2010). However, "the more plausible causal relationship is that school context drives principals' activities" (May et al., 2012, p. 433). In the previous section, I reviewed the existing literature on principal time use and educational outcomes. Although educational outcomes contributed to school context, additional factors, including school location, level, student composition, and individual principal characteristics, may also have influenced principal behaviors (Louis, Leithwood, Wahlstrom, & Anderson, 2010). Although first explored in the 1920s (Koos, 1924), researchers largely have neglected to systematically investigate the relationship between school context and principal time use, instead focusing on effective schools with primarily low-income and high-minority student populations (Goldring et al., 2008). Challenges associated with collecting data from a large, heterogeneous sample of principals across multiple locations for extensive and irregular work hours may also have inhibited research on the relationship between school context and principal time use (Hochbein et al., 2017). The following section examined principal time use research that considered contextual factors outside of academic outcomes. Specifically, I analyzed literature that examined the influence of school level, principal role, principal characteristics, and leadership style on principal time use.

Similar to contemporary research, most of the principal time use studies in the 1920s focused only on recording the allocation of time for principals in a homogenous sample. However, to provide insight into the particular needs of rural principals, English (1927) conducted a comparative study analyzing the time distribution of rural and urban principals. English's findings suggested that while the relative importance of the duties of both the rural and urban principals were the same, urban principals' percent of time given to administration and supervision was higher than rural principals. In contrast, out of the seven possible constructs, rural principals spent a larger percent of their time on teaching and community leadership.

Historically, English's study was unique in its investigation of the impact of location on principal time use research. Not until the 1980s did researchers engage in similar comparative studies. Utilizing Mintzberg's theory of structured observations, researchers employed Martin and Willower's (1981) seminal study on the behavior of secondary principals to compare elementary principals (Kmetz & Willower, 1982), female principals (Berman, 1982), and special education principals (Madsen & Reyes, 1986). In the mid 2000s, researchers also investigated differences between principals and assistant principals (Buttram et al., 2006).

Like secondary principals, Kmetz and Willower's (1982) findings suggested that elementary principals suffered from "busy person" syndrome. However, in comparison to Martin and Willower's (1981) findings, elementary principals engaged in fewer activities, experienced fewer interruptions, and interacted with a smaller number of people. Elementary principals also spent less time on extracurricular activities and student discipline. However, they allocated more time for instructional leadership and interactions with supervisors and parents. Differences also existed between male and female principals (Berman, 1982). From a sample of five participants, Berman concluded that female principals spent less time during the school day

and more time after-school hours on paperwork in comparison to Martin and Willower's sample of male principals. Females also attended longer meetings and engaged in more cooperative planning during scheduled meetings. Others initiated contact with females more often than with male principals. Females also had a higher percentage of total interactions with superiors than their male colleagues. Madsen and Reyes' (1986) findings revealed that special education principals' daily schedules were more flexible than general education principals. In addition to allocating less time to supervisory activities, special education principals attended longer meetings and spent more time on paperwork. In comparison to general education principals, special education principals "work at a less hectic pace, engage in fewer activities, and are minimally interrupted" (p. 42).

Buttram et al. (2006) found no differences in the amount of time middle school and high school principals spent on instructional, managerial, and personal activities; however, they did discover significant differences between high school principals and assistant principals. Although there was no difference in the amount of time principals spent on instructional leadership, assistant principals spent significantly more time on managerial activities. Based on a small sample of four high school principals and 17 assistant principals, assistant principals spent 39 minutes more minutes a day on management tasks. The study also indicated that, while instructional and management activities remained consistent, principals and assistant principals spent significantly different amounts of personal time throughout the week, with the most time on Fridays and the least on Wednesdays.

In contrast to the previous descriptive studies exploring principal time use in various contexts, Goldring et al. (2008) investigated the influence of context on leadership activity through cluster and discriminant analysis. Investigating to what extent principals can be grouped

by their tendencies to allocate their time across major realms of responsibility, the researchers discovered principals cluster into three groups: eclectic principals, instructional leaders, and student-centered leaders. Eclectic principals distributed time evenly across different leadership functions. In doing so, these principals spent less time on student affairs and more time on personnel issues in comparison to the other groups. As the name implies, instructional leaders spent the most time on instructional leadership, community and parent relations, and student affairs. In comparison to the other groups, student-centered leaders spent a significantly greater amount of time on student affairs, almost 20 hours a week. The groups demonstrated few differences in other areas, including building operations, school finances, school district functions, and professional growth. Although principals' individual attributes did not significantly influence time use, discriminant analysis revealed that contextual factors distinguished between the three clusters. Eclectic principals most likely worked in medium sized elementary schools with higher academic press, higher student engagement, and lower percentage of disadvantaged students. Goldring et al. (2008) argued that the eclectic principal may be "reacting to their environmental stability through spending time on varied activities and leadership responsibilities" (p. 347). In contrast, instructional leaders and student-centered leaders may be forced to "prioritize and focus their actions under more challenging contextual conditions" (p. 349).

Contextual factors, including school level, principal characteristics, principal role, and leadership style may influence principal time use. Historically neglected and methodologically difficult to prove causality, few studies have isolated the effects of context on principal behaviors. Instead, researchers have used Martin and Willower's (1981) seminal study on secondary principals as a point of reference to compare differences in school levels, principal

characteristics, and principal roles. Only Goldring et al.'s (2008) study employed statistical analyses to examine the relationship between principal time use and school context. Although educational theorists have posited the importance of school context (Bolden et al., 2003; Hersey and Blanchard, 1982), few empirical studies have successfully linked principal time use and school contexts.

Summary

In summary, much can be learned from the last 100 years of principal time use literature. Although historical and political contexts influenced the development of time use research, we know that "principal's work is notoriously busy, messy, multifaceted, and intense. And it has always been so" (Rousmaniere, 2015, p. 151). Findings consistently revealed that brief and unanticipated interactions dominated the typical day of a principal (Morris et al., 1984). Principals' activities occurred across numerous settings, including offices, classrooms, hallways, cafeterias, auditoriums, and athletic fields (Wolcott, 1973). In addition, the majority of principals' time did not involve activities related to instruction (Grissom Loeb, & Master, 2013). However, threats to construct and external validity, as well as a lack of studies exploring within-principal variation, minimized the potential understanding of how principals allocated their time by limiting researchers' ability to generalize and compare findings.

In collecting data on the composition of principal time use, most studies, regardless of purpose and research question, investigated the allocation of time to instructional and organizational activities. McMurry (1913) outlined the timeless struggle of the principal's multifaceted role:

> Two kinds of duties whose relation to each other is of the highest significance confront (the principal) from the start. On the one hand, he has to look after the condition of the

> building, the janitor's service, supplies and fire drills; to consult with parents and children about tardiness, truancy, other misconduct and health of pupils; and to advise teachers about these same things... On the other hand, he is responsible for such an organization of the school as will secure a high moral tone and for such assistance to teachers as will place the instruction on a high plane. In other words, there is a very large class of duties, largely mechanical, that belong to the general manager and business man in distinction from the educator… Which of these two shall dominate the other and occupy the greater portion of his time, is one of the first questions to consider in judging the efficiency of a principal. (p.178)

Since the turn of the century, studies have continued to grapple with the relationship between instructional and organizational time. Time use findings varied across studies; yet research findings suggested organizational and managerial activities continued to dominate the principal's day (Camburn et al., 2010).

Although Dwyer (1985) concluded that principals were able to significantly change their schools' instructional systems and consequently affected the social and academic experiences of students, few studies discerned the relationships between principal time use and achievement outcomes. Martinko and Gardner's (1983) findings suggested very little basis for discriminating between the behaviors of high-performing principals and moderately-performing principals. Scott (1990) reinforced this conclusion and noted, "the most dramatic finding in this study is the absence of consistent differences in the types of activities that effective versus less effective principals engage in" (p. 20). More recently, Horng et al.'s (2010) findings indicated the time principals spent on organizational tasks was positively associated with both student performance and gains in student performance. Currently, there is little consistent evidence that has

associated principal time use with student or school outcomes. Additional outcomes, including student, teacher, principal, and school variables, may be needed to gain additional insights into the relationships between principal time use and achievement.

Methodological limitations and small, homogenous sample sizes have made collecting data on the effect of school context and individual attributes on principal time use challenging (Goldring et al., 2008). Beyond Goldring et al. (2008), researchers have noted the presence of contextual factors, but have neglected to examine the influence of context on principal time use. Kmetz and Willower (1982) argued "these data revealed substantial individual differences among the principals which probably can be attributed to such things as administrative style, personal preference, and situational factors like school design and size or environmental demands" (p. 74). Marsden and Reyes (1986) hypothesized that the time differences "may in part be due to small student and staff populations at the special education facilities" (p. 42). However, few researchers followed up with rigorously designed studies to systematically investigate the influence of context on time use.

In an effort to minimize threats to construct and external validity and increase the ability to generalize and compare findings, the current study aimed to collect data on the composition of the non-urban principal's day in order to better understand the relationships between principal time use and school context, including prior academic outcomes, school level, location, and student demographics. To this end, the study responded to three research questions:

1. How do non-urban principals allocate their time?
2. How does a principal's allocation of time vary during the day and over a week?
3. How does school context predict variation within principals' allocation of time during the day and over a week?

Chapter Three: Methods

Introduction

In the response to the threats of validity and lack of variability in existing principal time use research, the current study contributed to the literature by including principals from multiple districts in non-urban settings in the sample. Whereas previously published principal time use research had a bias for spring data collection (Hochbein et al., 2016), this study recorded principal time in the fall once daily routines were established after the start of the new school year. Historically, researchers gathered data on principals through self-report and observational techniques for short periods of time (Spillane & Zuberi, 2009). In contrast, I utilized ESM to gather time use data from principals during the course of one month. ESM allowed for the tracking of multiple principals across a larger population of schools and days than is typically possible with observational techniques (Spillane et al., 2007). In addition to allowing an increase in sample size and observational period, ESM mitigated the influence of participants' perceptions of time use by being "as objective about subjective phenomenon as possible without compromising the essential personal meaning of the experience" (Csikszentmihalyi & Larson, 2014). Aligned with previous research and published time use constructs, I surveyed principals to categorize their current activity; however, I also used ESM to capture location, stakeholder interaction, anticipated, and initiated time without the limitation of recall bias (Juster et al., 2003). From these data, I ran statistical analyses to explore within-principal variation, as well as investigated the relationships between principal time use and school context, including prior academic outcomes, school level, location, and student demographics. To guide the analysis, I asked three research questions:

1. How do non-urban principals allocate their time?

2. How does a principal's allocation of time vary during the day and over a week?
3. How does school context predict variation within principals' allocation of time during the day and over a week?

To answer these questions, the following chapter was structured to detail the study's research design. First, I described the sample. Next, I explained the data collection process and procedures. After defining the dependent and independent variables, I concluded the chapter by outlining the statistical procedures designed to answer each research question.

Research Design

Sample. To recruit a sufficient number of principals, the proposed study employed purposeful, non-probability sampling. First, I contacted the school districts associated with the Lehigh University Study Council. As a consortium of nearly 40 local school districts committed to participating in professional development experiences, the study council offered access to area superintendents already in partnership with Lehigh University. Second, I emailed the project description and request for participation to superintendents from six counties in the southeastern region of Pennsylvania (PA).

In addition to convenience, I targeted school districts in Southeast PA due to their similarities in size and locale of the modal United States school district. Located outside the metropolis of Philadelphia, the southeastern region of PA is comprised of rural, town, suburban, and small urban locales. According to the United States Census Bureau, the six counties' 2016 populations ranged from 63,853 to 826,075 people. Similar to the overall United States population, 21% of the population was under the age of 18. The percentage of the population that was white ranged from 80% to 96%. At $219,283, the mean home value was slightly greater

than the overall United States average of $184,700. In 2016, excluding Philadelphia (pop. 1,567, 442), the largest urban area in the southeastern region of PA had a population of 120, 207 people.

The target sample drew principals from a potential of 74 school districts in mostly rural and suburban locales. Upon receiving permission from interested superintendents, I emailed the districts' principals and invited them to participate in the study. In total, 62 principals from 20 school districts enrolled in the study (Table 1). One principal dropped out of the study after the first week due to insufficient Internet access to complete the survey instrument bringing the final sample to 61 principals. 38% of the sample were female. Although participants ranged in principal experience from one to 30 years, the average number of years serving in their current position was seven years. With the majority of participants holding a master's degree, 3% of the sample had a bachelor's degree and 8% of the sample had a doctorate. 52% of the sample were principals in elementary schools, while 30% worked in middle schools and 18% in high schools. In accordance to the National Center for Education Statistics designations, 64% of the sample were principals in suburban locales, while 25% worked in rural locales and 7% working in towns. Although three urban principals were included in the sample, all participating school districts were dramatically smaller, ranging in size from approximately 1,400 students to 14,000 students, than previously published principal time use samples.

Table 1.

Sample by Level and Locale

	Rural	Town	Suburban	Urban	Total
ES	7	1	22	2	32
MS	5	2	10	1	18
HS	3	1	7	0	11
Total	15	4	39	3	61

Note. ES = elementary school, MS = middle school, HS = high school.

Procedures. After recruitment of a sample of principals, I collected time use data over a four-week period during the fall of the 2017-2018 school year. Using the participants' personal smart phones, the Remind app, and a Qualtrics survey as tools, I utilized ESM to record the participating principals' activities. The smart phones and app randomly alerted principals through a text message to electronically respond to a predetermined survey. Originally designed for educational purposes, the Remind app was created to allow teachers and school district personnel to communicate with groups of people through real-time messaging. The platform was also designed to allow users to schedule messages prior to sending them. In alignment with previously published research (Sebastian et al., 2017), and to ensure an adequate collection of data across the day, I programmed prompts to randomly occur within six two-hour blocks of time during weekdays between the hours of 7:00 a.m. and 7:00 p.m. Beginning October 2, 2017 and ending October 27, 2017, participating principals were notified to complete the survey a total of 100 times.

Prior to the commencement of the study, I met with all participating principals in person or via video conference to detail the project, answer questions, and collect the necessary contact information, including email addresses and cell phone numbers. To ensure reliable self-coding of survey questions, I verbally defined the constructs utilized in the survey, as well as provided a handout and email with definitions for all participants (Appendix A). Additionally, I obtained informed consent prior to any data collection (Appendix B).

In the initial participant meeting I also instructed the principals on the survey completion protocol. If the principals were unable to reply to the survey when notified, they were instructed to respond as soon as they were able. However, the principals were instructed to report on the activity that they were engaged in when they originally received the notification. If the

principals were unable to reply to a survey prior to receiving the next notification, they were instructed to disregard the first survey and only respond to the second.

Once enrolled, the principals received a text message containing a personalized, unique link to the Qualtrics predetermined survey. Qualtrics, an online research platform, provided tools to create, maintain, and distribute the survey, as well as download participant responses throughout the process. I instructed the principals to bookmark the survey link to the homepage of their smart phone and activate the link every time they received a notification. By doing so, each participating principal's survey responses were linked to his or her identity.

When prompted, principals responded to the following questions: (a) How would you categorize your current activity? (b) Which standards define the nature of your activity? (c) With what type of educational stakeholder are you currently interacting? (d) Where is this activity taking place? (e) Was this activity anticipated? (f) Did you initiate this activity? For question one, participants categorized their activity as not school related, organizational, instructional, relational, or other. For question two, participants defined the nature of their activity according to the ten Professional Standards for Educational Leaders outlined by the National Policy Board for Educational Administration (NPBEA): (a) Mission, Vision, and Core Values, (b) Ethics and Professional Norms, (c) Equity and Cultural Responsiveness, (d) Curriculum, Instruction and Assessment, (e) Community of Care and Support for Students, (f) Professional Capacity of School Personnel, (g) Professional Community for Teachers and Staff, (h) Meaningful Engagement of Families and Community, (i) Operations and Management, and (j) School Improvement. Participants were able to choose as many standards as needed to define the nature of their activity. For question three, participants recorded with how many district personnel, teachers, students, non-school educators, guardians, community members, and other

stakeholders they were currently interacting. For question four, participants chose between the following locations: office, hallway, common space, classroom, grounds, district building, or off-campus. For questions five and six, participants chose yes or no. As the questions and answers were predetermined, participants answered all questions by selecting the correct option button on the survey.

After the study began, I monitored the principals' response rates to stay alert to any potential technological malfunctions of the Remind or Qualtrics systems. After the first day, I contacted participants who did not respond to any of the Remind notifications. Two participants reported that they had not received the notifications. In both cases, the participants had downloaded the app prior to enrolling in the study and used it for communication in either their school or their children's school. Having used the app previously, the Remind notifications for the study were going through the app and not directly to the phone as push notifications. After identifying the problem, both participants were able to change the settings on the Remind app and receive the notifications as text messages on their phone.

At the conclusion of the data collection period, I downloaded all of the survey data from Qualtrics in preparation for data analysis. Although I collected the majority of the data for the study through Qualtrics, I also utilized publically available data from the Pennsylvania Department of Education (PDE) and the National Center for Education Statistics (NCES) in the statistical analyses. I downloaded data on school contextual factors from the PDE website and school location data from the NCES website. Prior to running statistical analyses, I merged the data documents together into a master spreadsheet.

Variables. To answer all of the proposed research questions, I employed multiple dependent and independent variables throughout the analyses. The following section was

structured to outline and define the study's variables. Beginning with the definitions of the dependent variables, I also discussed how the variables were operationalized. Next, I described the school level contextual independent variables. Finally, the section concluded with an explanation of the independent variables that represented academic outcomes.

Dependent variables. The study's variables included categories of principal activity, professional standards, type of stakeholder interactions, location, anticipated time, and initiated time. The categories of principal activity were used as dependent variables in the inferential statistics analyses, while the rest of the variables were used in descriptive statistics. Chosen for their prevalence in existing time use literature (Mahone et al., 2016), I utilized instructional, organizational, relational, and other time as the four constructs of principal activity. Although previous principal time use research often emphasized the difference in time spent on instructional and organizational activity, some researchers defined more expansive lists of time use constructs (Camburn et al., 2006; Horng et al., 2010). However, published research neglected to consistently find significant differences between constructs outside of the instructional, organizational, and relational time divide. Instead of attempting to create a detailed list of all potential principal activity, I chose to use the four constructs that encapsulated the most prevalent categories in existing literature.

Drawing on definitions from Grissom and Loeb (2009), organizational activities were defined as routine administrative duties and tasks executed to comply with state and federal regulations. Examples included managing budgets, fulfilling special education requirements, maintaining campus facilities, managing school schedules, and developing and monitoring a safe school environment. Grissom and Loeb defined instructional activities as those that promoted, supported, and improved the implementation of curricular programs. Examples included

evaluating curriculum, coaching teachers, assessing results from program evaluation and development, using data to inform instruction, and planning and implementing required professional development. Relational activities were defined as being related to building strong interpersonal relationships within the school as well as working with external stakeholders. Examples included developing relationships with students, communicating with parents, attending school activities, counseling staff, fundraising, working with local community members and organizations.

To provide additional data about the nature of principal time, I also reported the ten Professional Standards for Educational Leaders (PSEL). Developed through a review of empirical research and input from researchers, principal associations, and over 1,000 school and district leaders, the professional standards intended to not only guide practice through the preparation, hiring, development, supervision and evaluation of principals, but also aimed to inform policies and regulations that oversee the principal profession (NPBEA, 2015). The NPBEA (2015) provided definitions for each standard on their website (Table 2).

In an effort to expand the traditional constructs used to measure principal time use, I also reported anticipated time and initiated time. Inspired by Kuehny's definition (1925), I conceptualized anticipated activities as being preceded and directed by purposeful thought. Principals categorized an activity as anticipated when they either planned or foresaw the activity prior to it taking place. Grounded in research on distributed leadership (Spillane et al., 2008), I included the initiated time construct to further investigate the nature of principals' leadership behaviors. Whereas previous researchers gathered data on whether principals lead alone or with others (Spillane & Hunt, 2010), I conceptualized initiated time as whether a principal caused or

facilitated the beginning of the activity. Considered together, anticipated and initiated time provided insight into the proactive and retroactive nature of principal time use.

Table 2.

PSEL Definitions

Standard	Definition
Mission, Vision, and Core Values	Effective educational leaders develop, advocate, and enact a shared mission, vision, and core values of high-quality education and academic success and well-being of each student.
Ethics and Professional Norms	Effective educational leaders act ethically and according to professional norms to promote each student's academic success and well-being.
Equity and Cultural Responsiveness	Effective educational leaders strive for equity of educational opportunity and culturally responsive practices to promote each student's academic success and well-being.
Curriculum, Instruction, and Assessment	Effective educational leaders develop and support intellectually rigorous and coherent systems of curriculum, instruction, and assessment to promote each student's academic success and well-being.
Community of Care and Support for Students	Effective educational leaders cultivate an inclusive, caring, and supportive school community that promotes the academic success and well-being of each student.
Professional Capacity of School Personnel	Effective educational leaders develop the professional capacity and practice of school personnel to promote each student's academic success and well-being.
Professional Community for Teachers and Staff	Effective educational leaders foster a professional community of teachers and other professional staff to promote each student's academic success and well-being.
Meaningful Engagement of Families and Community	Effective educational leaders engage families and the community in meaningful, reciprocal, and mutually beneficial ways to promote each student's academic success and well-being.
Operations and Management	Effective educational leaders manage school operations and resources to promote each student's academic success and well-being.
School Improvement	Effective educational leaders act as agents of continuous improvement to promote each student's academic success and well-being.

Depending on the analysis, I operationalized the previous variables in one of three ways. First, I found the total average percentage of times the participants responded to each survey question. This included the average percentage of time the participants categorized their activity as organizational, instructional, relational, or other, as well as the average percentage of time the participants engaged in each professional standard. I also calculated the average percentage of time spent with each stakeholder type and in each location, as well as anticipated and initiated time. Second, in alignment with Sebastian et al. (2017), I computed the percentage of time the participants responded to the category of activity by two-hour blocks. The six two-hour time blocks included:

1. 7:00 a.m. – 8:59 a.m.
2. 9:00 a.m. – 10:59 a.m.
3. 11:00 a.m. – 12:59 p.m.
4. 13:00 p.m. – 14:59 p.m.
5. 15:00 p.m. – 16:59 p.m.
6. 17:00 p.m. – 18:59 p.m.

Time operationalized by two-hour block allowed the investigation of variation in instructional, organizational, relational, and other time spent throughout a typical day. Designed to capture principal time use before and after the traditional hours of the school day, the blocks also aimed to correspond to meaningful differences in the day across many school schedules. As an example, although not all school days start at the same time, they did start between the hours of 7:00 a.m. and 8:59 a.m. Third, I computed the percentage of time the participants responded to the category of activity by day of the week. Time operationalized by day of the week allowed the investigation of variation in instructional, organizational, relational, and other time spent

across a typical week. As discussed in a subsequent section, the research questions and consequent analyses determined the composition of survey data I employed as dependent variables.

Independent variables. School level independent variables were used to explore the relationship between school context and principal time use. Variables included: the 2016-2017 Pennsylvania Final Academic Score (FAS), a longitudinal academic gain score, school level (elementary, middle, high), school location (rural, town, suburban, urban), total student enrollment, percent minority enrollment, and percent free and reduced lunch (FRL). FAS, total school enrollment, minority enrollment, and FRL were continuous variables and grand mean centered. Grand mean centering the continuous variables allowed the comparison to the average percent for each variable from the overall sample. The gain score was also continuous; however, I did not grand mean centered it as it has a meaningful zero. School level and school location were categorical variables and dummy coded with the elementary level and suburban locale as reference groups.

2016-2017 Final Academic Score (FAS). The PDE combined data elements from four areas in order to create the overall indicator for school performance each year. Indicators of academic achievement (including PSSA/Keystone performance, industry standards-based competency assessments, grade three reading proficiency, and SAT/ACT college ready benchmarks) and indicators of closing the achievement gap (both for all students and historically underperforming students) represented 50% of FAS. Indicators of academic growth, including measures of the school's impact on the academic progress of groups of students from year-to-year, represented 40% of FAS. The final 10%was comprised of other academic indicators that contributed to student achievement, including graduation rate, promotion rate, and attendance

rate. FAS, ranging from 25-120, were displayed as part of the Pennsylvania School Performance Profile (SPP). The PA SPP offered a web-based resource to communicate with educational stakeholders about academic performance and assisted schools and districts in the improvement of academic improvement (SPP website, 2016).

Academic gain score. Inspired by Bowers' (2015) study on site selection of districts for in-depth qualitative central office research, I also created a longitudinal academic gain score to determine whether sampled schools were significantly outperforming or underperforming long-term performance expectations. Different from academic growth scores, the continuous academic gain score indicated to what extent schools performed better or worse than expected by comparing predicted FAS scores to the actual FAS scores over four years. Bowers' (2015) study guided the variable selection for the analysis. The outcome variable for the analysis was the FAS for each participating school in each of the four years of available data from 2012 to 2016. Bowers included numerous covariates and controls to capture student demographics, enrollment, locale, attendance, teacher experience, and salary. Due to the available PDE data, I distilled Bowers' variable selection to the following six variables: school year, total student enrollment, title 1 status, percent of white students per school, district locale, and school-level academic score variance.

I employed a three-level hierarchical linear growth model, with time points nested within schools nested within districts, to determine how school level factors (enrollment, title 1 status, and percent of white students) and district level factors (locale and academic score variance) predicted FAS. To calculate the predicted school-level FAS gain scores, I began by finding the difference between the year 2012-2013 predicted FAS and the 2015-2016 predicted FAS. Next, I compared the predicted school-level FAS gain score to the actual FAS gain for each school

between 2012 and 2016. The resulting continuous variable indicated whether a school was significantly outperforming or underperforming expected long-term performance trends. Whereas other studies have explored achievement and growth variables (Grissom et al., 2013), I was unable to locate any studies that utilized an academic gain measure in the evaluation of principal effects on prior academic outcomes. An academic gain measure offered the ability to investigate the principal's impact on whether a school outperforms or underperforms expected performance trends while accounting for the effects of demographic factors on performance and growth.

School level and location. The level of school was defined as follows: elementary = grades kindergarten through 5, middle = grades 6 through 8, and high = grades 9 through 12. NCES used census-defined terms and identified school location as follows: rural was outside an urbanized area and at least 10 miles from an urban cluster, town was outside an urbanized area but inside an urban cluster, suburban was inside an urbanized area but outside a principal city, and city was both inside an urbanized area and inside a principal city.

Statistical Procedures

To answer the study's research questions, I employed descriptive statistics and hierarchical linear modeling (HLM) (Table 3). In addition to the demands of the specific research questions, multiple types of analyses were appropriate due to the different ways the time use data were operationalized. I primarily focused on the total average percentage of time when exploring descriptive statistics. When using the dependent variable as a percentage of time spent during a two-hour block or day of the week, I ran HLM to account for the shared variance in the hierarchically structured data. In repeated measures research, data collected at different times are nested within each study participant (Raudenbush & Bryk, 2000). Analyses of hierarchical

data are best performed using statistical techniques that account for the hierarchy (Woltman, Feldstain, MacKay, & Rocchi, 2012). HLM is a complex form of ordinary least squares regularly used by education researchers (Lee & Hallinger, 2012). Organized by research question, the following section was structured to detail the statistical procedures I used to complete the analyses.

Table 3.

Research Design

Question	Purpose	DV	IV	Procedure
1	Describe time allocation of non-urban principals	Organizational Instructional Relational Other PSEL Interactions Location Anticipated Initiated		Descriptive Statistics
2	Identify variation in time allocation during the day and over a week	Organizational Instructional Relational Other	Time	2-Level HLM & HLGM *Series 1* 1. 2-hour blocks 2. Principal *Series 2* 1. Day 2. Principal
3	Identify predictors to variation in time allocation within principals	Organizational Instructional Relational Other	FAS Gain score School level Location Enrollment % Minority % FRL	2-Level HLM & HLGM *Series 1* *Series 2*

Note. DV= dependent or outcome variable. IV = independent or grouping variable.

Question one: Time variation between principals. To begin to explore how non-urban principals allocate their time, I used descriptive statistics to answer question one. Despite the historical findings of differences in rural and urban principals time allocation (English, 1927), I expected to discover few differences between rural, town, and suburban principals. Given the consistency of time use findings during the past 100 years and the existence of isomorphism in education (LeTendre, Baker, Akiba, Goesling, & Wiseman, 2001), I predicted that non-urban principals spent their time similarly to previously sampled principals with the majority of time given to organizational activities. Relying on graphs and data tables, I described rural, town, and suburban principals' typical fall semester school day in terms of average total percentage of time spent in organizational, instructional, relational, and other activities, as well as by PSEL, stakeholder interactions, location, anticipated time, and initiated time.

Question two: Time variation within principals. To answer question two, I used hierarchical growth modeling to investigate how principals' allocation of time varies during the day and over a week. Although I did not expect to find differences in time spent in days of the week, I expected to find variation within a principal's day. Sebastian, et al., (2017) found within day variation to be domain dependent with both linear and quadratic trends present. Specifically, I hypothesized there would be variation within a principal's day in terms of the amount of time allocated to instructional activities. If consistent with Sebastian et al. (2017), instructional time would display a curvilinear relationship with less time devoted early in the day, peaking around mid-day, and then dropping off again in the afternoon.

The analytical models for these analyses consisted of two-level hierarchical non/linear growth models, with time points nested within principals. Employing the Restricted Maximum Likelihood (REML) estimation method, I ran two series of four models using the percentage of

time the principals responded in each category of activity (organizational, instructional, relational, and other) as the outcome variable. In the first series of models, I compiled the percentage of time spent in a category of activity by two-hour blocks to investigate linear and quadratic trends in the variation of principal time use throughout the day. The two-hour block of time from 7:00 a.m. to 8:59 a.m. served as the intercept for the first set of models. The second series of models employed the percentage of time spent in a category of activity by day to investigate the variation in principal time use over a week. Based on my hypothesis, instead of investigating the linear and quadratic trend across the week, I dummy coded day of the week to compare differences between the days. The percentage of time spent in a category of activity on Monday served as the intercept for the second set of models. The following descriptions of analyses applied to both series of models.

Beginning with the fully unconditional models, I investigated whether the percentage of time allocation varied by principal. The empty model partitioned the variance in the percentage of time spent in a category of activity into two components, between time points and between principals. After running the models, I calculated the Intraclass Correlation Coefficients (ICC). The ICCs determined the proportion of the total variability in the outcome variable that was due to variability between principals. If there was sufficient variance in the intercepts at level two, I moved forward to conduct unconditional linear growth models for the series of models exploring within day variation and random coefficient models for the series of models exploring differences between days of the week. As I was interested in discovering variability between principal time use, I allowed both the intercept and slope to vary.

For the first series of models investigating within-day variation, the unconditional linear growth models allowed me to explore the effect of time on the percentage of time spent in

organizational, instructional, relational, and other activities. If a significant effect of time was discovered, the model also determined if this linear trend varied by principal. As Sebastian et al.'s (2017) research suggested a quadratic trend in percentage of time spent in categories of activities during the day, I ran the unconditional linear and quadratic growth model with varying intercept and slope. The general equation for these models was:

Level-1 Model

$$ACTIVITY_{ti} = \pi_{0i} + \pi_{1i}*(HOUR_{ti}) + \pi_{2i}*(HOUR\_SQ_{ti}) + e_{ti}$$

Level-2 Model

$$\pi_{0i} = \beta_{00} + r_{0i}$$

$$\pi_{1i} = \beta_{10} + r_{1i}$$

$$\pi_{2i} = \beta_{20} + r_{2i}$$

Mixed Model

$$ACTIVITY_{ti} = \beta_{00} + \beta_{10}*HOUR_{ti} + \beta_{20}*HOUR\_SQ_{ti} + r_{0i} + r_{1i}*HOUR_{ti} + r_{2i}*HOUR\_SQ_{ti} + e_{ti}$$

For the second series of models investigating variation in days of the week, the random coefficient models allowed me to explore the effect of day on the percentage of time spent in organizational, instructional, relational, and other activities. The general equation for these models was:

Level-1 Model

$$ACTIVITY_{ti} = \pi_{0i} + \pi_{1i}*(TUESDAY_{ti}) + \pi_{2i}*(WEDNESDAY_{ti}) + \pi_{3i}*(THURSDAY_{ti}) + \pi_{4i}*(FRIDAY_{ti}) + e_{ti}$$

Level-2 Model

$$\pi_{0i} = \beta_{00} + r_{0i}$$

$$\pi_{1i} = \beta_{10} + r_{1i}$$

$$\pi_{2i} = \beta_{20} + r_{2i}$$

$$\pi_{3i} = \beta_{30} + r_{3i}$$

$$\pi_{4i} = \beta_{40} + r_{4i}$$

Mixed Model

$$ACTIVITY_{ti} = \beta_{00}$$

$$+ \beta_{10}*TUESDAY_{ti}$$

$$+ \beta_{20}*WEDNESDAY_{ti}$$

$$+ \beta_{30}*THURSDAY_{ti}$$

$$+ \beta_{40}*FRIDAY_{ti}$$

$$+ r_{0i} + r_{1i}*TUESDAY_{ti} + r_{2i}*WEDNESDAY_{Yti} + r_{3i}*THURSDAY_{ti}$$

$$+ r_{4i}*FRIDAY_{ti} + e_{ti}$$

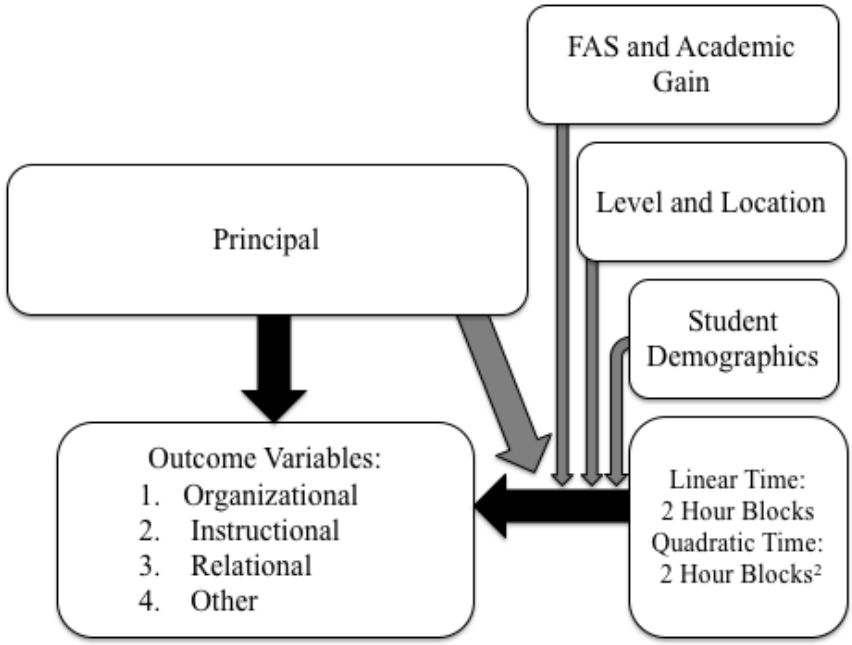
Question three: Predictors of within principal time variation. To address question three, I continued the previous analyses by adding level two predictor variables to both the significant linear and quadratic growth models and the models for significant days of the week. In addition to the hypotheses for research question two, I also expected to find that school context and prior academic outcomes predicted the variation in a principal's allocation of time during the day. Specifically, I expected to find that location and academic gain score significantly predicted variation in instructional time.

For the first series of models investigating whether school context can be used to predict the variation in the linear and quadratic trends of principal time use, I added the following level

two school context predictor variables to significant linear and quadratic terms: FAS, academic gain score, school level (dummy coded with elementary as reference group), school location (dummy coded with suburban as reference group), total student enrollment, percentage minority enrollment, and percentage FRL. Initially, I also attempted to add predictors to the intercept, however the models failed to run. Removing predictors on the intercept and focusing on variation across two-hour time blocks during the day allowed the models to successfully iterate. To assess changes in variation, I built the model from the bottom up retaining only significant predictors. Due to the complexity of the models and limited variance, I proceeded in a stepwise process beginning with variables that were found significant in previously published time use literature. The first block included the academic outcome variables of FAS and the academic gain score. Next, I introduced school level and location together in the second block of variables. The final block included the remaining student demographic variables (Figure 1).

Figure 1.

Schematic Model of Effects for Time Variation Within a Day



As I built the model, I consulted the final estimation of variance components to determine if there was significant variability to continue adding predictor variables to the linear and quadratic terms. The general equations for these models were:

Level-1 Model

$$ACTIVITY_{ti} = \pi_{0i} + \pi_{1i}*(HOUR_{ti}) + \pi_{2i}*(HOUR\_SQ_{ti}) + e_{ti}$$

Level-2 Model

$$\pi_{0i} = \beta_{00} + r_{0i}$$

$$\pi_{1i} = \beta_{10} + \beta_{11}*(FAS_i) + \beta_{12}*(GAIN_i) + \beta_{13}*(MS_i) + \beta_{14}*(HS_i) + \beta_{15}*(RURAL_i) + \beta_{16}*(TOWN_i) + \beta_{17}*(URBAN_i) + \beta_{18}*(ENROLL_i) + \beta_{19}*(MIN_i) + \beta_{110}*(FRL_i) + r_{1i}$$

$$\pi_{2i} = \beta_{20} + \beta_{21}*(FAS_i) + \beta_{22}*(GAIN_i) + \beta_{23}*(MS_i) + \beta_{24}*(HS_i) + \beta_{25}*(RURAL_i) + \beta_{26}*(TOWN_i) + \beta_{27}*(URBAN_i) + \beta_{28}*(ENROLL_i) + \beta_{29}*(MIN_i) + \beta_{210}*(FRL_i) + r_{1i}$$

Mixed Model

$$ACTIVITY_{ti} = \beta_{00}$$

$$+ \beta_{10}*HOUR_{ti} + \beta_{11}*(FAS_i*HOUR_{ti}) + \beta_{12}*(GAIN_i*HOUR_{ti}) + \beta_{13}*(MS_i*HOUR_{ti}) + \beta_{14}*(HS_i*HOUR_{ti}) + \beta_{15}*(RURAL_i*HOUR_{ti}) + \beta_{16}*(TOWN_i*HOUR_{ti}) + \beta_{17}*(URBAN_i*HOUR_{ti}) + \beta_{18}*(ENROLL_i*HOUR_{ti}) + \beta_{19}*(MIN_i*HOUR_{ti}) + \beta_{110}*(FRL_i*HOUR_{ti})$$

$$+ \beta_{20}*HOUR\_SQ_{ti} + \beta_{21}*(FAS_i*HOUR\_SQ_{ti}) + \beta_{22}*(GAIN_i*HOUR\_SQ_{ti}) + \beta_{23}*(MS_i*HOUR\_SQ_{ti}) + \beta_{24}*(HS_i*HOUR\_SQ_{ti}) + \beta_{25}*(RURAL_i*HOUR\_SQ_{ti}) + \beta_{26}*(TOWN_i*HOUR\_SQ_{ti}) + \beta_{27}*(URBAN_i*HOUR\_SQ_{ti}) + \beta_{28}*(ENROLL_i*HOUR\_SQ_{ti}) + \beta_{29}*(MIN_i*HOUR\_SQ_{ti}) + \beta_{210}*(FRL_i*HOUR\_SQ_{ti})$$

$$+ r_{0i} + r_{1i}*HOUR_{ti} + r_{2i}*HOUR\_SQ_{ti} + e_{ti}$$

Where, depending on the model:

β_{00} = the expected percentage of time in category of activity (organizational, instructional, relational, other) at the intercept, between 7:00 and 8:59,

β_{10} = the expected linear growth at the intercept,

β_{11} = the expected interaction between time and FAS,

β_{12} = the expected interaction between time and academic gain score,

β_{13} = the expected interaction between time and middle school level,

β_{14} = the expected interaction between time and high school level,

β_{15} = the expected interaction between time and rural locale,

β_{16} = the expected interaction between time and town locale,

β_{17} = the expected interaction between time and urban locale,

β_{18} = the expected interaction between time and total student enrollment,

β_{19} = the expected interaction between time and percentage minority enrollment,

β_{110} = the expected interaction between time and percentage FRL,

β_{20} = the expected acceleration rate of the dependent variable by two-hour time blocks,

β_{21} …β_{210} = the expected acceleration of the interaction between time and school contextual variables,

r_{0i} = the random deviation from the fixed intercept for principal$_i$,

r_{1i} = the random deviation from the fixed linear slope for principal$_i$,

r_{2i} = the random deviation from the fixed quadratic slope for principal$_i$, and

e_{ti} = the random residual at the two-hour block$_t$ for principal$_i$.

Using the final estimation of fixed effects with robust standard errors, I interpreted the regression coefficients of the cross-level interactions to determine the direction and significance of the relationships between the school contextual variables and principal time. I also calculated

R^2 to compare the models with and without the level two predictors. This comparison helped to determine how well the model accounted for variance between principals.

For the second series of models investigating whether school context can be used to predict differences in principal time use across days, I added the same variables from the previous models in a bottom up fashion retaining only significant predictors. I also proceeded in a stepwise process; first introducing the academic outcome variables, then level and location, and finally the student demographic variables. As I built the models, I consulted the final estimation of variance components to determine if there was significant variability to continue adding predictor variables to each day. The general equations for these models were:

Level-1 Model

$$ACTIVITY_{ti} = \pi_{0i} + \pi_{1i}*(TUESDAY_{ti}) + \pi_{2i}*(WEDNESDAY_{ti}) + \pi_{3i}*(THURSDAY_{ti}) + \pi_{4i}*(FRIDAY_{ti}) + e_{ti}$$

Level-2 Model

$$\pi_{0i} = \beta_{00} + \beta_{01}*(FAS_i) + \beta_{02}*(GAIN_i) + \beta_{03}*(MS_i) + \beta_{04}*(HS_i) + \beta_{05}*(RURAL_i) + \beta_{06}*(TOWN_i) + \beta_{07}*(URBAN_i) + \beta_{08}*(ENROLL_i) + \beta_{09}*(MIN_i) + \beta_{010}*(FRL_i) + r_{1i}$$

$$\pi_{1i} = \beta_{10} + \beta_{11}*(FAS_i) + \beta_{12}*(GAIN_i) + \beta_{13}*(MS_i) + \beta_{14}*(HS_i) + \beta_{15}*(RURAL_i) + \beta_{16}*(TOWN_i) + \beta_{17}*(URBAN_i) + \beta_{18}*(ENROLL_i) + \beta_{19}*(MIN_i) + \beta_{110}*(FRL_i) + r_{1i}$$

$$\pi_{2i} = \beta_{20} + \beta_{21}*(FAS_i) + \beta_{22}*(GAIN_i) + \beta_{23}*(MS_i) + \beta_{24}*(HS_i) + \beta_{25}*(RURAL_i) + \beta_{26}*(TOWN_i) + \beta_{27}*(URBAN_i) + \beta_{28}*(ENROLL_i) + \beta_{29}*(MIN_i) + \beta_{210}*(FRL_i) + r_{1i}$$

$$\pi_{3i} = \beta_{30} + \beta_{31}*(FAS_i) + \beta_{32}*(GAIN_i) + \beta_{33}*(MS_i) + \beta_{34}*(HS_i) + \beta_{35}*(RURAL_i) + \beta_{36}*(TOWN_i) + \beta_{37}*(URBAN_i) + \beta_{38}*(ENROLL_i) + \beta_{39}*(MIN_i) + \beta_{310}*(FRL_i) + r_{1i}$$

$$\pi_{4i} = \beta_{40} + \beta_{41}*(FAS_i) + \beta_{42}*(GAIN_i) + \beta_{43}*(MS_i) + \beta_{44}*(HS_i) + \beta_{45}*(RURAL_i) + \beta_{46}*(TOWN_i) + \beta_{47}*(URBAN_i) + \beta_{48}*(ENROLL_i) + \beta_{49}*(MIN_i) + \beta_{410}*(FRL_i) + r_{1i}$$

Mixed Model

$$ACTIVITY_{ti} = \beta_{00} + \beta_{01}*(FAS_i) + \beta_{02}*(GAIN_i) + \beta_{03}*(MS_i) + \beta_{04}*(HS_i) + \beta_{05}*(RURAL_i) +$$

$$\beta_{06}*(TOWN_i) + \beta_{07}*(URBAN_i) + \beta_{08}*(ENROLL_i) + \beta_{09}*(MIN_i) + \beta_{010}*(FRL_i)$$

$$+ \beta_{10}*TUESDAY_{ti} + \beta_{11}*(FAS_i*TUESDAY_{ti}) + \beta_{12}*(GAIN_i*TUESDAY_{ti}) +$$

$$\beta_{13}*(MS_i*TUESDAY_{ti}) + \beta_{14}*(HS_i*TUESDAY_{ti}) + \beta_{15}*(RURAL_i*TUESDAY_{ti}) +$$

$$\beta_{16}*(TOWN_i*TUESDAY_{ti}) + \beta_{17}*(URBAN_i*TUESDAY_{ti}) + \beta_{18}*(ENROLL_i*TUESDAY_{ti}) +$$

$$\beta_{19}*(MIN_i*TUESDAY_{ti}) + \beta_{110}*(FRL_i*TUESDAY_{ti})$$

$$+ \beta_{20}*WEDNESDAY_{ti} + \beta_{21}*(FAS_i*WEDNESDAY_{ti}) + \beta_{22}*(GAIN_i*WEDNESDAY_{ti}) +$$

$$\beta_{23}*(MS_i*WEDNESDAY_{ti}) + \beta_{24}*(HS_i*WEDNESDAY_{ti}) + \beta_{25}*(RURAL_i*WEDNESDAY_{ti}) +$$

$$\beta_{26}*(TOWN_i*WEDNESDAY_{ti}) + \beta_{27}*(URBAN_i*WEDNESDAY_{ti}) +$$

$$\beta_{28}*(ENROLL_i*WEDNESDAY_{ti}) + \beta_{29}*(MIN_i*WEDNESDAY_{ti}) + \beta_{210}*(FRL_i*WEDNESDAY_{ti})$$

$$+ \beta_{30}*THURSDAY_{ti} + \beta_{31}*(FAS_i*THURSDAY_{ti}) + \beta_{32}*(GAIN_i*THURSDAY_{ti}) +$$

$$\beta_{33}*(MS_i*THURSDAY_{ti}) + \beta_{34}*(HS_i*THURSDAY_{ti}) + \beta_{35}*(RURAL_i*THURSDAY_{ti}) +$$

$$\beta_{36}*(TOWN_i*THURSDAY_{ti}) + \beta_{37}*(URBAN_i*THURSDAY_{ti}) + \beta_{38}*(ENROLL_i*THURSDAY_{ti}) +$$

$$\beta_{39}*(MIN_i*THURSDAY_{ti}) + \beta_{310}*(FRL_i*THURSDAY_{ti})$$

$$+ \beta_{40}*FRIDAY_{ti} + \beta_{41}*(FAS_i*FRIDAY_{ti}) + \beta_{42}*(GAIN_i*FRIDAY_{ti}) + \beta_{43}*(MS_i*FRIDAY_{ti}) +$$

$$\beta_{44}*(HS_i*FRIDAY_{ti}) + \beta_{45}*(RURAL_i*FRIDAY_{ti}) + \beta_{46}*(TOWN_i*FRIDAY_{ti}) +$$

$$\beta_{47}*(URBAN_i*FRIDAY_{ti}) + \beta_{48}*(ENROLL_i*FRIDAY_{ti}) + \beta_{49}*(MIN_i*FRIDAY_{ti}) +$$

$$\beta_{410}*(FRL_i*FRIDAY_{ti})$$

$$+ r_{0i} + r_{1i}*TUESDAY_{ti} + r_{2i}*WEDNESDAY_{Yti} + r_{3i}*THURSDAY_{ti}$$

$$+ r_{4i}*FRIDAY_{ti} + e_{ti}$$

Where, depending on the model:

β_{00} = the expected percentage of time in category of activity (organizational, instructional, relational, other) at the intercept, on Monday,

β_{01} = the expected interaction between time and FAS,

β_{02} = the expected interaction between time and academic gain score,

β_{03} = the expected interaction between time and middle school level,

β_{04} = the expected interaction between time and high school level,

β_{05} = the expected interaction between time and rural locale,

β_{06} = the expected interaction between time and town locale,

β_{07} = the expected interaction between time and urban locale,

β_{08} = the expected interaction between time and total student enrollment,

β_{09} = the expected interaction between time and percentage minority enrollment,

β_{010} = the expected interaction between time and percentage FRL,

β_{10} = the expected difference between Tuesday and the intercept,

β_{11} ... β_{110} = the expected interaction between Tuesday and school contextual variables,

β_{20} = the expected difference between Wednesday and the intercept,

β_{21} ... β_{210} = the expected interaction between Wednesday and school contextual variables,

β_{30} = the expected difference between Thursday and the intercept,

β_{31} ... β_{310} = the expected interaction between Thursday and school contextual variables,

β_{40} = the expected difference between Friday and the intercept,

β_{41} ... β_{410} = the expected interaction between Friday and school contextual variables,

r_{0i} = the random deviation from the fixed intercept for principal$_i$,

r_{1i} = the random deviation from Tuesdays for principal$_i$,

r_{2i} = the random deviation from Wednesdays for principal$_i$,

r_{2i} = the random deviation from Thursday for principal$_i$,

r_{2i} = the random deviation from Friday for principal$_i$, and

e_{ti} = the random residual for day$_t$ within principal$_i$.

Using the final estimation of fixed effects with robust standard errors, I interpreted the regression coefficients of the cross-level interactions to determine the direction and significance of the relationships between the school contextual variables and principal time. I also calculated R^2 to compare the models with and without the level two predictors. This comparison helped to determine how well the model accounted for variance between principals.

Although HLM required large sample sizes (Woltman, et al., 2012), I had sufficient power to run these analyses. Hox, Moerbeek, and van de Schoot, (2010) suggested a sample size of 50 participants with 20 observations per participant in order to detect cross-level interactions. Exceeding this recommendation, the current study's sample consisted of 61 principals with a range of 14 to 100 data points per principal. Although HLM required fewer assumptions to be met than other statistical methods (Raudenbush & Bryk, 2002), prior to reporting the findings of the analyses, I also checked and reported the assumptions of linearity, normality, homoscedasticity, homogeneity of variance, and independence. As HLM can accommodate for non-independence of observations, lack of sphericity, missing data, discrepancy in group sample sizes, and heterogeneity of variance across repeated measures (Woltman, et al., 2012), I successfully ran the models necessary for the planned analyses.

Chapter Four: Results

Introduction

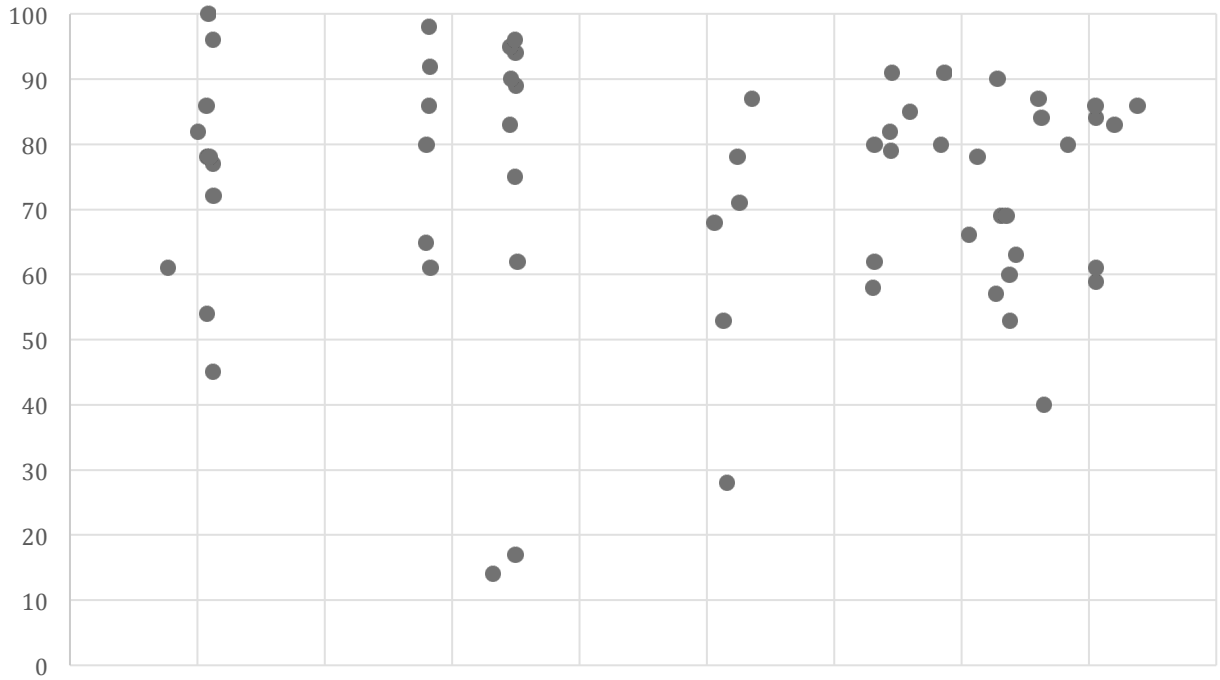
To analyze how non-urban principals allocated their time, principal time use data was collected during the month of October in 2017 using event sampling methodology. The sample consisted of 61 elementary, middle, and high school principals from 20 school districts located in Southeastern Pennsylvania. After analyzing descriptive statistics, hierarchical linear and non-linear growth models were applied to better understand the trajectories of time use across an average fall day, as well as differences between days of the week. School contextual factors, including previous academic achievement, school level, location, and student demographics, were used to predict variation in principal time use. The following results were based on 4,513 responses to the survey instrument. The overall average response rate was 74% (SD = 19.71) with a median response of 78% and a range from 14% to 100% (Figure 2).

I structured the following chapter to outline the study's findings by research question. First, I utilized descriptive statistics to provide evidence on how non-urban principals allocated their time. I considered the overall time allocated to instructional, organizational, and relational activities, as well as how time was distributed between professional standards, stakeholder interactions, and location. Additionally, I examined how principal time was anticipated and initiated. Next, I used inferential statistics to identify how principals' allocation of time varied during the day and over a typical fall week. I ran two series of four analyses to investigate variation in principals' organizational, instructional, relational, and other time use. For time variation during the day, I inspected plots to identify possible linear and quadratic trends then ran two-level hierarchical linear and non-linear growth models. For time variation over the week, I dummy coded day of the week to consider whether days differed from the intercept (Monday),

examined the plots, and ran two-level hierarchical linear models. Finally, I investigated how school contextual factors may have predicted variation within principals' allocation of time. After detailing the final models, I reported any violations of HLM assumptions.

Figure 2.

Scatterplot of Participants' Average Overall Response Rate



Question One: How Do Non-Urban Principals Allocate Their Time?

Activity type. The first survey question asked principals to categorize their current activity as organizational, instructional, relational, or other. Findings revealed that principals categorized 28% of the total survey responses as organizational, 24% as instructional, and 24% as relational. Dissimilar from previously reported principal time use findings, the sample of non-urban principals reported allocating their time evenly between instructional, organizational, and relational activities. Other school related activities not categorized in the survey comprised 5% of total principal responses. 20% of principals' responses between 7:00 and 19:00 hours on

activities were not school related. Concentrated at the end of the day, 63% of all not school related activities were documented between 17:00 and 19:00. Large standard deviations indicated substantial variability between principals' allocation of time and supported subsequent analyses to determine trends in variation by hour and day.

Considering school level, high school principals spent the most time on organizational activities (38%) with less time spent on instructional (24%) and relational (15%) activities (Table 4.). Conversely, elementary principals spent more time on instructional activities (29%) than organizational activities (25%) with similar time on relational activities (15%). Like high school principals, middle school principals spent the most time on organizational activities (32%), but spent more time on relational activities (28%). The descriptive statistics indicated that the school level of the principal might influence the average time allocation in instructional, organizational, and relational activities.

Table 4.

Distribution of Sample and Mean Percentages

	N	Instr	SD	Org	SD	Rela	SD	Oth	SD
Level									
Elementary	32	28.51	20.83	25.13	16.19	14.86	9.55	6.59	10.53
Middle	18	20.56	14.67	31.60	15.58	27.77	13.36	2.15	4.48
High	11	23.61	14.88	37.76	17.82	14.74	13.07	4.60	6.28
Locale									
Rural	15	21.03	12.57	29.03	18.29	19.10	11.60	5.10	6.08
Town	4	39.04	15.10	20.83	11.37	23.82	17.61	0.86	1.72
Suburban	39	25.41	20.45	30.15	16.85	17.89	13.29	5.51	9.92
Urban	3	26.56	11.63	31.16	18.43	19.43	3.88	1.85	3.21
Total	61	23.68	16.10	27.69	15.60	23.93	14.15	4.52	7.94

Note: Instr = Instructional, Org = Organizational, Rela = Relational, Oth = Other

Urban, Suburban, and Rural principals all spent time similarly with the most devoted to organizational activities, followed by instructional and relational activities. Town principals spent the most time on instructional activities (39%), then relational (24%), and organizational (21%) activities. However, the small sample of principals from town locales coupled with high standard deviations negated the ability to draw conclusions from these data.

Professional standards. The second survey question asked principals to identify the professional standards that defined their current activity. Overall, the sampled principals spent the most time in the mission, vision, and core values standard (21%), followed closely by the curriculum, instruction, and assessment standard (19%), and the community of care and support for students standard (19%). Principals also spent 13% of their time on the operations and management standard. Principals spent less than 10% of their time on all other standards with the least amount of time dedicated to school improvement (1%).

Given the option to report more than one standard at a time, 38% of the responses recorded multiple standards. Of the standards reported together, correlational analysis revealed weak relationships between the standards (Table 5). Three of the four strongest associations were found between the mission, vision, and core values standard and the school improvement, ethics and professional norms, and equity and cultural responsiveness standards. The school improvement standard was also most often recorded with the curriculum, instruction, and assessment standard.

Considering the percentage of time each standard was recorded independently of other standards also highlighted how principals conceptualized their time use. Although most prevalent overall, the mission, vision, and core values standard was recorded independently only 10% of the time. For all other times, mission, vision, and core values was one of several

standards principals used to define the nature of their activity. In contrast, the curriculum, instruction, and assessment standard was recorded independently 49% of the time, while the community of care and support of students standard was recorded independently 54% of the time. Principals exclusively defined the nature of their activity as operations and management 96% of the time.

Table 5.

Correlation Table of the Professional Standards

	1	2	3	4	5	6	7	8	9	10
1. MV	---									
2. ETH	.196**	---								
3. EQ	.175**	.194**	---							
4. CU	.132**	-.051**	-.030	---						
5. CO	.063**	.032	.110**	-.188**	---					
6. PCA	.139**	.105**	.012	.129**	-.095**	---				
7. PCO	.137**	.026	-.012	.107**	-.060**	.134**	---			
8. ME	.022	-.010	.055**	-.146**	-.185**	-.134**	-.061**	---		
9. OM	.027	.014	-.001	-.173**	-.098**	-.051**	-.105**	-.101**	---	
10. SI	.268**	.018	.040*	-.215**	-.081**	.186**	.128**	-.083**	-.046**	---

Note: ** significant at .01 level, * significant at .05 level. MV = Mission, Vision, and Core Values, ETH = Ethics and Professional Norms, EQ = Equity and Cultural Responsiveness, CU = Curriculum, Instruction, and Assessment, CO = Community of Care and Support for Students, PCA = Professional Capacity of School Personnel, PCO = Professional Community for Teachers and Staff, ME = Meaningful Engagement of Families and Community, OM = Operations and Management, SI = School Improvement.

To further understand the relationship between principal time use and professional standards, I analyzed the standards in relation to the principals' overall category of activity (Table 6). When engaged in instructional activities, principals most often defined the standards as either curriculum, instruction, and assessment (52%) or mission, vision, and core values (25%). Organizational activities were defined by operations and management (30%) and mission, vision, and core values (24%). Relational activities were defined by community of care and support for students (39%), mission, vision, and core values (15%), and meaningful engagement of families and community (14%). Finally, other time was most often defined by

operations and management (28%), community of care and support for students (19%), and mission, vision, and core values (13%).

Table 6.

Average Percentage of Professional Standard by Activity Type

	1	2	3	4	5	6	7	8	9	10
Instructional	24.93	2.21	1.15	52.26	7.22	7.31	1.92	0.67	0.87	1.44
Organizational	24.36	5.06	2.97	7.88	11.98	9.89	3.38	3.14	30.06	1.29
Relational	15.46	8.42	4.48	2.93	38.52	7.32	5.95	13.82	2.74	0.37
Other	12.93	9.52	2.04	6.12	19.05	9.52	2.72	7.48	27.89	2.72
Total	21.32	5.48	2.86	19.31	19.03	8.34	3.73	5.97	12.86	1.01

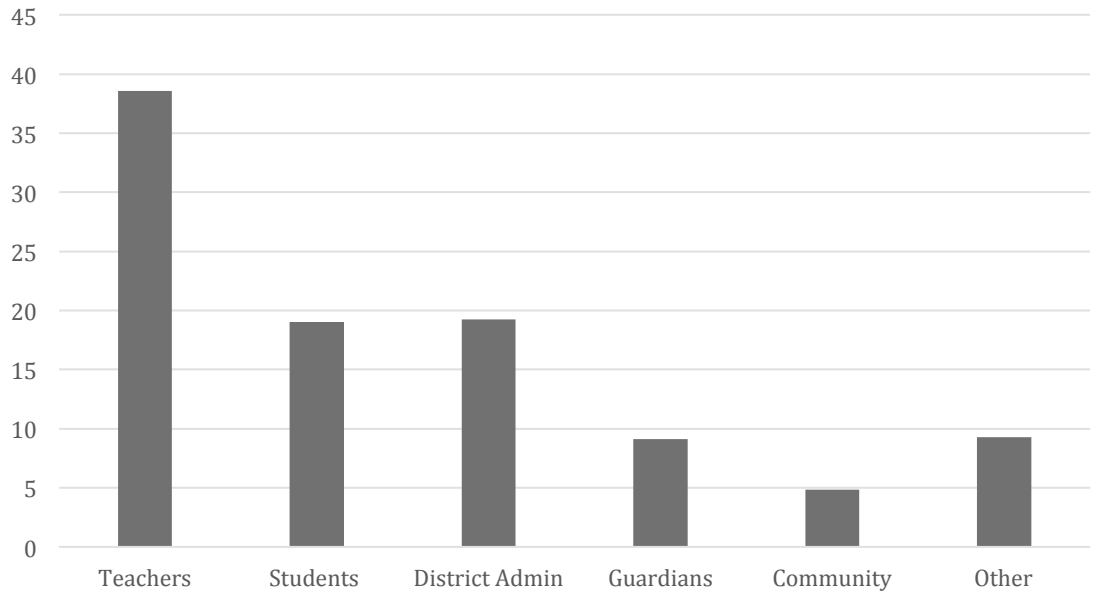
Note. 1 = Mission, vision, and Core Values, 2 = Ethics and Professional Norms, 3 = Equity and Cultural Responsiveness, 4 = Curriculum, Instruction, and Assessment, 5 = Community of Care and Support for Students, 6 = Professional Capacity of School Personnel, 7 = Professional Community for Teachers and Staff, 8 = Meaningful Engagement of Families and Community, 9 = Operations and Management, 10 = School Improvement

Stakeholder interactions. Most often in the company of others, principals reported interacting with stakeholders 72% of the time they answered the survey. 64% of these interactions were with groups of multiple stakeholders. When working with individual stakeholders (Figure 3), principals spent the majority of their time with teachers (39%). Equal time was spent engaging with district administrators (19%) and students (19%). Principals engaged with guardians 9% of their time, while only spending 5% of their time with community stakeholders. Principals reported spending 9% of their time with stakeholders not represented on the survey.

When interacting with teachers, principals most often met with individuals or small groups. Principals met with one or two teachers 55% of the time and groups smaller than ten 31% of the time. Principals interacted with groups of ten or more teachers only 13% of the time. Similarly, 60% of the time principals interacted with the central office involved individual administrators. Only 12% of central office interactions were dominated by meetings with more

than ten administrators. In contrast, when interacting with students, principals spent the majority of their time with ten or more students (56%). Principals spent 31% of student interactions with individuals. Only 12% of time interacting with students consisted of small groups less than ten. Figure 3.

Average Stakeholder Interactions



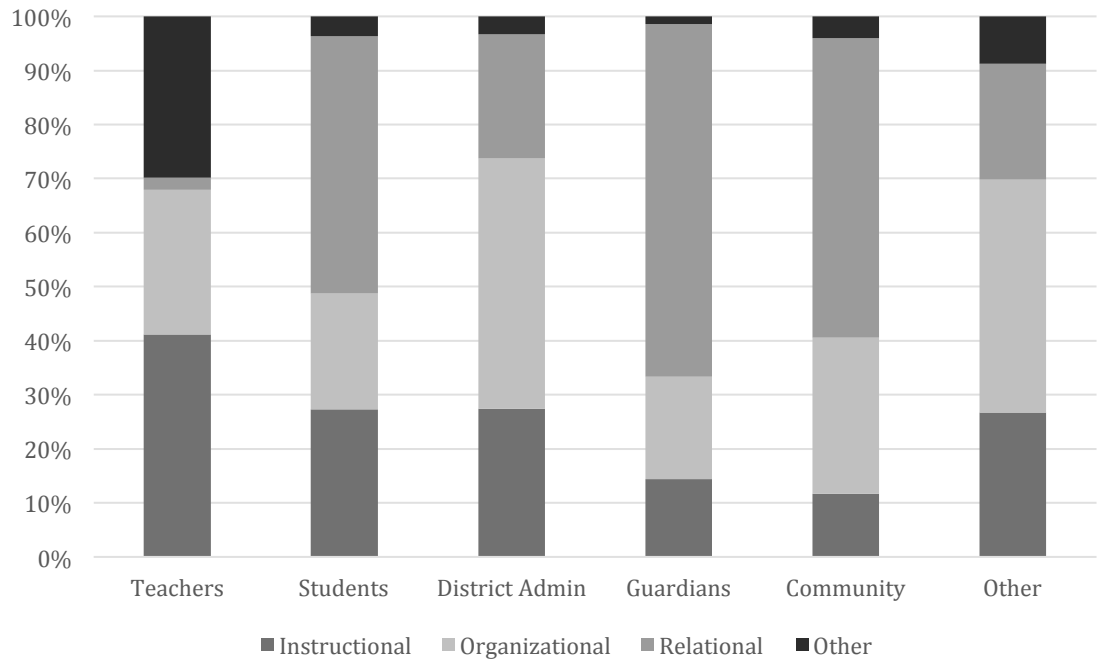
When meeting with guardians and community stakeholders, principals either interacted with individuals or large groups. 67% of guardian engagement occurred with one to two guardians while 24% occurred with groups of more than ten. Principals spent 51% of their time with community stakeholders meeting with individuals while 32% of this time was spent with groups of more than ten. Of the time principals reported spending with other stakeholders, 67% of the time was spent with individuals.

Considering stakeholder interactions and type of activity (Figure 4), principals most often engaged with teachers on instructional and organizational activities with marginal interactions

categorized as relational. Principals primarily categorized student, guardian, and community member interactions as relational activities. Conversely, principals considered interactions with district administrators as mostly organizational. Of note, principals seldom categorized interactions with guardians and community stakeholders as instructionally focused.

Figure 4.

Stakeholder Interactions by Activity Type

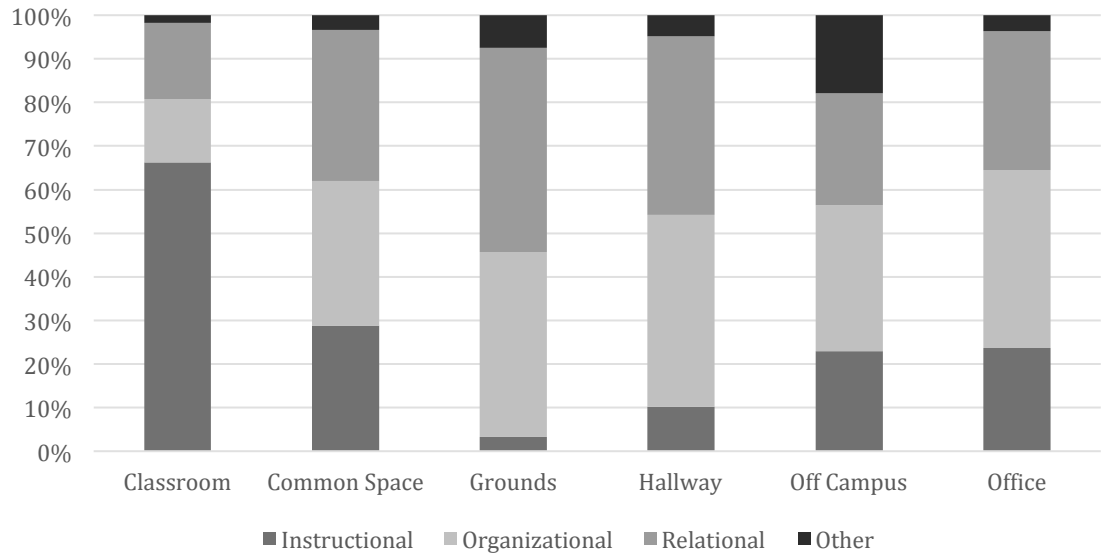


Location. Over the course of the study, 42% of the total survey responses located principals in the office. Principals spent an equal amount of time in common spaces (17%) and off campus (17%). 14% of principal time occurred in classrooms, while only 5% of time was spent in either the hallways and grounds of the school. Considering location and activity type concurrently, office, common space, and off campus time was almost equally split between organizational, instructional, and relational activities (Figure 5). Principals primarily categorized time spent in classrooms as instructional, while the hallways and grounds equally shared

organizational and relational activities. Of note, the majority of principal activity that was not categorized as organizational, instructional, or relational occurred off campus.

Figure 5.

Activity Type by Location



Anticipated and initiated time. Overall, principals anticipated 68% of their total interactions and activities. Principals also initiated 60% of their total interactions and activities. In comparing activity types (Table 7), principals most often anticipated instructional activities. Similarly, but to a lesser extent, principals most often initiated instructional activities.

Table 7.

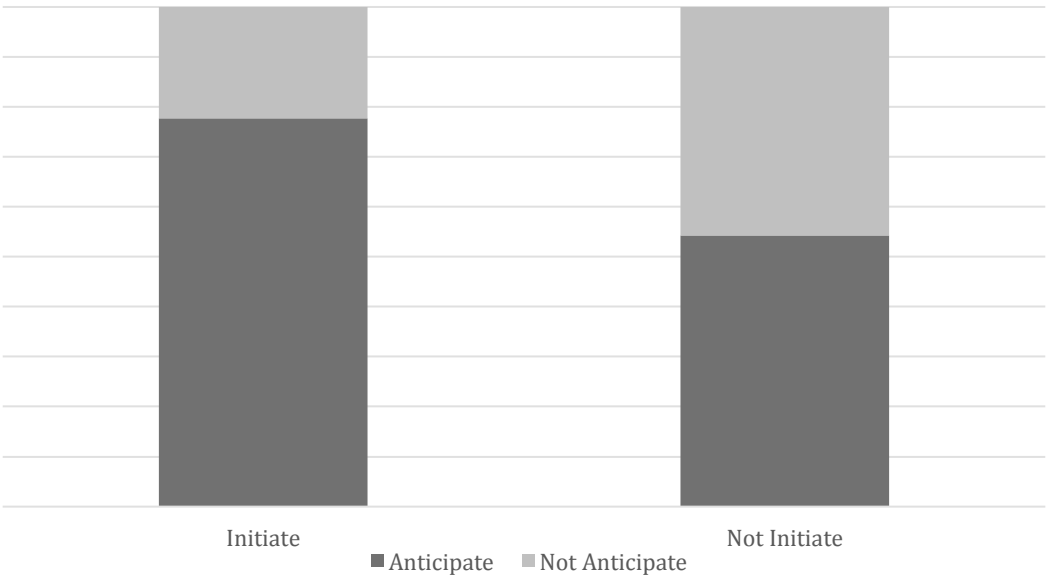
Percentage of Anticipated and Initiated Time by Activity

	N	Anticipated	Initiated
Instructional	1038	81.41	65.99
Organizational	1247	67.52	59.04
Relational	1094	54.57	52.52
Other	191	67.02	59.16
Total	3730	68.36	59.98

Additionally, principals often anticipated and initiated an interaction or activity (Figure 6). 47% of principal time was both initiated and anticipated, while only 18% was neither anticipated nor initiated. Principals anticipated but did not initiate 22% of their interactions and activities. Principals also initiated but did not anticipate 14% of their interactions and activities.

Figure 6.

Anticipated and Initiated Activity



Summary. Overall, the survey responses indicated that non-urban principals spent similar amounts of time on organizational, instructional, and relational activities over the course of the study. However, large standard deviations indicated a high rate of variability in an individual principal's responses. The school level of the sampled principals indicated differences in the time allocation by activity type. On average, high school and middle school principals spent the majority of their time on organizational activities, whereas elementary school principals spent the most time on instructional activities. Increased time allocation on organizational activities for high school and middle schools may have been the result of the

demands of larger student populations and the management of more administrative staff in comparison to elementary school principals. In contrast, elementary school principals may have spent a higher proportion of time on instructional activities as the school's sole administrator responsible for overseeing the instructional program. The findings indicated that school locale did not seem to influence principals' overall average time allocation.

Principals defined the nature of their activity using both individual and multiple standards. Although reported most frequently, principals seldom exclusively focused on the mission, vision, and core values of the school. Instead, the standard was one of multiple standards used to define the nature of an activity indicating that principals perceived many different types activities as fulfilling the school's mission, vision, or core values. In fact, principals reported that 25% of all instructional and organizational activities were mission critical. Conversely, principals almost exclusively engaged in the standards of curriculum, instruction, and assessment, community of care and support of students, and operations and management. In alignment with the overall findings on instructional and relational time, principals spent similar amounts of time on curriculum, instruction, and assessment standard and the community of care and support of students standard. Although principals reported the most time spent on organizational activities, only 13% of responses were defined by the operations and management standard. In comparison to the standards that defined instructional and relational time, principals used a larger variety of standards to define their activity when engaged in organizational tasks. The findings indicated that principals may have delineated instructional and relational activities from their stasis of managing organizational activities.

Spending only 28% of their time alone, principals were regularly in the company of heterogeneous groups of educational stakeholders. When interacting with homogenous groups,

principals were most often with one or two teachers or district administrators. Over the course of the study, principals did not often participate in meetings with large numbers of stakeholders except when interacting with students. Principals were most often engaged with faculty members on instructional activities, but seldom reported their activity as instructional when interacting with other stakeholders. Although principals spent more than half of their day with groups of different types of stakeholders, they may have perceived instructional activities as predominantly the domain of teachers.

Similar to previously reported principal time use research, sampled principals spent the highest proportion of their time in the office. However, principals reported spending over half of their day in spaces outside of the office, including common spaces and off campus. In the three most commonly located spaces, principals spent similar time on instructional, organizational, and relational activities providing evidence that principals may have had control over their day and were not reacting to emergent situations dependent on their location.

In contrast to the pervasive narrative of the principal's day dominated by unexpected demands, the sampled principals reported that the majority of their day was both anticipated and initiated. This finding, in addition to the disparate finding that sampled principals spent their time similarly between activity types, provided evidence that school context may have influenced principal behaviors. Although previous research has collected data using similar methodology and over similar observational periods, few samples featured non-urban principals. The school contextual variables of locale and total school enrollment may have contributed to the sampled principals' time allocation.

Question Two: How Does a Principal's Allocation of Time Vary During the Day and Over a Week?

To answer question two, I structured this section in two parts. First, I detailed the findings from the series of analyses on time variation during a typical school day. Beginning with descriptive statistics, I then described the results from the fully unconditional and unconditional linear growth models for instructional, organizational, relational, and other time allocation. Second, I detailed the findings from the series of analyses on time variation over a typical week. Similar to the previous analyses, I reported descriptive statistics and the results from the fully unconditional models (FUM) for instructional, organizational, relational, and other time allocation. I described the findings from the random coefficients model exploring the difference between time allocation by day of the week. To analyze the proportion variance in activity type explained by time of the day and day of the week, I also reported the change in level-1 variance for all models using the equation σ^2 *FUM* - σ^2 *New model* / σ^2 *FUM*.

Time variation during the day. Descriptive statistics of principal time allocation to instructional, organizational, and relational time displayed trends and trajectories during a typical fall day (Figure 7.). On average, principals' instructional time suggested a quadratic trend with an inverted "U" shape. Spending 19% of their time on instructional activities between 7:00 and 8:59, principals increased the percentage of time to 34% between 11:00 and 12:59 before instructional time began to decrease at 13:00 (Table 8). Only 6% of principals' responses between 17:00 and 18:59 were categorized as instructional. Relational time displayed a similar, albeit less steep, shape. Beginning the day with 22% of time spent on relational activities, principals increased their time throughout the day with the peak of activity at 28% between 15:00 and 16:59. Relational time decreased to 14% between 17:00 and 18:59. Unlike the

previous quadratic trends, organizational activities displayed a negative linear trend. Between 7:00 and 8:59, 35% of principals' responses were categorized as organizational. This trend steadily declined throughout the day ending with 13% of time spent on organizational activities between 17:00 and 18:59. Time spent on other activities remained fairly consistent throughout the day. High standard deviations for all categories of activity indicated high variability in results.

Figure 7.

Average Percentage of Time by Hour Block

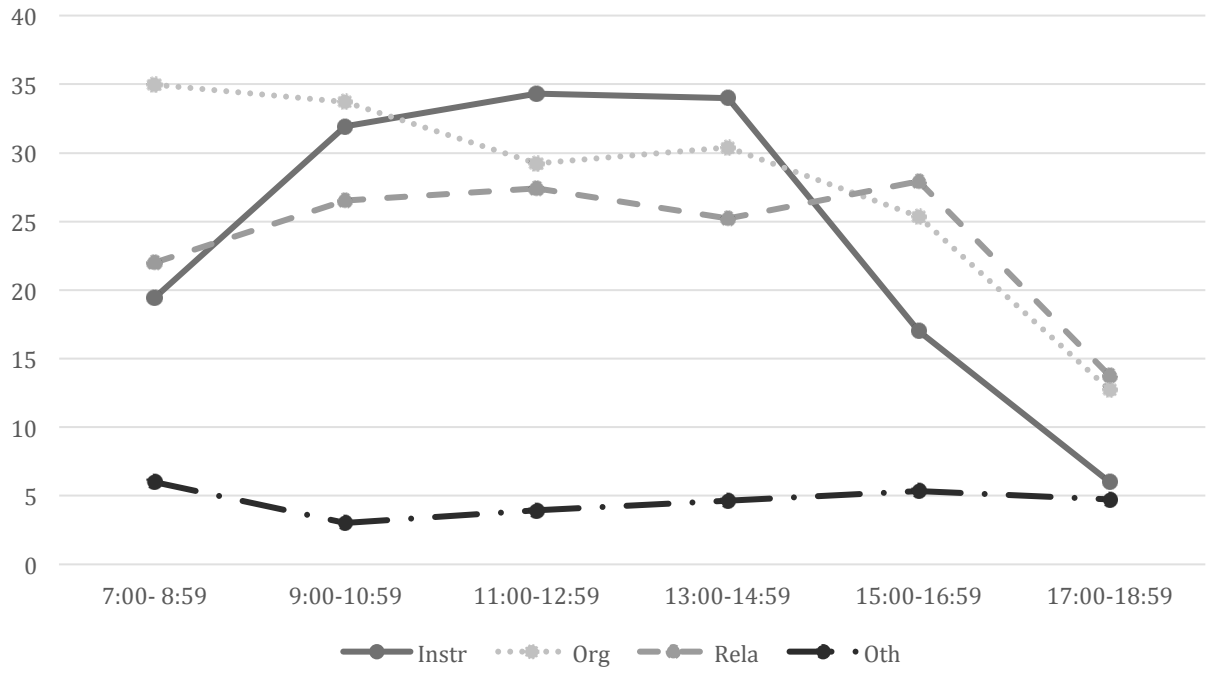


Table 8.

Mean Percentile by Two Hour Block

	N	%	Instr	SD	Org	SD	Rela	SD	Oth	SD
7:00- 8:59	755	16.76	19.43	13.97	34.98	16.90	21.98	17.02	6.01	11.19
9:00-10:59	796	17.67	31.95	17.73	33.71	18.83	26.54	14.35	3.02	5.57
11:00-	719	15.96	34.31	22.99	29.23	17.88	27.41	17.50	3.93	7.35

12:59										
13:00-14:59	690	15.32	33.97	17.31	30.41	16.60	25.24	15.77	4.65	9.97
15:00-16:59	744	16.51	17.02	15.48	25.38	16.11	27.94	20.20	5.32	10.07
17:00-18:59	689	15.29	5.99	8.25	12.70	15.54	13.72	12.11	4.74	11.03

Note. % = percentage of total responses, Inst = Instructional, Org = Organizational, Rela = Relational, Oth = Other, SD = Standard Deviation

Before running the statistical analyses, I examined a random selection of ten plots of individual participant's data to assess for possible linear and quadratic trends during the day for each activity type. Next, I ran hierarchical linear and non-linear growth models. I employed the restricted maximum likelihood estimation method in all of the following analyses to ensure unbiased estimates of variance components. Prior to running the unconditional linear growth models, tests of the fully unconditional models found a significant proportion of the variance in instructional (ICC = .12, $\chi^2 = 106.39$, $p < .001$), organizational (ICC = .17, $\chi^2 = 135.01$, $p < .001$), relational (ICC = .18, $\chi^2 = 138.50$, $p < .001$), and other time (ICC = .23, $\chi^2 = 165.94$, $p < .001$) occurred between principals (Table 9). These findings supported the use of multilevel modeling in the subsequent analyses.

Table 9.

Fully Unconditional Model Statistics Two Hour Block Within a Day

Statistic	Instr	Org	Rela	Oth
Coefficient	23.88*	27.79*	23.83*	4.62*
τ	44.10	59.28	52.23	20.26
σ^2	337.83	281.54	236.65	68.21
Reliability (λ)	.44	.56	.57	.64
ICC	.12	.17	.18	.23

Note. ICC = Level 2 variance/Total variance = $\tau/(\tau+\sigma^2)$. *$p < .001$.

After the fully unconditional model confirmed the necessity for further HLM analyses, I ran unconditional linear and non-linear growth models for instructional, organizational, relational, and other time. To provide evidence for the second research question and determine if time use varied by principal, I added the level-1 predictor of time. I operationalized the percentage of time in two-hour blocks to test the presence of linear trends and I squared this variable to explore quadratic trends. Both variables were entered uncentered as random effects to the models. The time block from 7:00 to 8:59 represented the intercept at time 0.

Instructional. An examination of a random selection of plots for the percentage of time spent on instructional activities revealed possible positive linear and quadratic trends over the course of the day. The model revealed a significant positive slope (β_{10} = 14.33, $t(60)$ = 8.40, $p <$ .001) and quadratic trend (β_{20} = -3.50, $t(60)$ = -10.65, $p <$ .001). Additionally, there was significant variance on both the linear slope (χ^2 = 79.77, p = .04) and quadratic slope (χ^2 = 81.20, p = .03) to continue the analysis and add level-2 predictors to the model in order to answer research question three. The level-1 model, with the linear and quadratic predictors of time, accounted for 45.27% of the within-principal variance in percentage of time allocated to instructional activities.

Organizational. An examination of a random selection of plots for the percentage of time spent on organizational activities also revealed possible positive linear and quadratic trends over the course of the day. Although the model initially revealed a significant linear slope, upon adding the quadratic term the linear slope became insignificant. However, the model revealed a significant quadratic trend (β_{20} = -1.04, $t(60)$ = -3.26, p =.002). To maximize the variance component, I fixed the linear slope. Consequently, the quadratic slope had significant variance (χ^2 = 81.40, p = .03) to continue the analysis. The level-1 model, with the fixed linear predictor

and random quadratic predictor of time, accounted for 26.17% of the within-principal variance in percentage of time allocated to organizational activities.

Relational. An examination of a random selection of plots for the percentage of time spent on relational activities also revealed a possible positive linear and quadratic trend over the course of the day. The model revealed a significant positive slope (β_{10} = 6.51, $t(60)$ = 4.06, $p <$ .001) and quadratic trend (β_{20} = -1.53, $t(60)$ = -4.97, $p < .001$). However, there was not significant variance across principals on either the slope or quadratic to add level-2 predictors to the model. The level-1 model, with the linear and quadratic predictors of time, accounted for 16% of the within-principal variance in percentage of time allocated to relational activities.

Other. An examination of a random selection of plots for the percentage of time spent on other activities revealed little variation and no clear linear trend over the course of the day. Although this model revealed there was no significant linear or quadratic growth across principals over the day, there was significant variance in both the linear slope (χ^2 = 116.20, $p <$ .001) and quadratic slope (χ^2 = 116.45, $p < .001$) to continue the analysis and add level-2 predictors to the model in order to answer research question three. Although the percentage of time principals spent in activities categorized as "other" was small, significant linear growth may not have been found in this model due to conflicting directions of growth. The addition of level-2 predictors may indicate variation undetected by visual inspection of the data. The level-1 model, with the linear and quadratic predictors of time, accounted for 21.79% of the within-principal variance in percentage of time allocated to other activities.

Time variation over the week. Descriptive statistics of principal time allocation to instructional, organizational, and relational time displayed potential differences between days of the week (Figure 8.). On average, the data indicated that principals spent slightly different

amounts of time on instructional activities over a typical fall week. Whereas principals spent around 25% of their time on instructional activities on Mondays, Wednesdays and Thursdays, this percentage decreased to 21% on both Tuesdays and Fridays (Table 10).

Figure 8.

Average Percentage of Time by Day of the Week

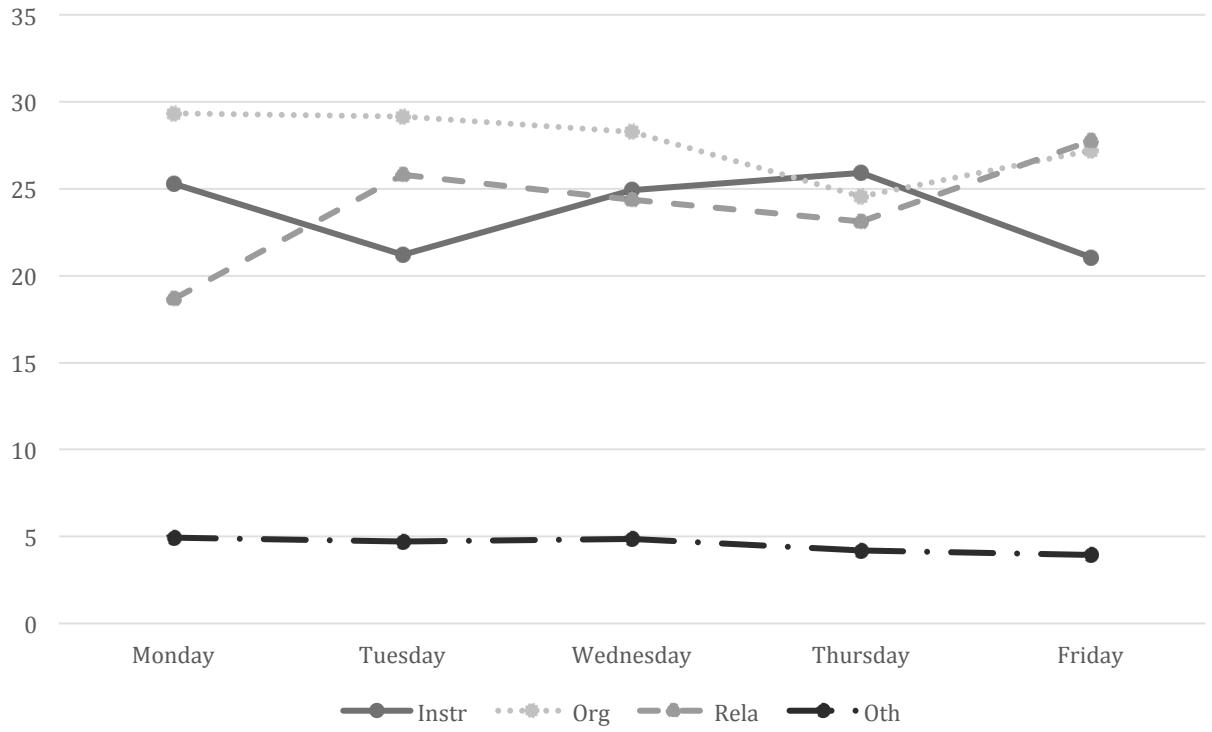


Table 10.

Mean Percentile by Day of the Week

	N	%	Instr	SD	Org	SD	Rela	SD	Oth	SD
Monday	940	20.87	25.28	18.30	29.32	16.77	18.65	12.71	4.92	8.56
Tuesday	930	20.64	21.19	14.52	29.15	16.79	25.81	15.11	4.70	7.34
Wednesday	927	20.58	24.93	13.05	28.27	14.50	24.38	13.51	4.87	9.14
Thursday	897	19.91	25.90	16.24	24.54	13.14	23.12	12.99	4.18	7.24
Friday	811	18.00	21.06	17.67	27.19	16.50	27.76	15.03	3.93	7.44

Note. % = % of total responses

Organizational time data decreased throughout the week with the most time spent on Mondays at 29%. At 25%, principals spent the least amount of time on organizational activities

on Thursdays. In contrast, relational time increased throughout the week with 19% of time spent on relational activities on Mondays and 28% of time on Fridays. Time spent on other activities remained consistent between 4% and 5% throughout the week. Large standard deviations for all categories of activity during the week indicated substantial variability in results.

Prior to running the random coefficients models, tests of the fully unconditional models found a significant proportion of the variance in instructional (ICC = .33, $\chi^2 = 205.09$, $p < .001$), organizational (ICC = .28, $\chi^2 = 177.10$, $p < .001$), relational (ICC = .31, $\chi^2 = 196.83$, $p < .001$), and other time (ICC = .37, $\chi^2 = 235.00$, $p < .001$) occurred between principals (Table 11). These findings supported the use of multilevel modeling in the subsequent analyses.

Table 11.

Fully Unconditional Model Statistics by Day Across the Week

Statistic	Instr	Org	Rela	Oth
Coefficient	23.75*	27.67*	23.89*	4.53*
τ	86.13	68.74	63.39	23.34
σ^2	175.48	175.57	137.93	39.96
Reliability (λ)	.71	.66	.70	.74
ICC	.33	.28	.31	.37

Note. ICC = Level 2 variance/Total variance = $\tau/(\tau+\sigma^2)$. *$p < .001$.

After the fully unconditional models confirmed the necessity for further HLM analyses, I examined a random selection of ten plots of individual participants' data to assess for possible linear and quadratic trends over the week for each activity type. Next, I ran random coefficients models for instructional, organizational, relational, and other time. To provide evidence for the second research question and determine if the effect of day varied by principal, I added the level-1 predictor of time. I operationalized the variable by calculating the percentage of time the participants categorized their activity by day of the week. I entered the dummy coded day

variables as uncentered random effects to the models. Monday represented the intercept at time 0.

Instructional. An examination of a random selection of plots for the percentage of time spent on instructional activities over the week revealed slight differences between days with greater percentages of time in the middle of the week. However, the model revealed no significant difference between days of the week. There was significant variance in Monday (χ^2 = 141.69, $p < .001$), Tuesday (χ^2 = 116.20, $p < .001$), Thursday (χ^2 = 116.20, $p < .001$), and Friday (χ^2 = 116.20, $p < .001$) to continue the analysis and add level-2 predictors to the model to answer question three in the following section. Significant differences may not have been found in this model due to variance caused by school contextual factors. Adding predictors to the model may highlight initially unseen differences. The level-1 model accounted for 46% of the within-principal variance in percentage of time allocated to instructional activities.

Organizational. An examination of a random selection of plots for the percentage of time spent on organizational activities over the week did not reveal any discernable differences. However, the model revealed a significant difference between Monday (β_{00} = 29.32) and Thursday (β_{30} = -4.78, $t(60)$ = -1.96, p = .05). In comparison to 29% on Mondays, the model found principals spent 25% of their time on organizational activities on Thursdays. The model also showed significant variance on Monday (χ^2 = 166.77, $p < .001$), Tuesday (χ^2 = 92.37, p = .004), Wednesday (χ^2 = 125.13, $p < .001$), Thursday (χ^2 = 115.89, $p < .001$), and Friday (χ^2 = 139.05, $p < .001$) to continue the analysis and add level-2 predictors to the model. The level-1 model accounted for 46% of the within-principal variance in percentage of time allocated to organizational activities.

Relational. An examination of a random selection of plots for the percentage of time spent on relational activities revealed differences by day with percentage of time increasing throughout the week. The model revealed significant differences between Monday (β_{00} = 18.65), Tuesday (β_{10} = 7.16, $t(60) = 3.73$, $p < .001$), Wednesday (β_{20} = 5.73, $t(60) = 2.82$, p = .01), Thursday (β_{30} = 4.47, $t(60) = 1.97$, $p = .05$), and Friday (β_{40} = 8.76, $t(60) = 4.12$, $p <$ .001). On Mondays, principals spent almost 19% of their time on relational activities. The model found principals spent 26% on Tuesdays, 24% on Wednesdays, 23% on Thursdays, and 28% on Fridays. The model also showed significant variance on Monday ($\chi^2 = 108.97$, $p <$ .001), Tuesday ($\chi^2 = 109.48$, $p < .001$), Wednesday ($\chi^2 = 121.87$, $p < .001$), Thursday ($\chi^2 =$ 152.95, $p < .001$), and Friday ($\chi^2 = 133.16$, $p < .001$) to continue the analysis and add level-2 predictors to the model. The level-1 model accounted for 55% of the within-principal variance in percentage of time allocated to organizational activities.

Other. An examination of a random selection of plots for the percentage of time spent on other activities over the week did not reveal any discernable differences. The model revealed no significant difference between days of the week. There was significant variance in Monday ($\chi^2 =$ 187.17, $p < .001$), Tuesday ($\chi^2 = 79.23$, $p = .04$), Wednesday ($\chi^2 = 125.76$, $p < .001$), Thursday ($\chi^2 = 116.67$, $p < .001$), and Friday ($\chi^2 = 88.95$, $p = .01$) to continue the analysis and add level-2 predictors to the model. The level-1 model accounted for 37% of the within-principal variance in percentage of time allocated to instructional activities.

Summary. For principal time variation during the day, the fully unconditional model confirmed the necessity for multilevel modeling with a range of 12% of variance occurring between principals for instructional time and 23% of variance occurring between principals for other time. Reinforcing the trends observed through descriptive statistics, time of day was a

significant predictor of instructional, organizational, and relational time. The instructional time model found a significant positive linear slope and quadratic trend indicating that principals' days began with a relatively small percentage of time allocated to instructional tasks, then increasing the instructional time throughout the day before dropping off after 15:00. As the data collection period exceeded the traditional school day, a drop off of instructional time was anticipated after teachers and students left for the day. Although the relational time model also found a significant positive linear slope and quadratic trend, it was not as severe as the instructional slope. Principals slowly increased the amount of time they spent on relational activities throughout the day until 17:00. In comparison to time spent on instructional activities, principals' relational time peaked after the traditional school day indicating that a substantial amount of principals' relational time may have occurred in after-school meetings or attendance at athletic games or special events. Although principals' organizational time generally decreased throughout the day, the trend was not significant. However, organizational time displayed a significant quadratic trend. Considered together, the significant findings for linear and quadratic trends during the school day provided evidence that principals' days had a rhythm and routine based on the time of the day. Overall, time of day accounted for a range of variance in the percentage of time allocated by activity from 16% of relational time to 45% of instructional time. The instructional, organizational, and other models had sufficient variance to continue the analysis and add level-2 school contextual predictors in the subsequent models to further explore variation within principals' allocation of time during the day.

For principal time variation over the week, the fully unconditional models also confirmed the necessity for multilevel modeling. The models ranged from accounting for 28% of the variance occurring between principals in organizational time to 37% of the variance occurring

between principals in other time. The instructional time model revealed no significant differences between days of the week, yet there was significant variance to add level-2 predictors to Monday, Tuesday, Thursday, and Friday. Although no general differences were found in instructional time between days of the week, the subsequent models with level-2 predictors may reveal initially unseen variation. The model for organizational time revealed a significant difference between Monday and Thursday, as well as significant variance on all days to add level-2 predictors to the model. The difference in organization time between Mondays and Thursdays may have occurred because principals front loaded their week with organizational tasks to prepare for the upcoming week and were then focused on other activities on Thursdays. As an example, although it was not found to be significant, principals generally spent more time on instructional activities on Thursdays in comparison to the other days of the week. Future analyses considering the composite of principal time use may reveal additional insight into the meaning behind the differences in organizational time allocation by day. The relational time model found both significant differences and variances between all days of the week. Principals may have spent the least amount of time on relational activities on Mondays due to the proximity to the weekend. As the previous analysis for research question one revealed, relational time was dominated by student interactions. Principals spent more time on relational activities as the week progressed and students were on campus. Overall, day of the week accounted for a substantial amount of variance in the percentage of time allocated by activity with a range of 37% in other time to 46% in both instructional and organizational time. The planned analyses for research question three built upon these findings to analyze whether school contextual factors predicted variation within principals' allocation of time during the day and over a week.

Question Three: How Does School Context Predict Variation Within Principals' Allocation of Time During the Day and Over a Week?

To test whether school contextual factors, including prior academic outcomes, school location, level, and student demographics, predicted variation within principals' allocation of time during the day and over a week, level-2 predictors were inserted into the previously described models. Similar to the previous section, I structured this section into two parts. First, I detailed the findings from the series of analyses on predictors of time variation during a typical school day. Results included significant predictors, graphs of significant predictors, changes in level-2 variance (τ_{00}FUM - τ_{00}New Model/τ_{00}FUM), and discussion of the assumptions of hierarchical linear modeling. Second, I used the same process to detail the findings from the series of analyses on predictors of time variation between days in a typical week.

Prior to running the final models, the predictor variables were analyzed for linearity and independence. The assumptions of linearity and independence were upheld. Issues of multicollinearity were also assessed (Table 12). Preliminary analyses revealed moderate positive linear relationship between the gain score and FAS, school enrollment and high school, and percent minority enrollment and urban location. A moderate negative linear relationship was discovered between FRL status and FAS. As the predictors were added in blocks at different times to the model, I did not remove any variables due to these moderate linear relationships. However, a strong positive relationship was discovered between percent minority enrollment and FRL status. As preliminary analyses revealed FRL was a significant predictor of principal time on several models, I removed percent minority enrollment from the models. To attend to any other violations of HLM assumptions, including violations of normality and homoscedasticity, all findings for the analyses were interpreted using robust standard errors.

Table 12.

Correlations and Descriptive Statistics

	1	2	3	4	5	6	7	8	9	10
1. Gain	---									
2. FAS	.504**	---								
3. MS	-.300*	-.399**	---							
4. HS	.466**	.451**	-.303*	---						
5. Rural	.046	.070	.048	.029	---					
6. Town	.023	.158	.119	.048	-.151	---				
7. Urban	.037	-.178	.019	-.107	-.130	-.060	---			
8. FRL	-.232	-.513**	.040	-.254*	-.360**	-.135	.317*	---		
9. Enroll	.154	.330**	.093	.507**	-.173	-.145	-.069	-.160	---	
10. Min	-.096	-.285*	.068	-.232	-.476**	-.204	.504**	.687**	.035	---
M	1.18	73.71	---	---	---	---	---	31.87	718.38	20.48
(SD)	3.35	9.90	---	---	---	---	---	13.13	523.23	12.89
Min.	-9.87	55.30	0	0	0	0	0	8.00	209	4.27
Max.	6.369	95.30	1	1	1	1	1	65.00	3227	62.29

Note: ** significant at .01 level, * significant at .05 level

Predictors of time variation during the day. The final models for percentages of time by two-hour blocks over the day found significant predictors to variation in instructional, organizational, and other time. Middle school level and total student enrollment predicted variation in instructional time. Urban locale was a significant predictor of the quadratic slope of organizational time. Rural locale was a significant predictor of variation in other time. However, all models violated some assumptions of HLM. The following section details the findings from the final between principal models with level-2 predictors for variation in time by two-hour blocks over the course of a typical fall day.

Instructional. The final equations for the level-2 predictors of the linear and quadratic growth model for percentage of instructional time over the course of a day were:

Level-1 Model

$$INST_{ti} = \pi_{0i} + \pi_{1i}*(HOUR_{ti}) + \pi_{2i}*(HOUR\_SQ_{ti}) + e_{ti}$$

Level-2 Model

$$\pi_{0i} = \beta_{00} + r_{0i}$$

$$\pi_{1i} = \beta_{10} + \beta_{11}*(MS_i) + \beta_{12}*(ENROLL_i) + r_{1i}$$

$$\pi_{2i} = \beta_{20} + \beta_{21}*(ENROLL_i) + r_{2i}$$

Mixed Model

$$INST_{ti} = \beta_{00}$$
$$+ \beta_{10}*HOUR_{ti} + \beta_{11}*MS_i*HOUR_{ti} + \beta_{12}*ENROLL_i*HOUR_{ti}$$
$$+ \beta_{20}*HOUR\_SQ_{ti} + \beta_{21}*ENROLL_i*HOUR\_SQ_{ti}$$
$$+ r_{0i} + r_{1i}*HOUR_{ti} + r_{2i}*HOUR\_SQ_{ti} + e_{ti}$$

The final model's intercept, the percentage of time spent on instructional time between 7:00 and 8:59 for an elementary school with a total enrollment equal to the average of the sample of schools, was 20.13% (Table 13). Earlier models found significant linear and quadratic slopes and sufficient variance to support the addition of predictor variables into the model. Middle school (β_{11} = -1.04, $t(58)$ = -2.98, p = .04) and enrollment (β_{12} = -.008, $t(58)$ = -2.98, p = .004) were significant negative predictors of the linear slope. When entered in the second block of variables with middle school, high school was also a significant negative predictor of the linear slope (β_{12} = -8.22, $t(58)$ = -2.98, p = .05) (Figure 9). As student demographic variables were added in the third block, however, high school was no longer significant. A larger sample of high school principals may provide the power necessary to find future significance.

Table 13.

Final Between Principal Models of Instructional Time by Two Hour Block with Predictors

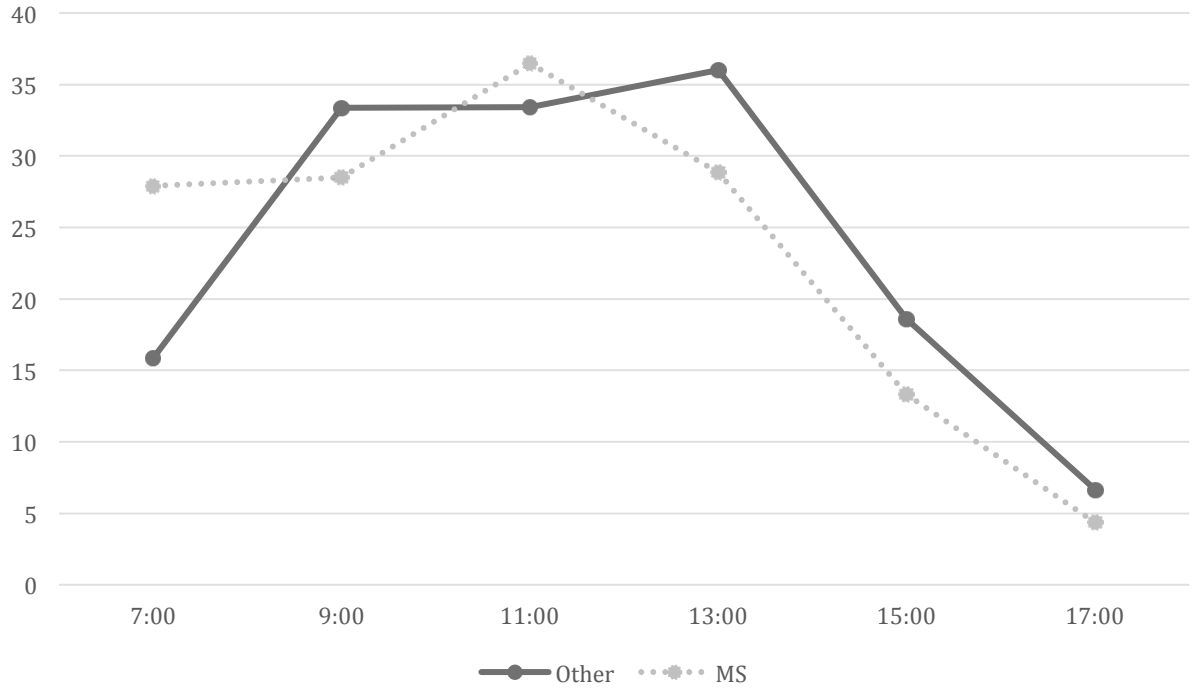
Fixed effects	Coefficient	SE
Intercept	20.13***	1.57
Slope	14.64***	1.65
MS	-1.04*	0.48
Enroll	-0.008**	0.003

Quadratic	-3.51***	0.31	
Enroll	0.002**	0.001	
Random effects	Variance	*df*	χ^2
Intercept	17.94	60	60.95
Slope	54.18	58	72.32~
Quadratic	2.40	59	73.12
Level 1 σ^2	184.20		

Note. ~ $p < .10$. *$p < .05$. ** $p < .01$. *** $p < .001$.

Figure 9.

Average Instructional Time Within a Day by Middle School Level

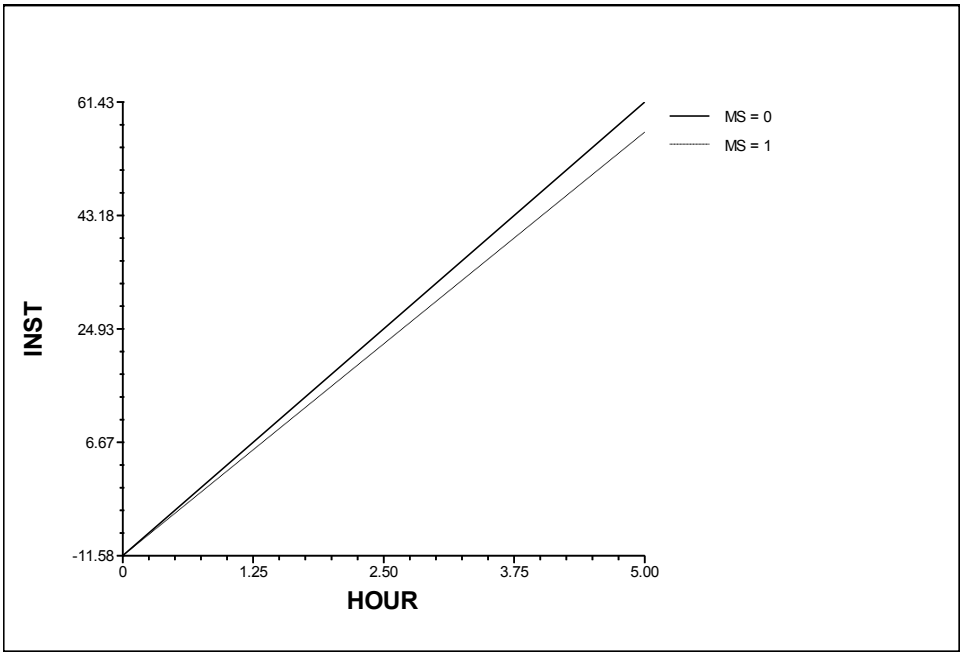


In comparison to elementary school principals, for each two-hour block after the intercept, middle school principals were found to spend less 1.04% of their time on instructional activities (Figure 10). For every student above the average enrollment, principals were predicted to spend less .01% of their time on instructional activities. Enrollment also was a significant positive predictor of the quadratic slope (β_{21} = .002, $t(59) = 3.20$, $p = .002$) indicating that schools with above average enrollment dropped off at a less steep rate than schools with average

or below average enrollment (Figure 11). As many of the schools with above average enrollment in the sample were middle and high schools, these results may have been the product of the models confounding the school level and total student enrollment variables. The Level-2 model accounted for 59.32% of the variance in instructional time that occurred between principals.

Figure 10.

Predicted Linear Trend of Instructional Time Within a Day by Middle School

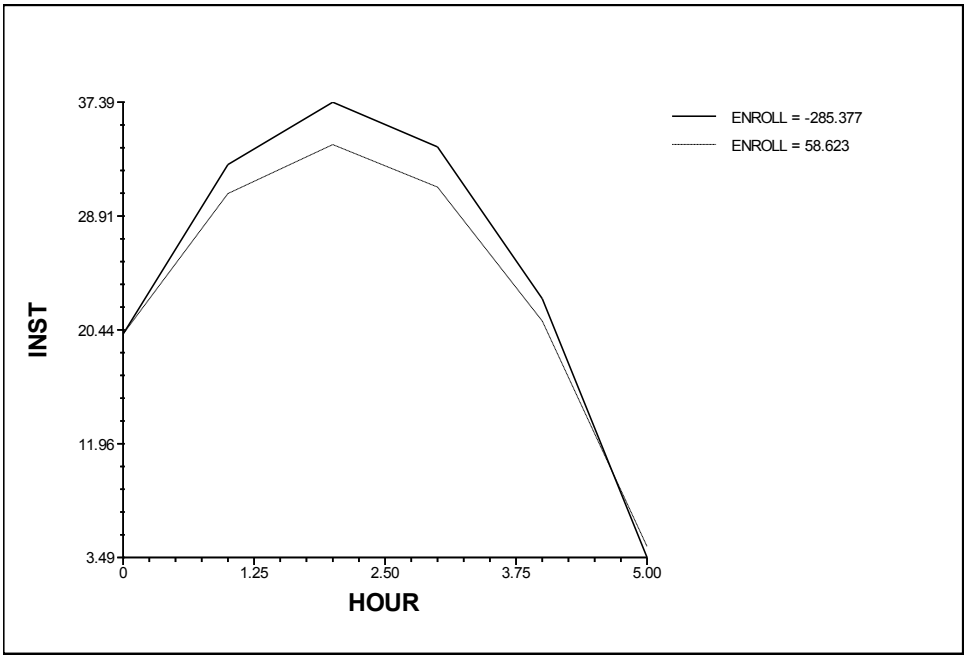


Although middle school was a significant predictor of the linear slope, the robust standard errors output varied greatly to the standard output indicating that there may have been violations of the assumptions of HLM. Level-1 and level-2 residual files were checked for violations of normality and homoscedasticity. A histogram confirmed normality of Level-1 residuals. The plot of level-1 residuals against the predicted values showed no strong structure or pattern in the residuals. The assumption of homoscedasticity of level-1 residuals was upheld. Each level-2 random effect residual was checked and confirmed for normality. When comparing expected Mahalanobis distance to actual Mahalanobis distance, the assumption of multivariate

normality was upheld. The plots of Level-2 residuals against predicted values also showed no strong structure or pattern of residuals. However, the test of homogeneity of level-1 variance was significant (χ^2 (59) = 84.92, p = .019), indicating that the variance terms were different across level-2 and the assumption of homoscedasticity had been violated. Although there were several potential sources for the assumption violation, as the outcome was not severely skewed, there were no substantial outliers, and the predictors were entered as random effects, the violation may have indicated that the one or more important predictors were omitted from the model that could account for additional variance. However, interpretation using robust standard errors mitigated the violations in assumptions.

Figure 11.

Predicted Linear and Quadratic Trends of Instructional Time Within a Day by Enrollment



Organizational. The final equations for the level-2 predictors of the quadratic growth model for percentage of organizational time over the course of a day were:

Level-1 Model

$$ORG_{ti} = \pi_{0i} + \pi_{1i}*(HOUR_{ti}) + \pi_{2i}*(HOUR\_SQ_{ti}) + e_{ti}$$

Level-2 Model

$$\pi_{0i} = \beta_{00} + r_{0i}$$

$$\pi_{1i} = \beta_{10}$$

$$\pi_{2i} = \beta_{20} + \beta_{21}*(GAIN_i) + \beta_{22}*(CITY_i) + r_{2i}$$

Mixed Model

$$ORG_{ti} = \beta_{00}$$
$$+ \beta_{10}*HOUR_{ti}$$
$$+ \beta_{20}*HOUR\_SQ_{ti} + \beta_{21}*GAIN_i*HOUR\_SQ_{ti} + \beta_{22}*CITY_i*HOUR\_SQ_{ti}$$
$$+ r_{0i} + r_{2i}*HOUR\_SQ_{ti} + e_{ti}$$

The final model's intercept, the percentage of time spent on organizational time between 7:00 and 8:59 for a suburban school with a gain score equal to the average for the sample of schools, was 33.92% (Table 14). After fixing the linear slope in earlier models, the significant quadratic slope had the necessary variance to support the addition of predictor variables to the model. Urban location was a significant negative predictor of the quadratic trend (β_{22} = -.37, $t(58)$ = -3.53, p <.001) indicating that urban schools had more of an accelerated drop off of organizational time at the end of the day in comparison to the other schools in the sample (Figure 12 & 13). This significant quadratic finding may have been the result of a relative peak in organizational time for urban principals around 11:00 and then the subsequent drop off throughout the remainder of the day. As previously published time use literature consistently reported that

urban principals' days were dominated with unanticipated interruptions, perhaps the sampled urban principals front-loaded their day with planned organizational activities to be available to deal with unexpected events as the day progressed. However, the practical significance of this finding should be interpreted with caution as the sample only included three urban schools. Of note, although the gain score was significant in earlier models, it dropped below significance in the final model ($p = .09$). The Level-2 model accounted for 96.02% of the variance in organizational time that occurred between principals.

Table 14.

Final Between Principal Models of Organizational Time by Two Hour Block with Predictors

Fixed effects	Coefficient		SE	
Intercept	33.92***		1.94	
Slope	1.31		1.64	
Quadratic	-1.02**		0.32	
Urban	-0.37***		0.10	
Random effects	Variance	*df*		χ^2
Intercept	116.20	60		157.50***
Slope	Fixed			
Quadratic	0.014	58		77.24*
Level 1 σ^2	207.71			

Note. ~ $p < .10$. *$p < .05$. ** $p < .01$. *** $p < .001$.

Similar to the previous model using instructional time as the outcome variable, the robust standard errors output differed greatly from the standard output indicating that there may have been violations of the assumptions of HLM. Level-1 and level-2 residual files were checked for violations of normality and homoscedasticity. A histogram showed of Level-1 residuals was slightly abnormal with skewness at 2.13 and kurtosis at 6.79. The plot of Level-1 residuals against the predicted values showed no strong structure or pattern in the residuals. Although the assumption of normality was violated, the assumption of homoscedasticity of Level-1 residuals was upheld. Each Level-2 random effect residual was checked for normality. The histograms

for the intercept (skewness: 3.03, kurtosis: 12.04), hour (skewness: -2.47, kurtosis: 11.41), and hours squared (skewness: 2.94, kurtosis: 12.58) all were abnormal indicating a violation of level-2 normality. The assumption of multivariate normality was also violated. When comparing expected Mahalanobis distance to actual Mahalanobis distance, the plotted values diverged from the expected line (figure x.). The plots of Level-2 residuals against predicted values showed no strong structure or pattern of residuals. However, the test of homogeneity of level-1 variance was significant (χ^2 (60) = 87.20, p = .012) indicating that the model did not account for level-1 variance in the same way across all of the principals and the assumption of homoscedasticity was violated. Robust standard errors were employed to interpret findings to mitigate the violations to HLM assumptions.

Figure 12.

Average Organizational Time Within a Day by Urban Locale

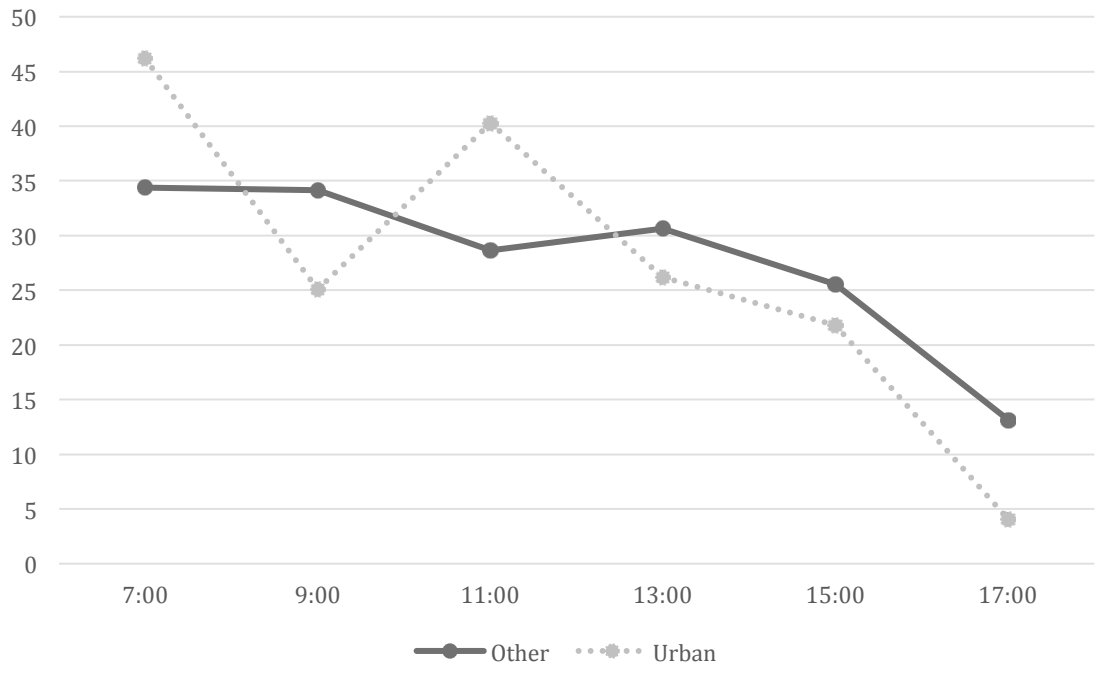
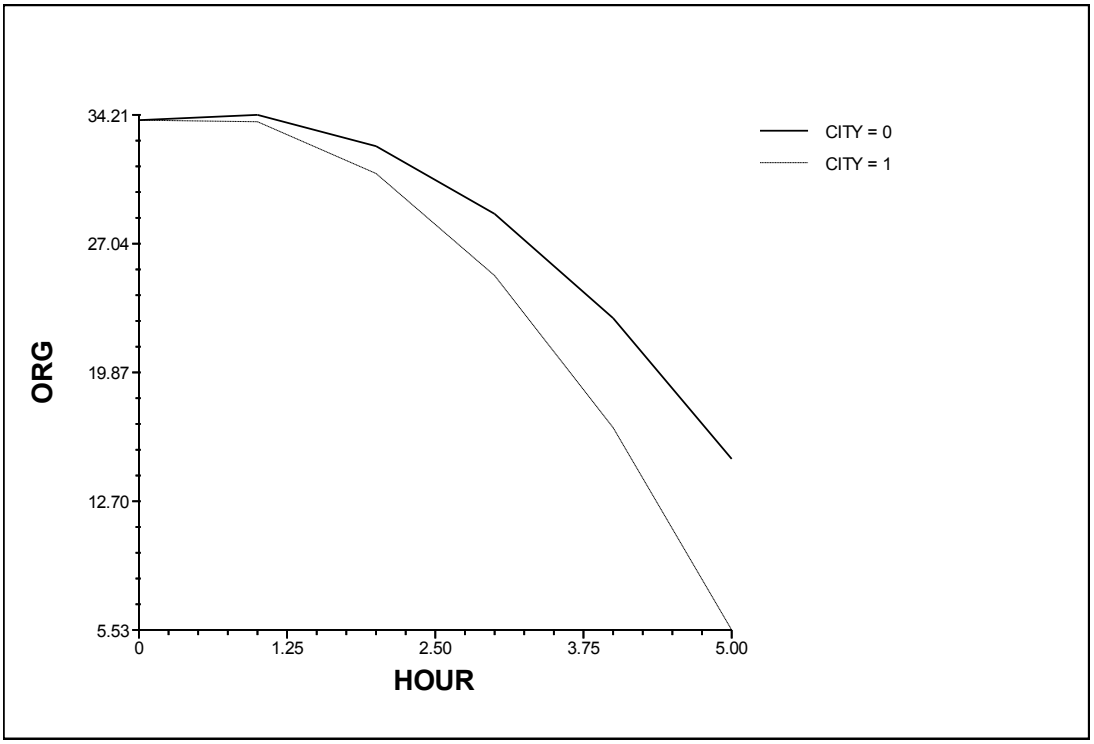


Figure 13.

Predicted Quadratic Trend of Organizational Time Within a Day by Urban Locale



Relational. As the unconditional linear and quadratic growth model did not have sufficient variance to add predictors to the model, the final equations for the percentage of relational time over the course of a day were:

Level-1 Model

$$RELA_{ti} = \pi_{0i} + \pi_{1i}*(HOUR_{ti}) + \pi_{2i}*(HOUR\_SQ_{ti}) + e_{ti}$$

Level-2 Model

$$\pi_{0i} = \beta_{00} + r_{0i}$$

$$\pi_{1i} = \beta_{10} + r_{1i}$$

$$\pi_{2i} = \beta_{20} + r_{2i}$$

Mixed Model

$$RELA_{ti} = \beta_{00}$$

$$+ \beta_{10}*HOUR_{ti}$$

$$+ \beta_{20}*HOUR\_SQ_{ti} + r_{0i} + r_{1i}*HOUR_{ti} + r_{2i}*HOUR\_SQ_{ti} + e_{ti}$$

The final model's intercept, the percentage of time spent on organizational time between 7:00 and 8:59, was 21.50% (Table 15).

Table 15.

Final Between Principal Models of Relational Time by Two Hour Block with Predictors

Fixed effects	Coefficient		SE	
Intercept	21.50***		1.84	
Slope	6.51***		1.38	
Quadratic	-1.53***		0.26	
Random effects	Variance	*df*		χ^2
Intercept	67.98	60		77.71~
Slope	10.76	60		49.73
Quadratic	0.34	60		48.19
Level 1 σ^2	198.80			

Note. ~ $p < .10$. *$p < .05$. ** $p < .01$. *** $p < .001$.

Unlike the previous two analyses, the robust standard errors output and standard output on the relational model were consistent. Level-1 and level-2 residual files were checked for violations of normality and homoscedasticity. A histogram confirmed normality of level-1 residuals. The plot of level-1 residuals against the predicted values showed no strong structure or pattern in the residuals. The assumptions of normality and homoscedasticity of level-1

residuals were upheld. Each level-2 random effect residual was checked and confirmed for normality. However, when comparing expected Mahalanobis distance to actual Mahalanobis distance, the plotted values created a steeper line than the expected 45-degree angle. The plots of level-2 residuals against predicted values showed no strong structure or pattern of residuals. The test of homogeneity of level-1 variance was significant (χ^2 (60) = 93.48, p = .004), indicating that the assumption of homoscedasticity had been violated.

Other. The final equations for the level-2 predictors of the linear and quadratic growth model for percentage of relational time over the course of a day were:

Level-1 Model

$$OTHER_{ti} = \pi_{0i} + \pi_{1i}*(HOUR_{ti}) + \pi_{2i}*(HOUR\_SQ_{ti}) + e_{ti}$$

Level-2 Model

$$\pi_{0i} = \beta_{00} + r_{0i}$$

$$\pi_{1i} = \beta_{10} + \beta_{11}*(RURAL_i) + r_{1i}$$

$$\pi_{2i} = \beta_{20} + \beta_{21}*(RURAL_i) + r_{2i}$$

Mixed Model

$$OTHER_{ti} = \beta_{00}$$
$$+ \beta_{10}*HOUR_{ti} + \beta_{11}*RURAL_i*HOUR_{ti}$$
$$+ \beta_{20}*HOUR\_SQ_{ti} + \beta_{21}*RURAL_i*HOUR\_SQ_{ti}$$
$$+ r_{0i} + r_{1i}*HOUR_{ti} + r_{2i}*HOUR\_SQ_{ti} + e_{ti}$$

The final model's intercept, the percentage of time spent on other time between 7:00 and 8:59 for a suburban school, was 5.22% (Table 16). Although earlier models found that linear and quadratic trends were not significant, available variance allowed the addition of predictor variables on both the linear and quadratic slopes. Rural locale was a significant positive

predictor of the linear slope (β_{11} = 3.53, $t(59) = 2.27$, $p = .03$) and a significant negative predictor of the quadratic slope (β_{21} = -.79, $t(59) = -2.52$, $p = .02$) (Figure 14). Although there was not a significant linear and quadratic trend for suburban principals, this model provides evidence for a significant linear and quadratic trend in other time over the course of a day for rural principals. In comparison to suburban schools, for each two-hour block of time after the intercept, rural school principals were predicted to spend an additional 3.53% of their time on other activities and this trend decelerated over the course of the day (Figure 15). The substantial difference in other time allocation by rural principals provided evidence that school locale may have influenced principal time allocation. The rural school locale may have dictated that principals spent their time on a wider array of tasks. The Level-2 model accounted for 57.46% of the variance in instructional time that occurred between principals.

Table 16.

Final Between Principal Models of Other Time by Two Hour Block with Predictors

Fixed effects	Coefficient		SE	
Intercept	5.22***		1.20	
Slope	-1.93~		1.14	
Rural	3.53*		1.56	
Quadratic	0.42~		0.22	
Rural	-0.79*		0.31	
Random effects	Variance	*df*		χ^2
Intercept	47.63	60		123.26***
Slope	37.62	59		115.85***
Quadratic	1.39	59		114.92***
Level 1 σ^2	52.31			

Note. ~ $p < .10$. *$p < .05$. ** $p < .01$. *** $p < .001$.

The robust standard errors output and standard output on the other time model were consistent. Level-1 and level-2 residual files were checked for violations of normality and homoscedasticity. A histogram of level-1 residuals was slightly abnormal with skewness at 2.12

and kurtosis at 7.02. The plot of level-1 residuals against the predicted values showed no strong structure or pattern in the residuals. Although the assumption of normality was violated, homoscedasticity of level-1 residuals was upheld. Each level-2 random effect residual was checked for normality. The histograms for the intercept (skewness: 2.95, kurtosis: 11.70), hours (skewness: -2.46, kurtosis: 11.25), and hours squared (skewness: 2.89, kurtosis: 12.16) were all abnormal. The assumption of normality at level-2 was also violated. When comparing expected Mahalanobis distance to actual Mahalanobis distance, the plotted values created as "s" curve away from the expected angle line. The plots of level-2 residuals against predicted values showed no strong structure or pattern of residuals. The test of homogeneity of level-1 variance was significant (χ^2 (58) = 492.54, p = .000), indicating that the assumption of homoscedasticity had been violated. Although the model did not account for level-1 variance in the same way across all of the principals, robust standard errors were employed to mitigate violations to HLM assumptions.

Figure 14.

Average Other Time Within a Day by Rural Locale

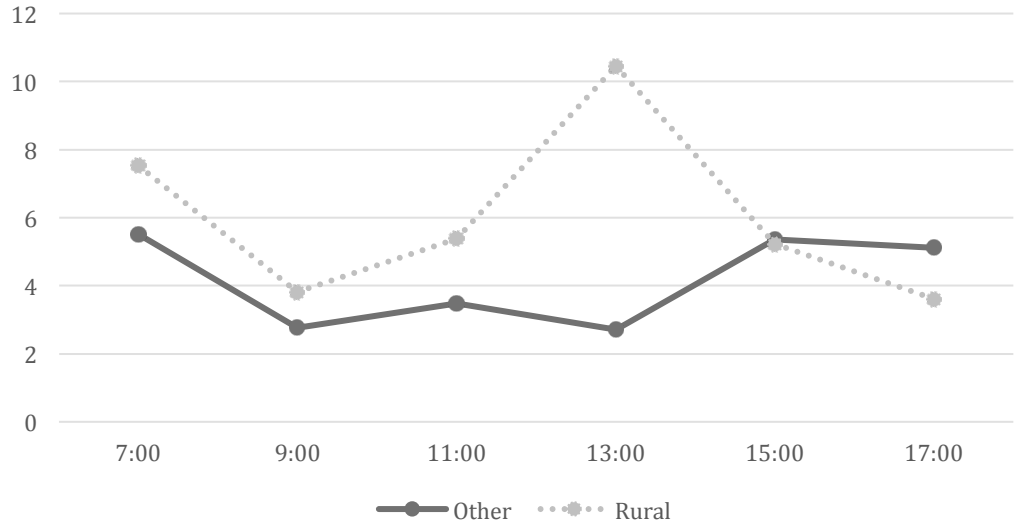
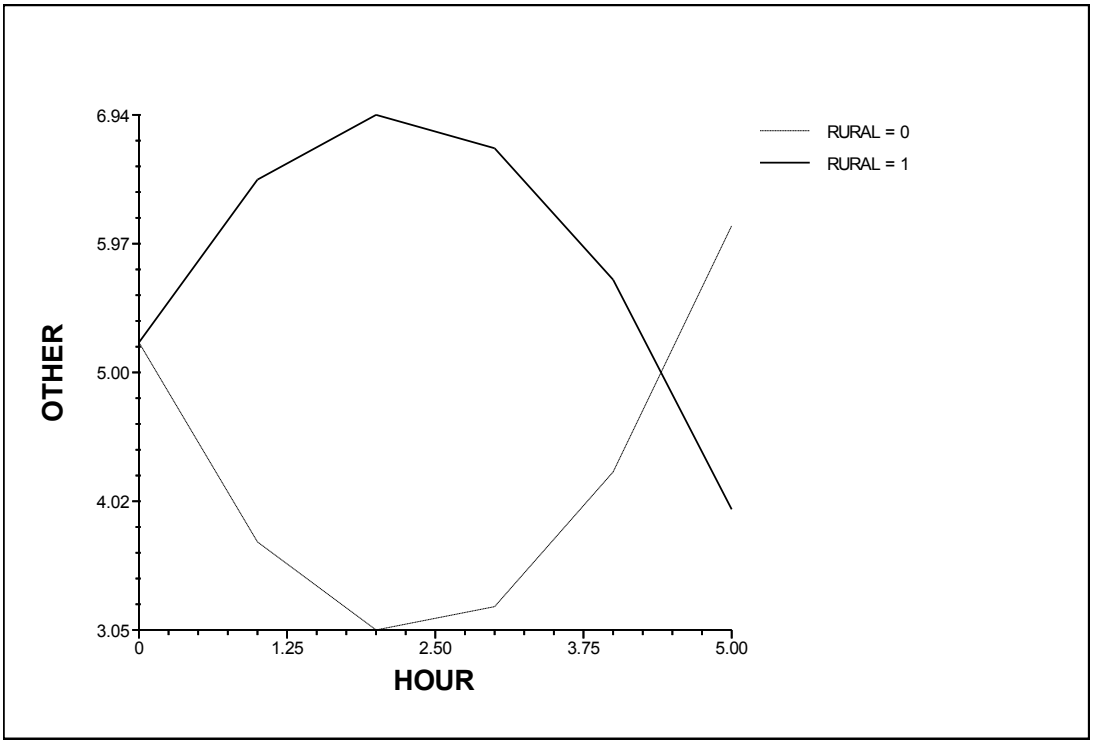


Figure 15.

Predicted Linear and Quadratic Trends of Other Time Within a Day by Rural Locale



Predictors of time variation over a week. The final models for percentages of time by day across the week found significant predictors to variation in instructional, organizational, relational, and other time. Student enrollment and rural locale predicted variation between days in instructional time. Student enrollment and middle school predicted variation between days in organizational time. FRL, middle school, rural locale, and total student enrollment predicted variation between days in relational time. FRL, middle school, and high school predicted variation between days in other time. However, all models violated some assumptions of HLM. The following section details the findings from the final between principal models with level-2 predictors for variation in time by day of the week.

Instructional. The final equations for the level-2 predictors of differences in the percentage of instructional time by day of the week were:

Level-1 Model

$$INST_{ti} = \pi_{0i} + \pi_{1i}*(TUESDAY_{ti}) + \pi_{2i}*(THURSDAY_{ti}) + \pi_{3i}*(FRIDAY_{ti}) + e_{ti}$$

Level-2 Model

$$\pi_{0i} = \beta_{00} + \beta_{01}*(ENROLL_i) + r_{0i}$$

$$\pi_{1i} = \beta_{10} + r_{1i}$$

$$\pi_{2i} = \beta_{20} + \beta_{21}*(RURAL_i) + r_{2i}$$

$$\pi_{3i} = \beta_{30} + r_{3i}$$

Mixed Model

$$INST_{ti} = \beta_{00} + \beta_{01}*(ENROLL_i)$$

$$+ \beta_{10}*TUESDAY_{ti}$$

$$+ \beta_{20}*THURSDAY_{ti} + \beta_{21}*RURAL_i*THURSDAY_{ti}$$

$$+ \beta_{30}*FRIDAY_{ti}$$

$$+ r_{0i} + r_{1i}*TUESDAY_{ti} + r_{2i}*THURSDAY_{ti} + r_{3i}*FRIDAY_{ti} + e_{ti}$$

The previous model for instructional time found no significant difference between days, however Monday, Tuesday, Thursday, and Friday had sufficient variance to continue the analysis and add level-2 predictors to the model. The model's intercept, the percentage of time principals in suburban schools with an average total student enrollment equal to the overall average of the sample spent on instructional activities on Mondays, was 25% (Table 17). Total student enrollment was a significant negative predictor (β_{01} = -.005, $t(59)$ = -2.65, p = .01) of differences between instructional time on Mondays. In schools with above average student enrollment, the

percentage of time spent on instructional activities on Mondays was projected to decrease .005% for every student above the average total student enrollment from the entire sample.

Rural locale was a significant negative predictor (β_{21} = -8.84, $t(59)$ = -3.29, p = .002) of differences between instructional time on Thursdays (Figure 16). In comparison to suburban principals on Thursdays, rural school principals were predicted to spend 8.84% less of their time on instructional activities. Although significant on Thursdays, rural principals generally spent less time than suburban principals on instructional activities. Rural principals may have spent less time on instructional activities because the geographical particularities of the rural context placed different demands on their role. The Level-2 model accounted for 27.07% of the variance in instructional time that occurred between principals.

Table 17.

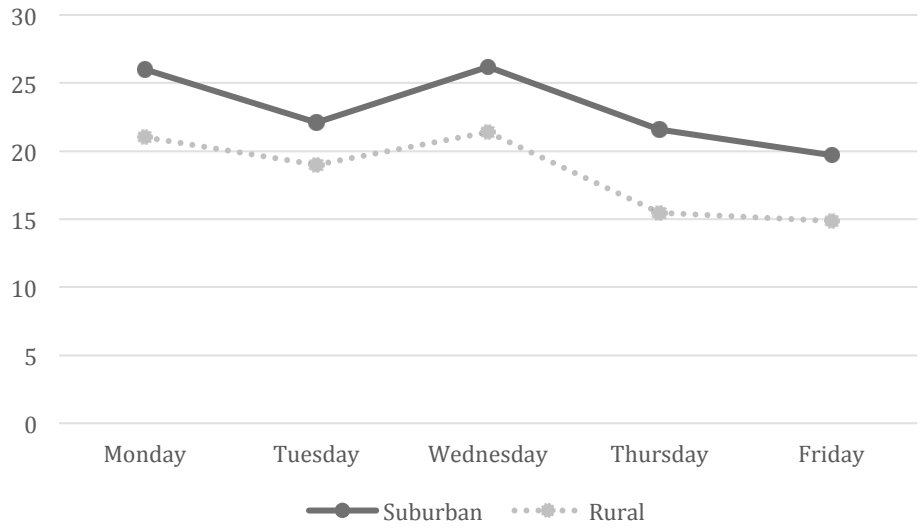
Final Between Principal Model of Instructional Time by Day of the Week with Predictors

	Instructional		
Fixed effects	Coefficient	SE	
Intercept	25.28***	2.32	
Enroll	-0.005	0.002	
Tuesday	-3.92	2.29	
Wednesday	-0.35	2.28	
Thursday	2.97	2.27	
Rural	-8.84**	2.69	
Friday	-3.44	2.23	
Random effects	Variance	*df*	χ^2
Intercept	118.10	58	130.48***
Tuesday	153.17	59	79.00*
Wednesday	72.66	59	75.01~
Thursday	68.46	58	76.27~
Friday	132.34	59	101.86***
Level 1 σ^2	115.54		

Note. ~ p < .10. *p < .05. ** p < .01. *** p < .001.

Figure 16.

Average Instructional Time Across a Week by School Level



Level-1 and level-2 residual files were checked for violations of HLM assumptions. A histogram confirmed normality of level-1 residuals. The plot of level-1 residuals against the predicted values showed no strong structure or pattern in the residuals. The assumptions of normality and homoscedasticity of level-1 residuals were upheld. Each level-2 random effect residual was checked and confirmed for normality. However, when comparing expected Mahalanobis distance to actual Mahalanobis distance, the plotted values created a steeper line than the expected 45-degree angle. The plots of level-2 residuals against predicted values showed no strong structure or pattern of residuals. The test of homogeneity of level-1 variance was significant (χ^2 (57) = 80.65, p = .02), indicating that the variance terms were different across level-2 and the assumption of homoscedasticity had been violated. Although the model did not account for level-1 variance in the same way across all of the principals, robust standard errors were employed to mitigate violations to HLM assumptions.

Organizational. The final equations for the level-2 predictors of differences in the percentage of instructional time by day of the week were:

Level-1 Model

$$ORG_{ti} = \pi_{0i} + \pi_{1i}*(TUESDAY_{ti}) + \pi_{2i}*(WEDNESDAY_{ti}) + \pi_{3i}*(THURSDAY_{ti}) + \pi_{4i}*(FRIDAY_{ti}) + e_{ti}$$

Level-2 Model

$$\pi_{0i} = \beta_{00} + \beta_{01}*(ENROLL_i) + r_{0i}$$

$$\pi_{1i} = \beta_{10} + r_{1i}$$

$$\pi_{2i} = \beta_{20} + \beta_{21}*(MS_i) + \beta_{22}*(ENROLL_i) + r_{2i}$$

$$\pi_{3i} = \beta_{30} + r_{3i}$$

$$\pi_{4i} = \beta_{40} + r_{4i}$$

Mixed Model

$$ORG_{ti} = \beta_{00} + \beta_{01}*(ENROLL_i)$$
$$+ \beta_{10}*TUESDAY_{ti}$$
$$+ \beta_{20}*WEDNESDAY_{ti} + \beta_{21}*MS_i*WEDNESDAY_{Yti} + \beta_{22}*ENROLL_i*WEDNESDAY_{Yti}$$
$$+ \beta_{30}*THURSDAY_{ti}$$
$$+ \beta_{40}*FRIDAY_{ti}$$
$$+ r_{0i} + r_{1i}*TUESDAY_{ti} + r_{2i}*WEDNESDAY_{Yti} + r_{3i}*THURSDAY_{ti}$$
$$+ r_{4i}*FRIDAY_{ti} + e_{ti}$$

The previous model for organizational time found a significant difference between Mondays and Thursdays and sufficient variance on all days to continue the analysis and add level-2 predictors to the model. The model's intercept, the percentage of time elementary principals in schools with enrollment equal to the average enrollment of the entire sample spent on organizational

activities on Mondays, was 29% (Table 18). The final model also discovered total student enrollment as a significant positive predictor (β_{01} = .007, $t(59) = 4.90$, $p < .001$) of differences on Mondays. In schools with above average student enrollment, the percentage of time spent on organizational activities on Mondays was projected to increase .007% for every student above the average total student enrollment from the entire sample. Principals in schools with large student populations may have spent more time on organizational activities on Mondays by meeting with their administrative team to prepare for the oncoming week. Schools with greater student populations may have also had more complex organizational needs in comparison to schools with small student populations.

Table 18.

Final Between Principal Model of Organizational Time by Day of the Week with Predictors

Fixed effects	Coefficient	SE
Intercept	29.32***	2.13
Enroll	0.007***	0.001
Tuesday	-0.17	2.33
Wednesday	-3.08	2.94
MS	6.89*	3.34
Thursday	-4.78~	2.44
Friday	-2.06	2.74

Random effects	Variance	*df*	χ^2
Intercept	146.42	57	140.31***
Tuesday	141.53	59	90.84**
Wednesday	213.73	57	121.18***
Thursday	175.33	59	113.97***
Friday	269.76	59	136.75***
Level 1 σ^2	97.09		

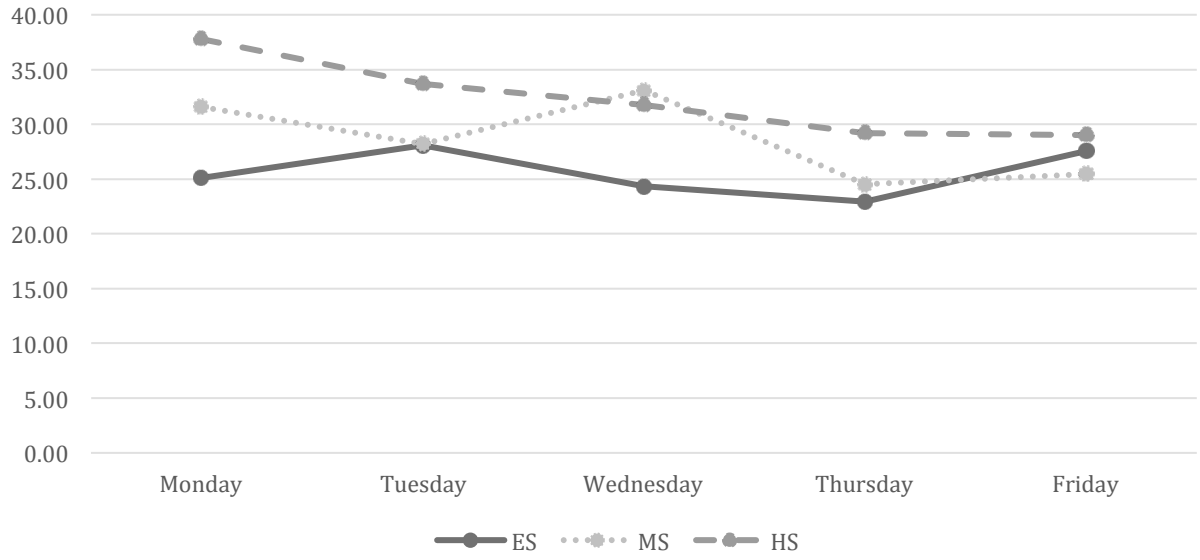
Note. ~ $p < .10$. *$p < .05$. ** $p < .01$. *** $p < .001$.

As detailed earlier, principals spent almost 5% less time on organizational activities on Thursdays. The model did not discover any predictors for this variation, however middle school was a significant positive predictor (β_{21} = 6.89, $t(58) = 2.06$, $p = .04$) to differences on

Wednesdays (Figure 17). In comparison to elementary principals on Wednesdays, middle school principals spent nearly 7% more time on organizational activities. Similar to the reverse relationship with instructional time, middle school principals generally spent more time on organizational activities throughout the week, with the difference only becoming significant on Wednesdays. Although total student enrollment was a significant predictor of the difference on Wednesdays in earlier models, it dropped from significance in the final model (p = .099). The Level-2 model accounted for 53.05% of the variance in instructional time that occurred between principals.

Figure 17.

Average Organizational Time Across a Week by School Level



Level-1 and level-2 residual files were checked for violations of HLM assumptions. A histogram confirmed normality of level-1 residuals. The plot of level-1 residuals against the predicted values showed no strong structure or pattern in the residuals. The assumptions of normality and homoscedasticity of level-1 residuals was upheld. Each level-2 random effect residual was checked and confirmed for normality. However, I was unable to graph the expected

Mahalanobis distance to actual Mahalanobis distance due to an error from SPSS stating that there were not enough available cases with valid values to continue. The plots of level-2 residuals against predicted values showed no strong structure or pattern of residuals. The HLM software was unable to compute the homogeneity of level-1 variance. The available assumption tests indicated that there were no violations to the assumptions of linearity, normality, homoscedasticity, or independence.

Relational. The final equations for the level-2 predictors of differences in the percentage of relational time by day of the week were:

Level-1 Model

$$RELA_{ti} = \pi_{0i} + \pi_{1i}*(TUESDAY_{ti}) + \pi_{2i}*(WEDNESDAY_{Yti}) + \pi_{3i}*(THURSDAY_{ti}) + \pi_{4i}*(FRIDAY_{ti}) + e_{ti}$$

Level-2 Model

$$\pi_{0i} = \beta_{00} + \beta_{01}*(FRL_i) + \beta_{02}*(MS_i) + r_{0i}$$

$$\pi_{1i} = \beta_{10} + r_{1i}$$

$$\pi_{2i} = \beta_{20} + r_{2i}$$

$$\pi_{3i} = \beta_{30} + \beta_{31}*(ENROLL_i) + r_{3i}$$

$$\pi_{4i} = \beta_{40} + \beta_{41}*(MS_i) + \beta_{42}*(RURAL_i) + \beta_{43}*(ENROLL_i) + r_{4i}$$

Mixed Model

$$RELA_{ti} = \beta_{00} + \beta_{01}*(FRL_i) + \beta_{02}*(MS_i)$$
$$+ \beta_{10}*TUESDAY_{ti}$$
$$+ \beta_{20}*WEDNESDAY_{Yti}$$
$$+ \beta_{30}*THURSDAY_{ti} + \beta_{31}*ENROLL_i*THURSDAY_{ti}$$

$$+ \beta_{40}*FRIDAY_{ti} + \beta_{41}*MS_i*FRIDAY_{ti} + \beta_{42}*RURAL_i*FRIDAY_{ti} + \beta_{43}*ENROLL_i*FRIDAY_{ti}$$

$$+ r_{0i} + r_{1i}*TUESDAY_{ti} + r_{2i}*WEDNESDAY_{Yti} + r_{3i}*THURSDAY_{ti}$$

$$+ r_{4i}*FRIDAY_{ti} + e_{ti}$$

The previous model for relational time found significant differences between Mondays and all the other days of the week, as well as sufficient variance on all days to continue the analysis and add level-2 predictors. The model's intercept, the percentage of relational time elementary principals in schools with an equal FRL percentage to the average FRL of the entire sample and an equal student enrollment to the average enrollment of the entire sample spent on Mondays, was 17% (Table 19). The final model found significant predictors for differences on Mondays, Thursdays and Fridays.

FRL (β_{01} = .18, $t(58) = 2.55$, p = .01) and middle school (β_{02} = 6.49, $t(58) = 2.94$, p = .01) were significant positive predictors of the differences on Mondays. In schools with above average FRL, the percentage of time spent on relational activities on Mondays was projected to increase an additional .18% for each additional percentage point above the average FRL (32%) for the entire sample. According to this finding, the sampled principal in the school with the highest rate of FRL (65%) would have spent an additional 6% of their time on relational activities on Mondays. Principals in schools with greater percentages of students with FRL may have had to spend additional time on relational activities on Mondays due to events that occurred over the weekend. This may have included an increase in student meetings or meetings with student guardians. Similarly, middle school principals spent an additional 6.49% of time on relational activities on Mondays.

Total student enrollment was a significant positive predictor (β_{31} = .005, $t(59) = 2.47$, p = .02) of the difference on Thursdays. In comparison to the intercept, the model predicted that

principals overall spent 21% of their time on relational activities on Thursdays. In schools with above average student enrollment, the percentage of time spent on relational activities on Thursdays was projected to increase an additional .005% for every student above the average total student enrollment from the entire sample. As a consistent predictor of principal time across activity type, these findings provided evidence that principals from schools with above average student enrollment may have had a different weekly routine in comparison to principals in smaller schools.

Middle school (β_{41} = -7.38, $t(57)$ = -2.74, p = .01), rural locale (β_{42} = 8.01, $t(57)$ = 3.41, p < .001), and total student enrollment (β_{43} = .006, $t(57)$ = 3.32, p = .002) were significant predictors of the difference on Fridays. In comparison to the intercept, the model found that principals overall spent 25% of their time on relational activities on Fridays. As a negative predictor of the Friday difference, the model predicted middle school principals spent 18% of their time on relational activities on Fridays. Overall, middle school principals differed from elementary and high school principals in their relational time trajectory across the week. Elementary and high school principals generally increased the amount of time, and middle school principals generally decreased the amount of time they spent on relational activities.

In comparison to the Friday intercept, the model found that rural principals spent an additional 8% of time on relational activities for a total of 33%. Although rural and suburban principals' time spent on relational activities was similar in the beginning of the week, rural school principals increased their relational time on Thursday and Fridays. Whereas some principals spent the most time on relational activities early in the week, rural school principals spent the majority of their relational time towards the end of the week. This may have been the result of many athletic competitions and social events occurring on Thursday and Friday

evenings. In schools with above average student enrollment, the percentage of time spent on relational activities on Fridays was projected to increase an additional .006% for every student above the average total student enrollment from the entire sample. Similar to the trends in relational time for rural locale, principals in schools with large student enrollments increased the amount of time they spent on relational activities on Thursdays and Fridays. The Level-2 model accounted for 15.04% of the variance in instructional time that occurred between principals. Table 19.

Final Between Principal Model of Relational Time by Day of the Week with Predictors

Fixed effects	Coefficient	SE
Intercept	16.73***	1.48
FRL	0.18**	0.07
MS	6.49**	2.21
Tuesday	7.16***	1.92
Wednesday	5.73**	2.04
Thursday	4.47*	2.25
Enroll	0.005*	0.002
Friday	8.97***	2.22
MS	-7.39**	2.70
Rural	8.01**	2.35
Enroll	0.006***	0.002

Random effects	Variance	*df*	χ^2
Intercept	74.58	57	138.71***
Tuesday	124.46	59	131.48***
Wednesday	152.87	59	146.36***
Thursday	211.18	58	180.44***
Friday	121.17	56	125.80***
Level 1 σ^2	51.97		

Note. ~ $p < .10$. *$p < .05$. ** $p < .01$. *** $p < .001$.

Level-1 and level-2 residual files were checked for violations of HLM assumptions. A histogram of level-1 residuals was slightly abnormal with a skewness of 1.53 and kurtosis of 3.99. However, the plot of level-1 residuals against the predicted values showed no strong structure or pattern in the residuals. Although the assumption of normality was violated,

homoscedasticity of level-1 residuals were upheld. Each level-2 random effect residual was checked and violated the assumption of normality with kurtosis scores ranging from 8.19 to 12.14. I was also unable to graph the expected Mahalanobis distance to actual Mahalanobis distance due to an error from SPSS stating that there were not enough available cases with valid values to continue. The plots of level-2 residuals against predicted values showed no strong structure or pattern of residuals. The test of homogeneity of level-1 variance was significant (χ^2 (59) = 88.80, p = .007), indicating that the model did not account for level-1 variance in the same way across all of the principals and the assumption of homoscedasticity had been violated. Robust standard errors were employed to mitigate these violations of normality and homoscedasticity.

Figure 18.

Average Relational Time Across a Week by School Level

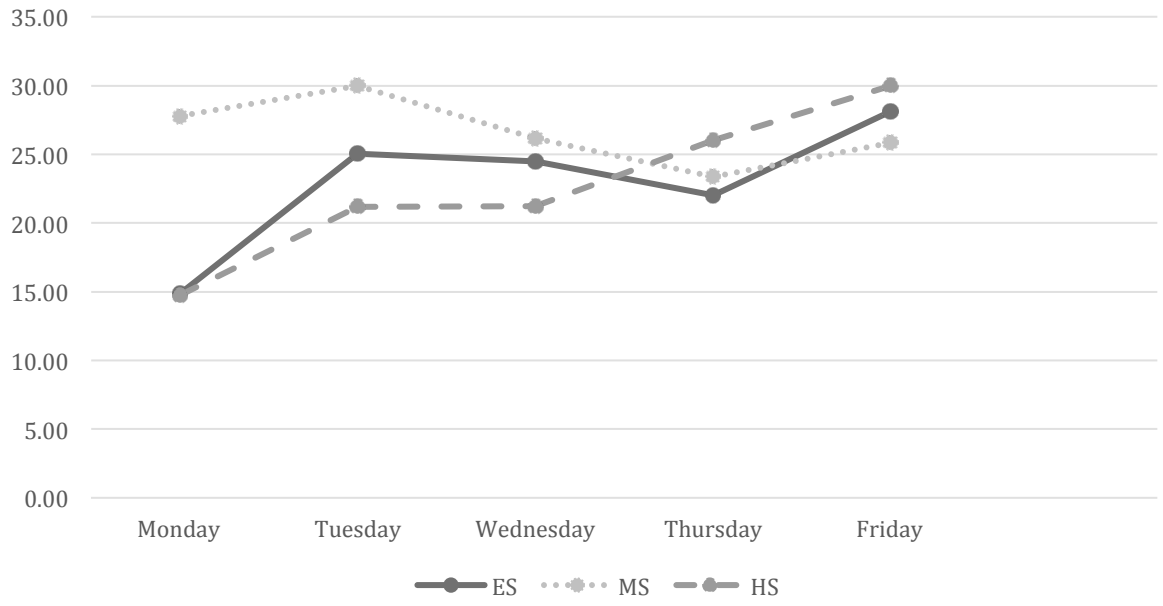
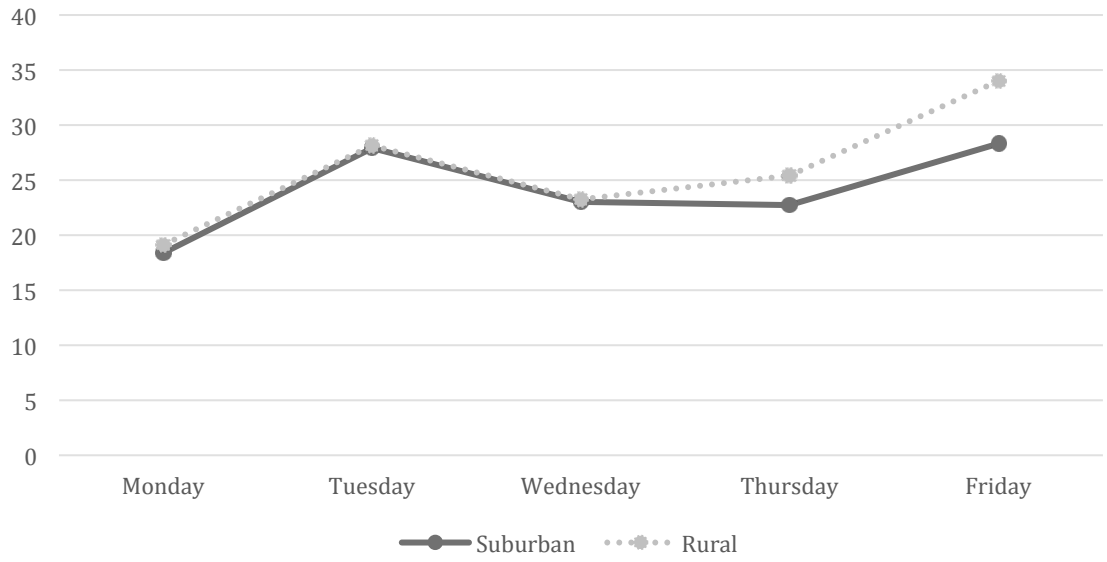


Figure 19.

Average Relational Time Across a Week by School Locale



Other. The final equations for the level-2 predictors of differences in the percentage of other time by day of the week were:

Level-1 Model

$$OTH_{ti} = \pi_{0i} + \pi_{1i}*(TUESDAY_{ti}) + \pi_{2i}*(WEDNESDAY_{Yti}) + \pi_{3i}*(THURSDAY_{ti}) + \pi_{4i}*(FRIDAY_{ti}) + e_{ti}$$

Level-2 Model

$$\pi_{0i} = \beta_{00} + \beta_{01}*(FRL_i) + \beta_{02}*(MS_i) + r_{0i}$$

$$\pi_{1i} = \beta_{10} + \beta_{11}$$

$$\pi_{2i} = \beta_{20} + r_{2i}$$

$$\pi_{3i} = \beta_{30} + r_{3i}$$

$$\pi_{4i} = \beta_{40} + \beta_{41}*(HS_i) + r_{4i}$$

Mixed Model

$$OTH_{ti} = \beta_{00} + \beta_{01}*(FRL_i) + \beta_{02}*(MS_i)$$

$$+ \beta_{10}*TUESDAY_{ti}$$

$$+ \beta_{20}*WEDNESDAY_{Yti}$$

$$+ \beta_{30}*THURSDAY_{ti}$$

$$+ \beta_{40}*FRIDAY_{ti} + \beta_{41}*HS_i*FRIDAY_{ti}$$

$$+ r_{0i} + r_{1i}*TUESDAY_{ti} + r_{2i}*WEDNESDAY_{Yti} + r_{3i}*THURSDAY_{ti}$$

$$+ r_{4i}*FRIDAY_{ti} + e_{ti}$$

The previous model for other time found no significant difference between days; however, all of the days had sufficient variance to continue the analysis and add level-2 predictors to the model. The model's intercept, the percentage of time elementary school principals in schools with a FRL equal to the overall average FRL of all schools spent on other activities on Mondays, was 5.91% (Table 20). FRL (β_{01} = -0.09, t(58) = -2.38, p = .02) and middle school (β_{02} = -3.34, t(58) = -3.25, p = .002) were significant negative predictors of differences on Mondays. In comparison to the intercept, with every percentage point increase in FRL above the overall average, the model found principals spent .09% less on other activities on Mondays. According to this finding, the sampled principal in the school with the highest rate of FRL would have spent almost 3% less of their time on other activities on Mondays. Additionally, in comparison to the intercept, middle school principals spent only 2.6% of their time on other activities on Mondays.

High school (β_{41} = 5.80, t(59) = 2.34, p = .02) was a significant positive predictor of a difference on Fridays (Figure 20). With the addition of predictors, the difference between Monday and Friday also became significant (β_{40} = -2.06, t(59) = -2.01, p = .05). In comparison

to the intercept, the model found that principals spent 3.84% of their time on other activities. The model found that high school principals, however, spent 9.64% of their time on other activities on Fridays. Although time spent on other activities was a relatively small percentage for all principals, change in other time may have indicated a difference in how principals from a variety of school contexts perceived their activities. The Level-2 model accounted for 9.71% of the variance in instructional time that occurred between principals.

Table 20.

Final Between Principal Model of Other Time by Day of the Week with Predictors

Fixed effects	Coefficient	SE
Intercept	5.91***	1.21
FRL	-0.09*	0.04
MS	-3.34*	1.03
Tuesday	-0.22	1.12
Wednesday	-0.05	1.31
Thursday	-0.74	1.26
Friday	-2.06*	1.03
HS	5.80*	2.44

Random effects	Variance	*df*	χ^2
Intercept	48.00	57	179.76***
Tuesday	30.78	59	86.02*
Wednesday	59.45	59	136.54***
Thursday	51.78	59	126.67***
Friday	21.66	58	85.99**
Level 1 σ^2 r	23.30		

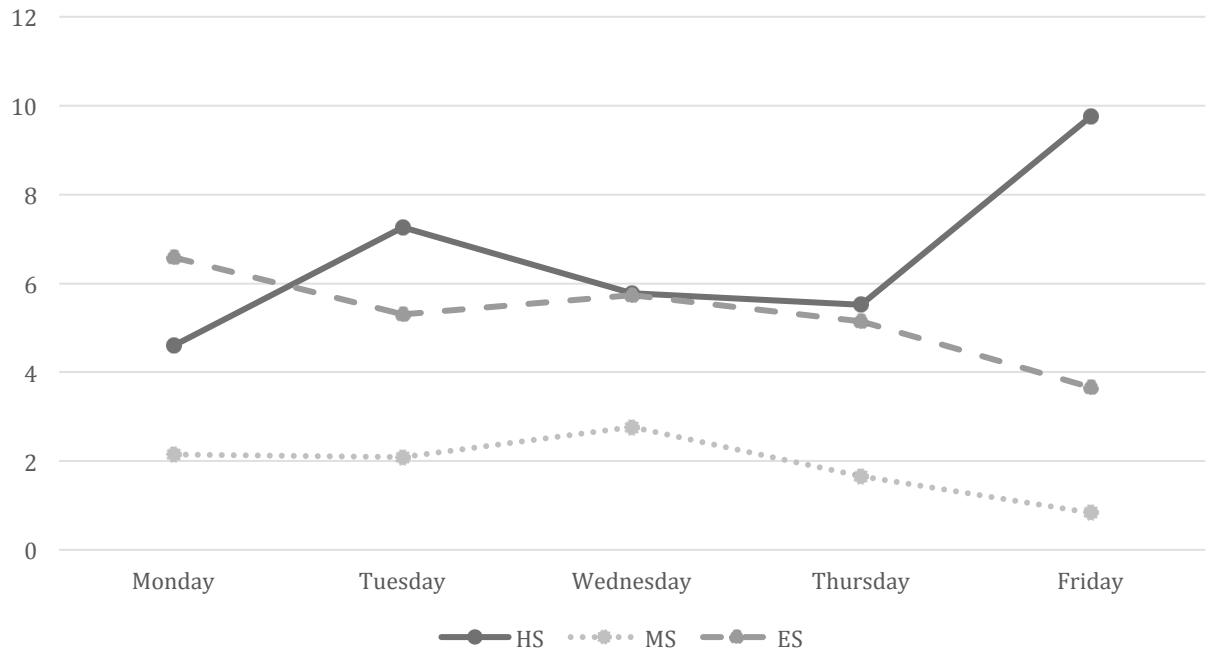
Note. ~ $p < .10$. *$p < .05$. ** $p < .01$. *** $p < .001$.

Level-1 and level-2 residual files were checked for violations of HLM assumptions. A histogram confirmed normality of level-1 residuals. The plot of level-1 residuals against the predicted values showed no strong structure or pattern in the residuals. The assumptions of normality and homoscedasticity of level-1 residuals was upheld. Each level-2 random effect residual was checked and confirmed for normality. The scatterplot comparing expected

Mahalanobis distance to actual Mahalanobis distance confirmed the assumption of multivariate normality. The plots of level-2 residuals against predicted values showed no strong structure or pattern of residuals. The HLM software was unable to compute the homogeneity of level-1 variance. The available assumption tests indicated that there were no violations to the assumptions of linearity, normality, homoscedasticity, or independence.

Figure 20.

Average Other Time Across a Week by School Level



Summary. To determine how school contextual variables predicted variation within principals' allocation of time during the day and over a week, I added level-2 predictors to the previous unconditional linear and non-linear growth and random coefficient models. Prior to running the new models, the assumption of independence was checked and upheld for all models. Linearity for all variables was also checked and the variable of percent minority

enrollment was removed to ensure that the assumption of linearity was not violated. The assumptions of normality and homoscedasticity were checked and violated in numerous analyses. Specifically, the tests of homogeneity of level-1 variance were significant in all models for time by activity type during the day and for the instructional and relational models for time over the week. A significant test of homogeneity of variance indicated that the variance terms were distributed unevenly across principals and may have been the result of one or more important predictors being omitted from the final model. Robust standard errors were used to interpret all findings to account for the violations of normality and homoscedasticity.

Supporting my original theory that existing principal time use research suffered from issues of external validity, analyses of the non-urban sample revealed that school level, school locale, and total student enrollment were significant predictors of principals' time variation during the day. Middle school and total student enrollment were significant predictors of the linear slope of instructional time, while total student enrollment also predicted the quadratic trend. As high school was also a significant predictor to the linear slope prior to adding additional variables to the model and the majority of schools with above average enrollment were middle and high schools, the model may have confounded the variables of school level and total student enrollment. Middle school principals and principals in large schools may have spent less time on instructional activities during the day because instructional activities were distributed among a team of administrators including assistant principals.

With a fixed linear slope, the model for organizational time found urban locale as a significant predictor to the quadratic trend. Although only three schools in the sample were located in urban locales, these findings provided further evidence that school locale influenced principal time use during the day. Rural locale was a significant predictor to both the linear and

quadratic slope in the other time model. Whereas principals in suburban schools spent the most time on activities classified as other in the morning and evening, rural principals' "other" time peaked in the early afternoon. The geographic context of rural schools may have demanded a different variety of tasks for principals' time during the day in comparison to suburban principals. In all models, time of the day accounted for over half of all variance in the principals' percentage of time by activity type. Accounting for a substantial amount of variance between principals validated the within-principal research design as a meaningful way to analyze principal time use. Overall, the findings provided evidence that time use trends existed within principals' days and were related to school level, locale, and total student enrollment.

School level, locale, total student enrollment, and FRL predicted variation in time allocation by activity type by day of the week. In the instructional model, student enrollment was a significant negative predictor of the differences on Mondays and rural locale was a significant negative predictor of the difference on Thursdays. Both in schools with greater than average student enrollment and rural contexts, principals may have been forced to spend their time on more emergent activities than improving the school's instructional programming. Demands specific to the schools' contexts may have superseded the principals' desires to engage in instructional activities. Furthermore, principals from schools with greater student populations may have relied on assistant principals or teacher leaders to lead instructional initiatives. In the organizational model, student enrollment was also significant positive predictor of differences on Mondays and middle school was a significant positive predictor of the differences on Wednesdays. The increase in organization time for principals in schools with greater than average student enrollment may have also accounted for the decrease in instructional time for

principals in similar schools on Mondays. Trends in routines by school level may also have contributed to differences in organizational time.

In the relational model, FRL and middle school were significant positive predictors of differences on Mondays, total school enrollment was a significant positive predictor of differences on Thursdays, and middle school, rural locale, and total student enrollment were significant predictors of differences on Fridays. Principals in potentially challenging contexts, including high rates of FRL, reported an increase in relational time on Mondays after the weekend when students were away from school. School level also influenced the trends of relational time across the week with elementary and high schools displaying a general positive trend, whereas middle school principals appeared to decrease the amount of time across the week. School locale did not explain variation until the end of the week when rural principals spent significantly more time on relational activities. Rural principals may have had more responsibilities to attend athletic competitions or social events at the end of the week in comparison to suburban principals. Overall, the findings provided evidence that school contextual factors, including school level, locale, and total student enrollment, accounted for variance in how principals' relational time.

The other time model also found FRL and middle school as significant negative predictors of time differences on Mondays and high school as a significant positive predictor on Fridays. However, the proportion of time spent on other activities was so small it was difficult to find practical significance in these findings. Although less substantial than the variance accounted for by the within day models, the weekly models accounted for 53% of the variance in the percentage of time spent on organizational activities, 27% of the variance in the percentage of time spent on organizational activities, and 15% of the time spent on relational activities.

Overall, the findings provided evidence that principals' days differed across the week and these differences were associated with school level, locale, total student enrollment, and FRL.

Chapter Five: Discussion and Implications

Introduction

After collecting data for one month in the fall of 2017 from a sample of non-urban principals, I found support for some findings from previous principal time use research but limited support for others. Grounded in over 100 years of research, I designed the study to contribute to the current conversation on how principals spend their time, as well as to explore the relationships between principal time use and school contextual factors including prior academic achievement, school level, locale, and student demographics. Specifically, I based the study's design on the work of four studies published in the past ten years (Goldring et al., 2008; Horng et al., 2010; May et al., 2012; Sebastian et al., 2017) (Appendix D). As the only study of the five to enroll principals from multiple school districts, the current study found more significant relationships between principal time use and school level, locale, and student demographics than previously discussed in the literature. Similar to Sebastian et al.'s (2017) findings, I also found significant variation within a principal's typical fall day and across a typical fall week. Although the comparison studies found significant relationships between student achievement and principal time use, the current study did not find relationships with either prior student achievement or the academic gain score used to indicate whether a school was out- or under-performing expected academic trends.

I structured the following chapter in three parts. First, I discussed the study's three major findings: the content and composition of the non-urban principal's day, within-principal variation across a typical day and over a typical week, and the relationships between principal time and school contextual factors. Then, I detailed the study's strengths and limitations. Finally, I concluded the chapter by outlining the study's implications and making recommendations for

principal practice, principal preparation programs, and the future direction of principal time use research.

Discussion

Content and composition. For over 100 years researchers have created a narrative of the principal's day as fast-paced, fragmented, and focused on administrative tasks. Relying on metaphor, researchers described the principal as a "lone-ranger" due to the amount of time the principal spent alone in his office or as a "firefighter" for the principal's responsibility to handle unexpected problems throughout the day (Spillane & Hunt, 2010). Whereas previously published principal time use research oversampled principals from large, urban districts, the purpose of the current study was to investigate whether this account remained consistent for non-urban principals. I hypothesized that non-urban principals allocated their time similarly to urban principals. In contrast, the study's findings suggested that principals often anticipated their activities and were able to proactively and evenly allocate their time between organizational, instructional, and relational activities. The study also found that non-urban principals' time was categorized by regular social interactions in multiple locations.

Activity type. Consistent with previous research (Buttram et al., 2006; Peterson, 1977), the current study found that principals spent the greatest proportion of their time on organizational activities (28%). However, the study's participants also spent similar time on instructional (24%) and relational (24%) activities. Although several studies have reported similar time use on relational activities (Goldring et al., 2008; Peterson, 1977), few studies have reported similar instructional time allocation. Instead, the study's findings were closer to the percentages of instructional time reported from principals on one-time surveys (Taie & Goldring, 2017). Plagued with validity threats, data from one-time surveys often reflected the amount of

time principals would ideally allocate to instructional activities (Smith & Andrews, 1989). The current study's finding on instructional time may have been the result of the month of the data collection. To establish a strong academic foundation, principals may have spent additional time on instructional tasks in the beginning of the school year (Brock & Grady, 1998).

However, like Goldring et al.'s (2008) "eclectic" cluster of principal, the non-urban sample distributed their time evenly across different activities. Eclectic principals tended to come from less disadvantaged schools and the researchers hypothesized that environmental stability allowed the principals to spend time on varied activities and leadership responsibilities. In comparison to large, urban districts, the schools in the current sample may not have had the same organizational challenges that forced previously sampled principals to allocate a high proportion of time to organizational activities and instead were able to more mindfully allocate their time across activities. Not only did these findings provide evidence that non-urban principals spent their time differently from previously sampled urban principals, high standard deviations and average differences in time allocation by level and locale indicated variation within the non-urban sample.

Professional standards. When recording the professional standard that defined their current activity, principals regularly perceived their tasks as fulfilling multiple standards. Not only did the standards help illuminate how principals spent their instructional, organizational and relational time, the responses also provided insight into the principals' intentions behind their activities. The use of multiple standards to define an activity indicated that principals thought complexly about the purpose of their actions. As an example, when engaged in instructional activities principals most often defined the task with the curriculum, instruction, and assessment standard. However, half of these responses were in concert with other standards. Out of all

responses recording the curriculum, instruction, and assessment standard, 19% also recorded the professional capacity of school personnel standard. 11% of responses were also categorized as community of care and support for students. These findings provided empirical evidence of how principals conceptualized their activities.

When responding with multiple standards, principals most often defined their activity as supporting the school's mission, vision, and core values. Principals categorized 25% of all instructional and organizational activities by the mission, vision, and core values standard. This finding may have indicated that a high proportion of principal time was spent on mission critical activities; however, it may have also revealed that principals used the mission, vision, and core values standard indiscriminately. Lack of specificity in a mission and vision may have inhibited school improvement efforts (Morphew & Hartley, 2006). In fact, less than 1% of the samples' responses were focused on school improvement. Additional qualitative data about the specific nature of principals' activities may have provided insight into the meaning behind the regular use of the mission, vision, and core values standard. Of note, the order of the standards on the survey may have also influenced participants' selections. Aligned with the most and least reported standards, the mission, vision, and core values standard was listed first and the school improvement standard was listed last.

Stakeholder interaction. Alone only 28% of the time, the current study found that principals were most often in the company of others. When interacting with stakeholders, principals spent the most time with small groups of teachers. Predictably, principals and teachers engaged in instructional activities over 40% of their time together. However, principals categorized only 2% of their time with teachers as relational. With the well-documented importance of strong relationships in organizations (Driscoll, 1978), the small proportion of

principal and faculty interactions focused on relational activities was surprising. Integral to school effectiveness and a positive school climate (Walstrom & Louis, 2008), Bryk and Schneider (2003) found principal respect and personal regard for teachers was associated with relational trust among all adult members of a school. Although I would have expected a higher proportion of time dedicated to relational activities with teachers, I did not over emphasize this data in my interpretation of the findings. The data may have underestimated the total relational time between principals and teachers as the data collection method was not effective in capturing short relational interactions. Practically, relational activities between teachers and principals could have occurred through short, informal conversations within interactions officially categorized as instructional or organizational. Principals may have focused on building interpersonal relationships during quick conversations in the beginning of instructional meetings or through greetings as they entered the building in the morning. Other factors, including time of the year, size of the school, and number of years teachers worked in the school, may have also contributed to the amount of time principals spent on relational activities with teachers.

After teachers, principals spent almost half their interactions with students (19%), district administrators (19%), and guardians (9%). When interacting with students and guardians, principals most often categorized their activities as relational. Considering the standards reported during these interactions, principals often spent this time in care and support of students and engaging with families to build interpersonal relationships. Early in the year, these types of interactions make logical sense as principals built the foundation for a success school year and may have been dealing with disciplinary issues. When interacting with district administrators, principals most often categorized their activities as organizational.

With students, district administrators, and guardians, a small proportion of interactions were reported as instructional. Although the greatest proportion of principal interactions were focused on instruction with teachers, this focus did not extend to students, district administrators, and guardians. For students and guardians, when dealing with discipline issues principals did not perceive their interactions as also pertaining to instructional issues. I specifically would have anticipated a higher percentage of time dedicated to instructional interactions between principals and district administrators. The low percentage of instructional interactions may be due to the time of the data collection and size of the school districts included in the sample. Instructional interactions with district administrators may have happened at other times during the year, particularly over the summer in preparation for the incoming school year. In addition, the sample consisted of principals working in districts that ranged from three schools to 22 schools. In small districts, instructional practices may not be as centralized as larger districts and the principals may have had more agency to implement and access instructional programming at the school level requiring fewer instructional interactions with district administrators.

Location. Similar to previous research, principals spent their time in multiple locations (Spillane & Zuberi, 2009). Although 42% of the total sample's time was spent in the office, the rest occurred in common spaces, classrooms, hallways, campus grounds, and off campus. Instructional activities occurred predominantly in classrooms but were also reported around 20% of the time principals were located in common spaces, the office, or off campus. Instructional activities rarely occurred in the hallway or other locations on campus. Principals engaged in organizational and relational activities in similar proportions in all locations, with the exception of less time devoted to both activities in classrooms.

Anticipated and initiated time. Although previous research indicated that principals' days were fragmented and interruption-driven (Kmetz & Willower, 1982; Peterson, 1977), the current study's findings indicated that principals overwhelmingly anticipated their interactions. As the instructional leader of the school, principals anticipated instructional activities more often than either organizational or relational activities. Although anticipated 68% of the time, I expected that principals would have anticipated a higher percentage of organizational tasks as they were defined as routine tasks executed to comply with state and federal regulations. However, principals may have also interpreted organizational tasks as those mandated from central office and consequently not anticipated all of the requests. As many relational activities were also categorized as community of care and support of students, the lower percentage of anticipated relational activities may have been the result of emergent student issues. The range of percentage of initiated activities between instructional, organizational, relational, and other time did not vary as widely as the range for anticipated time. The extent to which a principal initiated an activity may have been less related to activity type and more reliant on individual principal personality. Considered together, principals were anticipating and initiating almost half of all interactions and tasks. Counter to the previous narrative of a principal spending their day responding to unforeseen events, only 14% of principals' time was spent initiating an unanticipated activity. These findings suggested that principals were in control of the majority of their day. Another 22% of principals' time was anticipated but not initiated. As the leaders in their respective schools, but also responsible to district administrators, principals may not have had the authority to initiate a higher percentage of their time.

Despite a consistent narrative that principals' time was historically dominated by emergent administrative tasks, the current study's findings revealed that non-urban principals

evenly allocated their time across instructional, organizational, and relational activities. In addition, the sampled principals often anticipated and initiated their interactions. The study also found that principals' time was defined by a wide variety of professional standards. Most often in the company other others, principals spent the highest proportion of their time in the office. In addition to location, other factors, including the time of the year of data collection and personal characteristics, may have informed these findings. High standard deviations in average time allocation indicated that substantial variation existed in the sample. Additional analyses revealed trends in time use variation over the day and across the week, as well as the relationships between principal time use and specific school contextual factors.

Within-principal variation. From the prior systematic review that identified 55 empirical principal time use studies, only one article explored within-principal time allocation (Sebastian et al., 2017). Additional investigations of within-principal variation to identify daily and weekly trends in heterogeneous groups of principals was necessary to more fully understand the influence of school context on principal behaviors. Based on Sebastian et al.'s (2017) findings, I hypothesized that I would not find significant differences within principal time allocation across days of the week. I did, however, expect to find variation within a principal's day. The data provided support for half of my hypothesis. Clear trends existed over a principal's typical fall day. However, the models also found differences between the days of the week.

Between the hours of 7:00 and 19:00, principal time on instructional activities displayed an inverted "U" shape. Principals devoted only 19% of their time to instructional activities at the start of the school day, but this percentage increased until mid-day and peaked at 34%. After 13:00 instructional decreased with a sharp drop off after 17:00 when students and teachers were

no longer in the school buildings. Consistent with traditional school hours, time devoted to instructional activities was highest between 9:00 and 14:59. Seldom reporting instructional interactions when students were not present in the building, principals may have perceived instructional activities narrowly as only related to curriculum and assessment.

Although the final organizational model was entered with a fixed slope, the general time trend decreased throughout the day with the highest percentage of organizational time occurring between 7:00-9:00. Similar to instructional time, the organizational trend had a significant, but less severe, drop off in the evening at 17:00. Although principals spent less time on school related activities in the evening, 13% of their responses between 17:00 and 19:00 were still focused on organizational activities.

Similar in shape to instructional time, the relational time trend for a typical day also began with a low percentage of 22% and increased throughout the day until dropping off at 17:00. Whereas instructional time has already decreased by 15:00, relational time reached peak allocation between 15:00 and 16:59. Although quadratic trends were expected in all activities due to the hours of the study extending beyond the traditional hours of the school day, the increase in relational time between 15:00 and 16:59 indicated that principals were regularly interacting with stakeholders outside the constraints of the instructional day. As previously discussed, little of principals' relational time occurred in interactions with teachers. Instead, this time may have included after school meetings with parents, community members, or district administrators and attendance at sporting events or other extracurricular activities.

Counter to my previous hypothesis, the study's findings also indicated that principals' days differed across a typical fall week. Although organizational time differed between Mondays and Thursdays, relational time displayed the greatest differences with the lowest

percentage of time occurring on Mondays at 19% and each subsequent day significantly varying with a general positive trend throughout the week. In addition to these findings, the models for instructional, organizational, relational, and other time found significant variance components to support the addition of level-2 predictor variables to the models to investigate the relationship between principal time use and school context. High standard deviations in average principal time use by activity type indicated that there was substantial variance between principals. Descriptive statistics also revealed potential differences in time use by school level and school location. Although the models for instructional and other time did not initially report differences by day, the addition of school contextual variables to the models illuminated previously unseen trends in principal time use by day of the week.

Relationships between time and context. Despite theoretical claims of the importance of situational leadership, little empirical evidence has been published investigating the relationship between principal time use and school context. In studies exploring this relationship, researchers limited the sample of principals to a single school district in an attempt to provide evidence for a potential causal relationship. Instead of finding evidence that principal time led to changes in academic achievement, May et al. (2012) argued that the more plausible conclusion was that school context drove principals' activities and interactions. However, homogenous samples and abbreviated observational periods limited previous studies' ability to explore variance in principal time use. By enrolling a diverse sample of principals, the current study was able to investigate whether prior academic achievement, school level, location, and student demographics predicted variation in principals' instructional, organizational, relational, and other time. Confirming Louis et al.'s (2010) findings that contextual factors influenced

principals' behaviors, the current study's data indicated that school level, location, school size and FRL status significantly predicted variation in principal time.

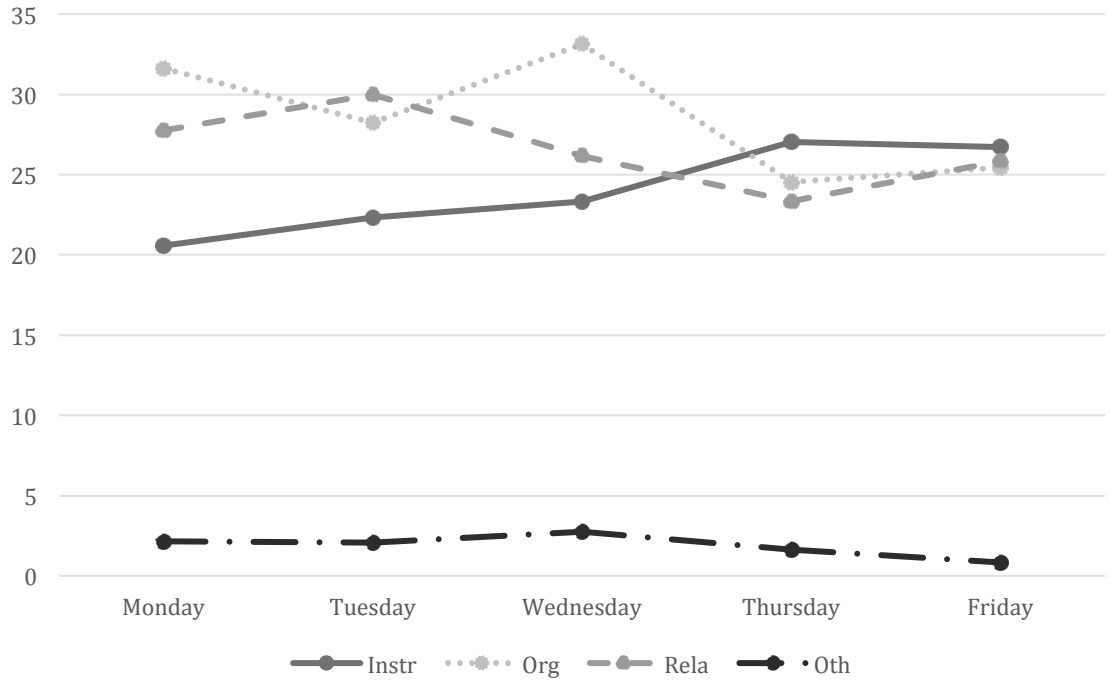
Middle school. Middle school principals' time differed from other principals' time both within the day and over the course of the week. In comparison to elementary school principals, middle school principals spent less time on instructional activities throughout a typical fall day. In particular, middle school principals' instructional time in the afternoon was five to seven percentage points lower than elementary principals. As previously discussed, the majority of instructional activities were categorized as the curriculum, instruction, and assessment standard. Although additional research would be required to identify differences in master schedules by school level, these data indicated that middle school afternoon schedules differed from elementary schools and may not have been conducive to instructional activities including evaluating teachers, classroom walkthroughs, and developing the educational program. The current study's data, in addition to Grissom et al.'s (2015) overall findings that high school principals spent less time on instruction than elementary principals, provided evidence that principals' instructional time varied by school level.

Middle school principals' time also varied across the week (Figure 21). In comparison to elementary school principals, middle school principals spent more time on organizational activities on Wednesdays, more time on relational activities on Mondays, and less time on relational activities on Fridays. Considered in concert with the average percentage of time use across the week, these data suggested that general weekly trends existed in middle school principals' organizational and relational time. With the exception of the peak on Wednesday, middle school principals' organizational time generally decreased throughout the week. In comparison, both elementary and high school principals' organizational time also displayed a

general negative slope throughout the week with the highest percentages of time occurring on Mondays and decreasing throughout the week. Middle school principals' relational time also generally decreased throughout the week. In contrast, elementary and high school principals' relational time displayed a general positive slope, with the lowest percentages of time occurring on Monday and increasing throughout the week.

Figure 21.

Middle School Time by Day of the Week

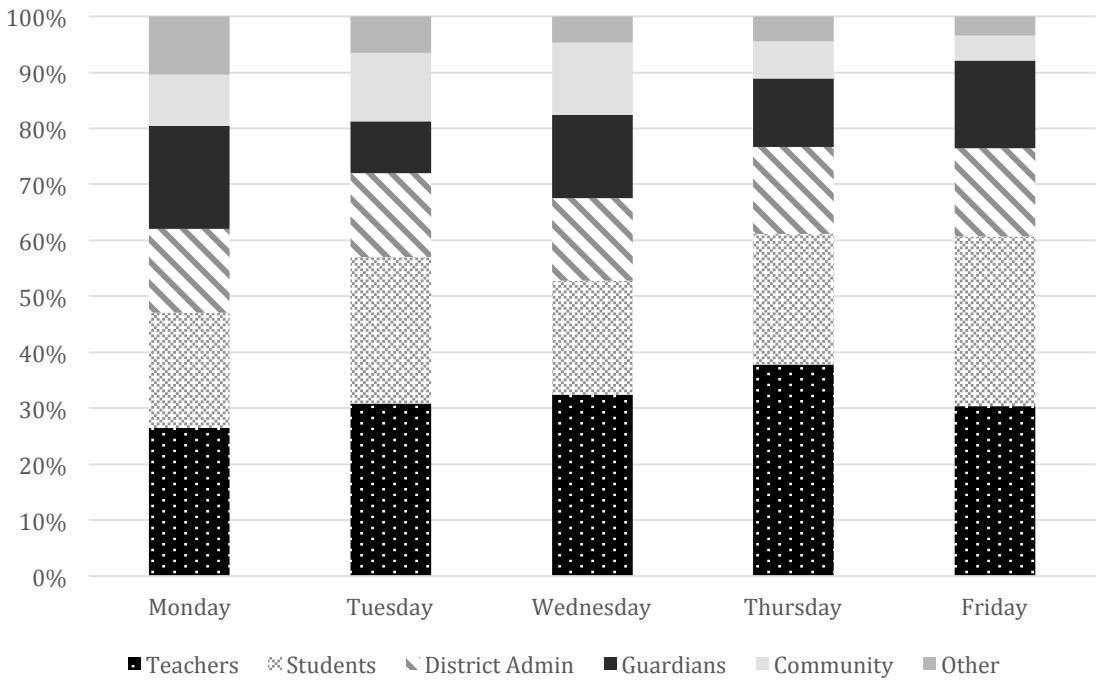


To better understand the differences in middle school relational time across the week, I also considered the proportion of stakeholder interactions during relational time (Figure 22). In comparison to Fridays, middle school principals spent a greater proportion of their relational time with guardians, community members, and other stakeholders on Mondays. As the professional standards used to describe these interactions consisted primarily of the community of care and support for students standard, follow-up interviews would be needed to provide

additional information about the specific nature of these interactions as well as the identity of the uncategorized stakeholders. Principals may have been interacting with guardians about events that occurred over the weekend or meeting with community members about events planned for the coming week.

Figure 22.

Middle School Relational Time by Day of the Week and Stakeholder Interaction



Rural locale. School locale was also a significant predictor of time variation within a principals' day and across a typical week. In comparison to suburban schools, the findings suggested that rural school principals spent an additional 3.53% of their time on other activities and this trend decelerated over the course of the day. Although the overall percentage of time categorized as "other" was relatively small across the entire sample, rural principals' time on other activities peaked at 9% between 13:00 and 15:00. As rural school principals may differ to their suburban counterparts with the amount of available administrative and facilities support

(Starr & White, 2008), the increase in other time may have resulted from rural principals having a broader set of responsibilities during the day. Analysis of the standards used to define this "other" time included representation of all ten standards so follow-up interviews would have been necessary to reveal additional information on the nature these activities and determine how rural principals' time varied from suburban principals throughout the day. Furthermore, additional research may have revealed that rural principals did not actually spent their time differently from suburban principals, instead that they perceived their time differently. Whereas a suburban principal may have perceived an activity as organizational, a rural principal may have perceived the same interaction as "other." Without identifying what activities were categorized as other, I was unable to determine additional trends.

Rural principals' time also varied across the week. In comparison to suburban principals, rural principals spent less time on instructional activities on Thursdays and more time on relational activities on Fridays. These differences may have been less about the specific days of the week and more indicative of differences in routine between rural and suburban principals. On average, rural principals spent less time than suburban principals on instructional activities throughout the entire week; however, the difference only became significant on Thursdays. With the rural schools' FAS ranging from 60 to 95 and 73% of rural schools underperforming their expected FAS, the rural sample had a range of school improvement needs that did not justify less time on instructional activities. Rural principals may not have devoted as much time to instructional activities because on average the rural school districts were smaller than suburban districts and employed less support staff. Rural principals may have focused their time on more time-sensitive organizational activities instead of instructional activities. Also, Duncan and Stock (2010) found that principal professional development needs in rural locales differed from

other areas. Rural principals may not have had the same tools to conduct instructional activities as principals in other locales.

Plots revealed that rural and suburban principals spent nearly identical time on relational activities during the week until Thursday, when rural principal increased their percentage to a peak of 34% on Friday. Comparison of stakeholder interactions and professional standards did not reveal differences in rural principals' relational time between days of the week. Although the data revealed rural principals spent more time on relational activities on Fridays in comparison to suburban principals, the findings did not indicate any reasons to explain the variance. Similar to Howley, Chadwick and Howley's (2002) findings on the influence of geographic isolation, the current study provided further evidence that rural locale influenced principal practice.

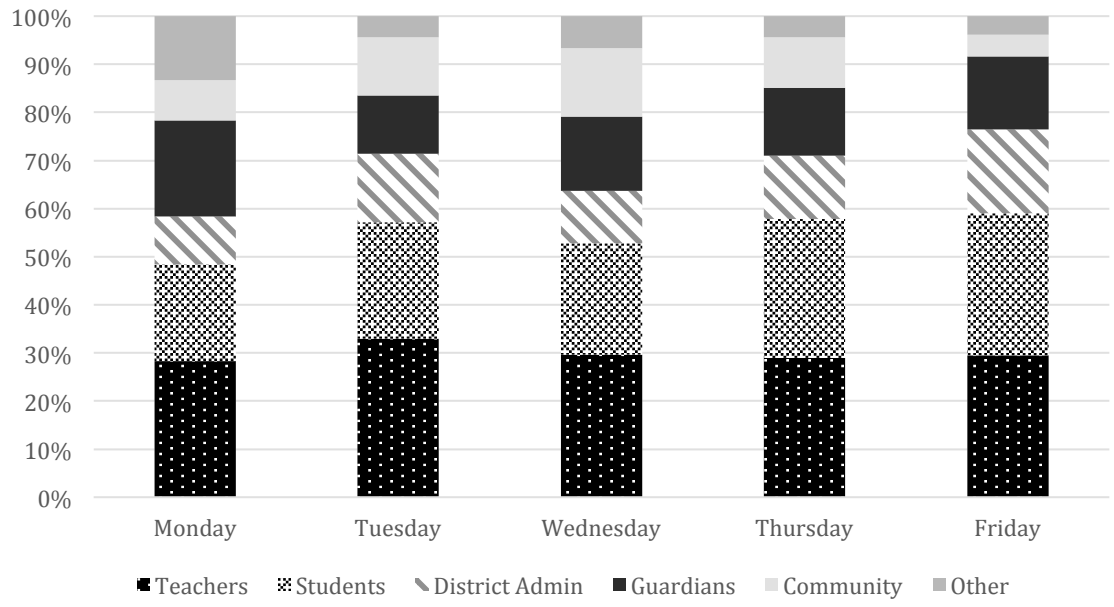
Total student enrollment. Total student enrollment was also a significant predictor of principals' time over the day and across the week. Principals in schools with a total student enrollment above the average enrollment for the entire study spent less time on instructional activities over the course of the day. The schools with above average student enrollments included six high schools, ten middle schools, and two elementary schools. In addition to being large, this entire sample of schools also employed assistant principals. The principals at these schools may have spent less time on instruction during the day because instructional leadership was distributed across the administrative team (Celikten, 2000; Spillane, Halverson, & Diamond, 2001). To provide additional insight into the differences in instructional time, future time use researchers should consider employing a sample of entire administrative teams.

In comparison to the average-sized school, principals in schools with large student bodies spent less time on instructional activities and more time on organizational activities on Mondays. They also spent more time on relational activities on Thursdays and Fridays. Considered

together, the time not spent on instructional activities on Mondays was categorized as organizational. As the head of the administrative team that included assistants, instead of the lone administrator, principals in large schools would have devoted more time to the management of their staff. Similar to the overall trend across the sample, principals in large schools also spent more time on relational activities throughout the week with significant increases on Thursdays and Fridays. The increased relational time on Thursdays and Fridays contained a higher proportion of time spent with students. In comparison to schools with average enrollment, principals of larger student populations would also have had an increase in both student discipline issues and student events, including artistic performances, athletic competitions, and social occasions. According to the data, principal interactions with students occurred in higher proportions on Thursdays and Fridays (Figure 23). This finding was likely the result of more student events scheduled later in the week.

Figure 23.

Total Student Enrollment Relational Time by Day of the Week and Stakeholder Interaction



The current study contributed to the canon of principal time use literature by finding significant relationships between principal time use and school context, including school level, locale, and total student enrollment. Although previous studies identified relationships between principal time and student achievement (Horng et al., 2010; May et al., 2012), the study did not find academic outcome variables to significantly predict principal time allocation to organizational, instructional, or relational activities. This discrepancy may be explained by the current study's sample and observational period. Whereas previously published time use literature employed samples of principals from single, highly urban school districts, this study's sample of principals hailed from 20 school districts ranging in locales from rural to small urban. School contextual factors may have accounted for the variance used by academic outcomes in previous studies. Additionally, the current sample may not have had the same range of variance in academic outcomes as previously sampled schools. The time of the data collection period may have also contributed to the non-significant relationship between time and academic outcomes. The current study only collected data for one month in the fall. A significant relationship between principal time use and academic outcomes may have presented at difference times of the school year. Although two previous studies (Horng et al., 2010; May et al., 2012), found principal time use to significantly predict academic outcomes, the current study's findings supported Martinko and Gardner's (1983) argument that few significant relationships occurred between principal time use and prior academic achievement.

Strengths and Limitations

The strengths of the study laid in the sample, observational period, data collection method, and statistical analyses. Whereas the majority of published principal time use research sampled principals from large urban districts, the current study sampled principals from

predominantly non-urban areas in districts with fewer than 14,000 students. In addition, previous researchers sampled principals from single districts to reduce validity threats and provide evidence for the likelihood of a causal relationship. Instead, the current study sampled 61 principals from 20 school districts to investigate the relationship between time use and school context. To collect data to investigate a principals' typical day and week, the observational period spanned weekdays from 7:00 to 19:00 for four consecutive weeks in the fall. Previous researchers most often collected data for a single week within traditional school hours. In contrast to observational methods, employing ESM allowed data collection for a large sample of participants in multiple locations and avoided the influence of an observer. With a median of 33 seconds and a mean of 88 seconds, the response time and overall response rate of 74% provided additional evidence that ESM was neither burdensome nor time consuming to principals' daily routines. Instead of analyzing between-principal variation, I ran two-level hierarchical linear and non-linear growth models to explore the within-principal variation over a typical fall day and across a typical fall week. The confluence of these factors in a single study contributed to the principal time use literature by stressing the importance of school context's interaction with leadership behaviors and providing evidence for how non-urban principals allocated their time.

The current study also had limitations. I identified four weaknesses for further consideration: the limits of the observational period, the constraints of ESM, the dependence on technology, and the threats to statistical validity. First, although the observational period captured principal time spent on planning, preparation, and other activities outside the traditional school day, restrictions from approving superintendents limited the observational period. In initial conversations aimed at recruiting the sample, superintendents were reticent to allow principals to enroll in a study that required participation outside of school hours. Although

principals often work late into the evening and on weekends (Hochbein et al., 2017), the current study did not capture this time, resulting in the potential for underestimation of the average total percentage of time use. In addition, although I collected longitudinal data and ran hierarchical linear and non-linear growth models, the data were operationalized as principal time use on a typical fall day and week. The findings were specific to the fall timeframe and could not be generalized to other times in the school year.

Second, although previous research documented ESM's ability to capture routine data, the methodology had not been proven to sufficiently capture exceptional or emergent activities (Spillane & Hunt, 2010). Consequently, the use of ESM may have missed documenting important elements of the principals' workday. Furthermore, to minimize response time, the survey instrument did not require the participants to describe the nature of their activity. Without additional details, I was unable to analyze the specificity or quality of the participant's behaviors.

Third, the design of the study required the participants to use their personal smart phones. Lack of access or desire to continuously carry a smart phone precluded principals from participation in the study. One participant withdrew from the study citing insufficient internet access, while two other participants noted slow internet speeds as a contributing factor to their low response rates. Additionally, participation required the ability to quickly and easily negotiate the Remind app, a web browser, and the Qualtrics survey. At least two interested principals declined to enroll in the study due to the technological requirements. Without technological ease, principals found participation in the study overly burdensome and disruptive to their daily routine.

Finally, the main statistical limitation of HLM was the requirement of large sample sizes. Although I had sufficient power to run the planned analyses, my sample sizes were substantially

smaller than several recently published principal time use studies (Grissom et al., 2013; Goldring et al., 2015). The sample size, disaggregated into three categories of school level and four categories of school locale, introduced threats to statistical validity. As an example, although a model found a significant relationship between organizational time and urban locale, the finding did not hold practical significance because the urban sample was based on only three schools. In addition, the study was limited by analyzing each outcome variable individually. Multivariate hierarchical linear modeling would have allowed the simultaneous analysis of instructional, organizational, and relational time and may have provided additional insights into the relationships between time and school context. There were also statistical limitations based on the decision to exclude non-significant variables from the final models. Due to the sample size and number of variables of interest, I chose to drop non-significant variables from the models to maximize the available variance. However, the exclusion of non-significant variables led to variation in reference categories and control variables, and threatened the ability to interpret results across models.

Implications and Recommendations

Principal practice. Despite these limitations, the study had implications for principal practice, principal preparation programs, and future principal time use research. Increased understanding of how principals spend their time offered the potential for improved principal practice. Using ESM to collect time use data allowed the sampled principals to quickly receive data about their daily work behaviors and interactions. By becoming more aware of their personal practice, principals could evaluate their leadership behaviors and reflect on the effectiveness of their time use. In the future, principals could use this information in professional goal-setting and evaluation.

In addition to gaining a better understanding of how principals spent their day, the study's design also offered the possibility to gather data on entire school-level or district-wide administrative teams. When initially meeting with superintendents to receive permission to invite principals to participate in the study, several superintendents expressed interest in using the study's findings to assess district-wide initiatives. As an example, one superintendent wanted access to his district's principals' data on total instructional time to help evaluate an existing district goal of improving student achievement. Another superintendent questioned if the study could accommodate additional survey questions to document how much time his district's elementary principals dedicated to implementing a new literacy program. Although outside the purview of this study, using ESM to collect time use data promised to be a powerful method to evaluate individual, school-level, and district-wide leadership practices.

Preparation programs. The study also highlighted the importance of researcher-practitioner partnerships between universities with principal preparation programs and school districts (Goldring & Sims, 2005; Kirschenbaum & Reagan, 2001). By gathering data that was practically useful to participants, area superintendents and principals were eager to participate in the study. In the future, similar research designs should include questions that are practically relevant to educational practitioners. By building the study's sample through a university consortium of school districts and actively engaging practitioners in the research process, I had access to more detailed and a larger volume of data. The inclusion of a large sample of principals from multiple school districts allowed adequate power and variation in the data to identify significant relationships between principal time use and school context. Consequently, the study's findings provided empirical evidence of the importance of situational leadership.

These findings, facilitated through a researcher-practitioner partnership, offered the possibility to inform principal preparation programs.

An increased understanding of the relationships between principal time use and school context may help guide the development of principal preparation programs. In addition to ensuring that preparation programs are teaching prospective principals to effectively manage their time between the organizational, instructional, and relational demands of the principalship, universities have a responsibility to train principals for the specific routines and practices of the role dictated by school level, locale, and the needs of the student demographics. As an example, the University of Virginia School Turnaround Program specializes in building capacity and providing principals with the skills and resources necessary to lead and improve persistently low achieving schools (Hochbein & Mahone, 2017). Similarly, principal preparation programs should train aspiring principals for the particular demands of the middle school principalship. The current study's findings revealed that middle school principals' daily and weekly schedule differed from their elementary and high school counterparts. Prospective middle school principals must be trained to meet the organizational demands of the middle school environment. Similarly, programs should also focus on preparing principals for the broad range of responsibilities delegated to rural principals. By focusing on the influence of situational leadership, universities have an opportunity to develop and evaluate their principal preparation programs based on the specific contextual needs of prospective principals.

Future research. Based on the study's findings, I recommended three areas for consideration in future principal time use research. First, although the current study gathered data from 7:00 to 19:00, future research should employ longer observational periods. Although instructional, organizational, and relational time decreased by the end of the daily observational

period, principals were still engaging in school-related activities 37% of the time. To fully capture the principal experience, observational periods should begin earlier in the morning, stretch further into the evening, and include weekends. Furthermore, the current study only collected data for one month in the fall. To understand variation and time trends throughout the school year, the study should be replicated in the spring and summer.

Second, as the current findings differed from previously published research and demonstrated variation within the non-urban sample, future principal time use research should employ large, heterogeneous samples. Including an adequate number of rural, town, suburban, and urban principals in the sample would allow statistical models to identify additional variation. Instead of gathering principals by region, a state-wide sample would provide consistency in the availability of school contextual factors yet heterogeneity in the sample. Both out of convenience and a desire to improve urban education, previous principal time use researchers almost exclusively sampled principals from large, urban districts. Moving forward, researchers need to be specific about filling the gaps in principal time use literature and focus on sampling under-represented principal populations.

Third, future research should move beyond mere time allocation and investigate the specificity and quality of leadership behaviors. To minimize the time needed to complete the survey instrument and encourage a high response rate, I limited the survey to six multiple choice questions. However, multiple choice questions did not yield rich, descriptive information on the nature of the principals' activities. Future research designs should consider a mixed methods approach, where after collecting principal time use data, the researcher interviews the participants to learn more about their behaviors. Researchers may also consider creating instruments that gather additional details about principals' activities and interactions.

Furthermore, a mixed methods or qualitative approach to studying principal behaviors would allow researchers to investigate questions of the relationship between the principals' intentions behind practices and school contextual factors, including academic achievement.

Conclusion

The current study responded to threats of external validity in the existing principal time use literature. I hypothesized that the over-emphasis of principals from large, urban districts in previous samples contributed to gaps in understanding about how principals spent their time. Although the study provided support for prior findings on principals' time by location and stakeholder interactions, the data suggested that the non-urban sample more evenly distributed their time between instructional, organizational, and relational activities than previously reported. Additionally, in contrast to the common narrative of principals' spending the majority of their day responding to emergent issues, the sampled principals overwhelmingly anticipated and initiated their daily activities. By documenting the content and composition of non-urban principals' time, the study advanced the boundaries of the current knowledge of principal behaviors.

Although previous researchers almost exclusively employed inferential statistics to explore time use differences between principals, the current study also examined time use differences within hours in the day and days of the week. Multilevel modeling identified clear trends across the non-urban principals' day. The study also found differences between days of the week. Whereas previous research reported limited support for the influence of school contextual variables on principal time, the current study's data indicated that school level, locale, and total student enrollment explained differences in principal's daily and weekly routines.

These significant findings illustrated the role school context played in how principals allocated their time.

Contributing to the literature on the relationships between school context and principal practice (Goldring et al., 2008, Louis et al., 2010), the study identified significant contextual predictors to variation within a principals' typical fall day and across a typical fall week. Principals' days differed according to school level, locale, and total student enrollment. As powerful agents of educational reform, Louis et al. (2010) argued that principals' success depended on "the ability of leaders to adapt their practice to the circumstances in which they find themselves" (p. 94). Increased understanding of situational leadership offered the potential for improved principal practice, as well as more focused principal preparation programs. Moving forward, researchers should continue to consider the influence of school context in their investigations of the intentions, specificity, and quality of principal behaviors.

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Appendix A: Introductory Letter with Survey Questions and Responses

September 5, 2017

Abby Mahone
Lehigh University, College of Education
111 Research Drive
Bethlehem, PA 18015

Dear Principals and Assistant Principals:

My name is Abby Mahone and I am a doctoral student at Lehigh University. For the past two years, Dr. Craig Hochbein, Dr. George White, and I have researched how principals spend their time. After completing a systematic review of over 100 years of principal time use research, we have also conducted studies on principals in community schools and career and technical institutes.

Many researchers have tried to find a connection between how principals allocate their time and student outcomes. We've discovered, however, that few researchers have taken the time to study rural and suburban principals, instead focusing solely on the role of the urban principal. As you know, the majority of principals in Pennsylvania work in rural and suburban schools. After 100 years of research, there is actually little documentation on how non-urban principal spends their time. As part of my dissertation research, I am interested in surveying principals in our area to learn more about how they spend their time. I hope you will consider participating!

Beginning on October 2, the principals participating in the study will receive five, randomly timed text messages throughout the day asking them to complete a short survey. The study is scheduled to run Monday through Fridays from October 2 to 27. The following link will take you to an example of a survey we used in a previous study:

https://lehigh.co1.qualtrics.com/jfe/form/SV_ePfaWFdNRas8yRT

In past studies, the majority of principals have finished the survey questions in less than 30 seconds, with a total commitment time of less than 3 minutes a day. Participating principals have been able to answer the survey around 80% of the time they receive a notification and anecdotally report that participation in the study did not interfere with their workday.

In order to participate, you will need to complete the informed consent form and provide the phone number for the phone you carry during the school day. At the conclusion of the study, I will provide you will both your individual time use data as well as the overall findings from the study. Previous participants have found the data to be useful in reflecting on their practice as well as setting professional growth goals. If you have any questions, please do not hesitate to contact me at either asm208@lehigh.edu or 717.802.0915.

Gratefully,
Abby Mahone

SURVEY QUESTIONS AND RESPONSES

Assessing the Influence of School Context and Academic Outcomes on Principal Time Use

1. How would you categorize your current activity?

a. **Not School Related**
b. **Organizational**: Routine administrative duties and tasks executed to comply with state and federal regulations, as well as oversee the functioning of the school.
c. **Instructional**: Activities aimed at promoting, supporting, and improving the implementation of curricular programs in classrooms.
d. **Relational**: Tasks related to building strong interpersonal relationships within the school as well as working with stakeholders beyond the school house doors.
e. **Other**: Any activity that does not fall within the above categories.

2. Which standards define the nature of your activity?

a. **Mission, Vision, and Core Values:** Effective educational leaders develop, advocate, and enact a shared mission, vision, and core values of high-quality education and academic success and well-being of each student.
b. **Ethics and Professional Norms:** Effective educational leaders act ethically and according to professional norms to promote each student's academic success and well-being.
c. **Equity and Cultural Responsiveness:** Effective educational leaders strive for equity of educational opportunity and culturally responsive practices to promote each student's academic success and well-being.
d. **Curriculum, Instruction, and Assessment:** Effective educational leaders develop and support intellectually rigorous and coherent systems of curriculum, instruction, and assessment to promote each student's academic success and well-being.
e. **Community of Care and Support for Students:** Effective educational leaders cultivate an inclusive, caring, and supportive school community that promotes the academic success and well-being of each student.
f. **Professional Capacity of School Personnel:** Effective educational leaders develop the professional capacity and practice of school personnel to promote each student's academic success and well-being.
g. **Professional Community for Teachers and Staff:** Effective educational leaders foster a professional community of teachers and other professional staff to promote each student's academic success and well-being.
h. **Meaningful Engagement of Families and Community:** Effective educational leaders engage families and the community in meaningful, reciprocal, and mutually beneficial ways to promote each student's academic success and well-being.
i. **Operations and Management:** Effective educational leaders manage school operations and resources to promote each student's academic success and wellbeing.
j. **School Improvement:** Effective educational leaders act as agents of continuous improvement to promote each student's academic success and wellbeing.

3. With what type of educational stakeholder are you currently interacting?
For question three, participants will record with how many district personnel, teachers, students, non-school educators, guardians, community members, and other stakeholders they are currently interacting.

4. Where is this activity taking place?
For question four, participants will choose between the following locations: office, hallway, common space, classroom, grounds, district building, or off campus.

5. Was this activity anticipated?
For question five, participants will choose between yes and no.

6. Did you initiate this activity?
For question six, participants will choose between yes and no.

Appendix B: Consent Form

CONSENT FORM

Assessing the Influence of School Context and Academic Outcomes on Principal Time Use

You are invited to be in a research study that examines the usage of time by school administrators over the course of one month. You were selected as a possible participant because of your role as a school administrator in eastern Pennsylvania. We ask that you read this form and ask any questions you may have before agreeing to be in the study.

This study is being conducted by: Abby Mahone, graduate student, Educational Leadership Program in the College of Education at Lehigh University
Dr. Craig Hochbein, Assistant Professor, Educational Leadership Program in the College of Education at Lehigh University
Dr. George White, Professor, Educational Leadership Program in the College of Education at Lehigh University

Purpose of the study

The purpose of this study is to examine the usage of time by school administrators and investigate the relationship between time use and school context.

Procedures

If you agree to be in this study, we would ask you to do the following things:

1. Respond to a silent prompt from the Remind app on your phone reporting your current activity. This will occur no more than 5 times per day between the hours of 7:00 a.m. and 7:00 p.m. during school days in the month of October.
2. When prompted by the Remind app, respond online to the following six questions:
    a. How would you categorize your current activity?
    b. Which standards define the nature of your activity?
    c. With what type of educational stakeholder are you currently interacting?
    d. Where is this interaction taking place?
    e. Was this interaction anticipated?
    f. Did you initiate this activity?

Risks and *Benefits* of being in the study

Possible risks:

Because of the random notification format, a small likelihood exists that participants could be prompted during meetings with sensitive content information.

The benefits to participation are:

Participants of the study could obtain a better understanding of how much time they spend in their role as a school administrator, as well as how they spend that time.

Compensation

There will be no compensation for participation in the study.

Confidentiality

The records of this study will be kept private. Research records will be stored securely and only researchers will have access to the records. In any sort of report we might publish, we will not include any information that will make it possible to identify the school or individual subjects. However, given the small sample size and the fact that

the subjects know each other, the subjects may be able to identify one another even when not individually identified in published materials or reports.

Voluntary Nature of the Study

Participation in this study is voluntary:
Your decision whether or not to participate will not affect your current or future relations with Lehigh University. Additionally, your decision whether or not to participate will not affect your current or future employment in your school district. If you decide to participate, you are free to not answer any questions or withdraw at any time without affecting your relationship with Lehigh University or your school district.

Contacts and Questions

The researchers conducting this study are:
Dr. Craig Hochbein, Dr. George White, and Abby Mahone. You may ask any questions you have now. If you have questions later, **you are encouraged** to contact them at 111 Research Drive, Bethlehem, PA, (610) 758-6249, or via email at craig.hochbein@lehigh.edu, gpw1@lehigh.edu, and asm208@lehigh.edu.

Questions or Concerns:
If you have any questions or concerns regarding this study and would like to talk to someone other than the researcher(s), **you are encouraged** to contact Naomi Coll at 610-758-3021 (email: inors@lehigh.edu) of Lehigh University's Office of Research and Sponsored Programs. All reports or correspondence will be kept confidential.

You will be given a copy of this information to keep for your records.

Statement of Consent

I have read the above information. I have had the opportunity to ask questions and have my questions answered. I consent to participate in the study.

Signature: _____ Date: _____

Print Name: _____

District: _____

School: _____

Position: _____

Work Cell Phone: _____

Email Address: _____

Signature of Investigator: _____ Date: _____

Appendix C: Survey

How would you categorize your current activity?

- Not School Related
- Organizational
- Instructional
- Relational
- Other

Which standards define the nature of your activity?

- Mission, Vision, and Core Values
- Ethics and Professional Norms
- Equity and Cultural Responsiveness
- Curriculum, Instruction, and Assessment
- Community of Care and Support for Students
- Professional Capacity of School Personnel
- Professional Community for Teachers and Staff
- Meaningful Engagement of Families and Community
- Operations and Management
- School Improvement

With what type of educational stakeholder are you currently interacting?

- Teachers
- Students
- District Administrators
- Guardians of Students
- Community Members
- Other

Where is this interaction taking place?

- Office
- Hallway
- Common Space
- Classroom
- Grounds
- Off Campus

Was this activity anticipated?

- Yes
- No

Did you initiate this activity?

- Yes
- No

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Appendix D: Comparison Research

Table 21.

Comparison of Current Study with Similar Principal Time Use Research

	Current Study	Goldring et al. (2008)	Horng et al. (2010)	May et al. (2012)	Sebastian et al. (2017)
Participants	61 principals,	46 principals,	65 principals,	39 principals,	68 principals,
Context	20 districts	1 district "Cloverville"	1 district Miami-Dade	1 district "Cloverville"	1 district "Cloverville"
Observation Period	20 consecutive days	5 consecutive days	1 day	36 non-consecutive days	28-36 non-consecutive days
Data Collection	ESM	Daily Instrument	Observations	Daily Instrument	Daily Instrument
Statistical Analysis	HLM	Cluster and Discriminant Analysis	Regression Analyses	HLM	HLM
Time Variation	Sig. hour and day variation				Sig. hour, day, and semester variation
Academic Variation	None found	Eclectic principals tend to come from schools with higher academic press and higher student engagement	Ave. achievement level + associated with time spent on instructional activity and organizational management, and - associated with administrative	Ave. achievement level + associated with time spent on finances and personnel issues, and – associated with planning and setting goals and instructional leadership	Ave. achievement level + associated with time spent on finances and community, and - associated with instructional leadership
Level Variation	For MS principals, Instructional time varied over the day and organization,	Eclectic principals tend to come from ES.	None found		ES principals spent a greater proportion of their day alone

	relational, and other time varied across the week.			
Locale Variation	For rural principals, other time varied over the day and instructional and relational time varied across the week.			
Student Variation	Enrollment predicted variation in instructional time over the day and instructional, organization, and relational time across the week.	Eclectic principals tend to come from schools with lower % of disadvantaged students and medium student enrollment	High % of black students and FRL predicted more time on administrative activities	Enrollment predicted a greater proportion of principal time working alone

Vita

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Lehigh University, College of Education 717.802.0915 (phone)
111 Research Dr., Iacocca Hall A215 610.758.3227 (fax)
Bethlehem, PA 18015

Education

Lehigh University
College of Education, Educational Leadership
Ed.D. in Educational Leadership, *Projected Graduation May 2018*

M.Ed. **Lehigh University**
College of Education, Comparative and International Education
Globalization and Educational Change, May 2010

B.A. **Muhlenberg College**
Theatre, May 2003
Phi Beta Kappa, Magna Cum Laude

Work Experience

2015- **Lehigh University, College of Education,** Bethlehem, PA
Graduate Assistant for Dr. Craig Hochbein

2010-2011 **Seven Generations Charter School,** Emmaus, PA
Lead Fifth Grade Teacher
Faculty Liaison to the Board of Directors

2003-2010 **The Swain School**, Allentown, PA
Student Activities Coordinator
History Department Chair
Fourth Grade Teacher
Director of the Theatre Arts Program

2003-2011 **Muhlenberg College**, Allentown PA
Lecturer
Director

Honors and Awards

2017 *Clark Seminar Participant*, University Council for Educational Administration

Publications

Hochbein, C. & Mahone, A. (2017). The failure fallacy: Examining the rate of school turnaround. In *Enduring myths that prohibit school turnaround.* Charlotte, NC: Information Age Publishing.

Hochbein, C. & Mahone, A. (2016, May 27). Examining the added value of value-added models. *Education Week*. Retrieved from http://blogs.edweek.org/edweek/op_education/2016/05/examining_the_added_value_of_vam.html

Presentations

Mahone, A. (November, 2017) The Influence of School Context and Performance on Principal Time Use. Roundtable presented at the Graduate Student Seminar at the University Council for Educational Administration (UCEA) Annual Conference, Denver, CO.

Mahone, A. & Hochbein, C. (November, 2017) Smart Schools: Developing Data Collection Technology to Improve the Study and Operation of Educational Organizations. Ignite session presented at the University Council for Educational Administration (UCEA) Annual Conference, Denver, CO.

Mahone, A., Hochbein, C., & Vanderbeck, S. (April, 2017). A systematic review of principal time use research: Examining methodology, constructs, and external validity. Poster presented at the annual meeting of the American Educational Research Association (AERA), San Antonio, TX.

Mahone, A. & Hochbein, C. (January, 2017). A systematic review of principal time use research: External and construct validity. Poster presented at the International Congress for School Effectiveness and Improvement (ICSEI) Annual Conference, Ottawa, ON.

Mahone, A., Hochbein, C., & Vanderbeck, S. (November, 2016). Examining the construct validity of principal time use research. Paper presented at the University Council for Educational Administration (UCEA) Annual Conference, Detroit, MI.

Hochbein, C., Mahone, A., & Vanderbeck, S. (November, 2016). A systematic review of principal time use research sampling and observation periods. Paper presented at the University Council for Educational Administration (UCEA) Annual Conference, Detroit, MI.

Vanderbeck, S., Mahone, A., & Hochbein, C. (November, 2016). A systematic review of principal time use research. Paper presented at the University Council for Educational Administration (UCEA) Annual Conference, Detroit, MI.

Grants Awarded

2016 Hochbein, C. & Mahone, A. (Co-Investigator). *Smart Schools: Developing Data Collection Technology to Improve the Study and Operation of Educational Organizations.* Lehigh University Mountaintop Experience, $10,000.

Professional Memberships

American Educational Research Association
University Council for Educational Administration
International Congress for School Effectiveness and Improvement