UNDERSTANDING TEACHER-STUDENT RELATIONSHIPS AND TEACHERS' PSYCHOLOGICAL ADJUSTMENT AS MULTIFACETED AND CO-DEVELOPING CLASSROOM PROCESSES

A Dissertation

Presented to

The Faculty of the Curry School of Education and Human Development

University of Virginia

In Partial Fulfillment

Of the Requirement for the Degree

Doctor of Philosophy

---

by

Catherine M. Corbin, M.A.

May 2020

Catherine Corbin
Department of Education Leadership, Foundations, and Policy
Curry School of Education and Human Development
University of Virginia
Charlottesville, VA

APPROVAL OF THE DISSERTATION

This dissertation, ("Understanding Teacher-Student Relationships and Teachers' Psychological Adjustment as Multifaceted and Co-Developing Classroom Processes"), has been approved by the Graduate Faculty of the Curry School of Education and Human Development in partial fulfillment for the degree of Doctor of Philosophy.

_____
Dr. Jason T. Downer (Chair)

_____
Dr. Patricia A. Jennings

_____
Dr. Erik A. Ruzek

_____
Dr. Joanna Lee Williams

_____
Dr. Joshua L. Brown (Fordham University)

_____Date

DEDICATION

I dedicate this work to my parents, Doug and Margaret, who have been unwavering in their support of me, both when easy and very, very hard. Your lessons in perseverance, humility, kindness, openness, and unconditional love flow through me every second of every day, and color all that I do including this work.

This work is also dedicated to my siblings (Wes, Sean, and Becky), who are unmatched in their brilliance, wit, determination, and most importantly, in their capacity to love. I am nothing if not the reflection of each of you – a fact that humbles me, and for which I am eternally grateful.

ACKNOWLEDGEMENTS

Many people have loved, supported, and guided me into this moment, and thus this work into existence. I'm grateful for the chance to acknowledge them here.

My path through this Ph.D. has been lit by several amazing mentors. Chief among them is my advisor, Jason Downer. In addition to being brilliant – he has the uncanny ability to jump ten thoughts ahead of you and catch that pitfall before you even know you should be looking for one –, he is kind and he is just. I have grown immeasurably as a result of his patience, generosity, and humility, and I am grateful for all of his support these past five years. Erik Ruzek stepped in as a second mentor and has taught me more about methods than I ever thought I could learn, especially that checking the small things pays off in spades. Sara Rimm-Kaufman was my teaching mentor, and created a warm and supportive space for me to feel insecure and unsure – exactly the space where learning happens. Joshua Brown's mentorship has also been instrumental to my doctoral experience. His ability to enact the social-emotional skills and practices he studies to create environments supportive of learning and growth has been inspiring to me. I would also like to thank Tish Jennings and Joanna Williams for sharing their time and expertise as members of my dissertation committee. Each of these women sees the world in systems, and their willingness to share that lens with me has been invaluable on my journey. There were many other faculty and project staff that supported me in ways big and small. In alphabetical order: Nica Basuel, Leslie Booren, Julie Broderick, Jamie DeCoster, Nancy Deutsch, Jennifer LoCasale-Crouch, Amy Lowenstein, Luke Miller, Natalia Palacios, Dick Reppucci, and Amanda Williford.

A very heartfelt and special thanks to my cohort-mate Pilar Alamos. I have a hard time imaging this experience without her. She pushed me to be better, while allowing me space to fall apart. I'm better – in so many ways – for having known and worked alongside her. I am also appreciative of Ashley, Ann, Chelsea, Christina, Fran, Haley, Jaclyn, Jasmin, Karen, Katie, Kelsey, Maria, Mark, Miray, Nicole, Shannon, Tatiana, Theresa M., Theresa P., and all of my other EP-ADS/Ed Policy peers and lab-mates.

I have also had the honor of being supported by several remarkable women. To Erika, Leann, Erin, Jessie, Dana, Jamie, Rachel, and Michelle: Thank you for growing (often stumbling) into and through adulthood with me. Your friendships have given me the privilege of having the most awe-inspiring intelligence, strength, tenderness, drive, and love reflected back at me. I am the woman I am today due in no small part to each of you. I would also like to thank my sisters-in-law, Bethany and Melanie, for modeling vulnerability and strength in effortless combination. I'm a better, more compassionate person because of both of you.

This journey brought unexpected support in the form of my partner, Allan. He has been an endless source of joy in my life, and I would not have made it through this process nearly as intact without his encouragement. He participated in countless hours of conversation about my research, and always provided a shoulder to cry on and a companion to laugh with. The bottomless hugs and hours of pinball weren't so bad either.

None of this would have been possible without the support of my family. I have extraordinary parents whose love and belief in me has carried me through many storms and into many celebrations. Thank you to my sister, Becky, for being my partner-in-crime. Her visits, tattoo excursions, phone calls, well-timed meme texts, and more brought a beautiful lightness to this process. Thanks also to my brother, Wes, who has always treated me as an intellectual equal, when all evidence is to the contrary.

Finally, I've waited my entire adult life to have the opportunity to publicly acknowledge my brother, Dr. Sean Epstein-Corbin, without whom my life's trajectory would look very different. You took on many roles that shaped me over the years – tutor, teacher, editor, advisor, confidant, therapist, cheerleader, and friend. You convinced me my shortcomings were only shortcomings because I believed others that named them as such, and with patience and grace, you pushed me to expect and be more than I ever would have imagined possible in your absence. From the very bottom of my heart, thank you.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

Page

Linking Document

Elementary school classrooms are critical contexts of development for students. Research indicates that students entering third grade below reading level are at disproportionate risk of persistent underachievement in math (Grimm, 2008), which has been associated with fewer years of college completion (Lee, 2012) and decreased lifetime earnings (Murnane, Willett, & Levy, 1995). Developmental systems theory (DST; Lerner, 1998), and the prosocial classroom conceptual framework (Jennings & Greenberg, 2009) more specifically, posit that students' academic and social-emotional achievement are influenced through myriad contextual factors including, though not limited to, teacher-student relationships and teachers' psychological adjustment. Indeed, empirical work has begun to amass showing both to be integral for elementary students' success in school (Klusman, Richter, & Lüdtke, 2016; O'Connor & McCartney, 2007). For example, achievement has been observed to decrease among students whose teachers reported high or increasing relational conflict across grades K-5 (Spilt, Hughes, Wu, & Kwok, 2012) and diminished psychological adjustment (McClean & O'Connor, 2015).

Despite mounting evidence highlighting the importance of teacher-student relationships and teachers' psychological adjustment for students' development, questions remain about how these features of the classroom environment develop and relate to one another. Guided by DST (Lerner, 1998) and the prosocial classroom framework (Jennings & Greenberg, 2009), this dissertation comprises three manuscripts that aim to address these gaps in knowledge by investigating teacher-student relationships and teachers' psychological adjustment as multifaceted and co-developing classroom processes. The following sections use DST and the prosocial classroom to situate teacher-student relationships and teachers' psychological adjustment within the broader context in which each develops, relying on more targeted theories

to outline expectations of specific processes and mechanisms through which change might occur – an approach that motivates the prioritization of multiple informants and multidimensional definitions that characterize the three manuscripts of this dissertation.

Understanding Classrooms as Dynamic Educational Settings

Developmental systems theory (DST; Lerner, 1998) postulates that individuals develop in systems to which they are more (e.g., interpersonal relationships) or less (e.g., social customs) proximal, and that interactions between the individual and these systems result in changes to both over time. Systems include an individual's characteristics (Bronfenbrenner & Morris, 2006), interpersonal relationships (Pianta, Hamre, & Stuhlman, 2003), as well as environments (Bronfenbrenner, 1994). Jennings and Greenberg (2009) applied DST to classrooms and coined the term 'prosocial classroom,' which reflects a conceptual framework in which aspects of teachers (e.g., psychological adjustment), various contextual factors (e.g., teacher-student relationships), and students' academic and social emotional achievement effect change in one another via bidirectional associations. Following from this, teachers' psychological adjustment is anticipated to influence the quality of teacher-student relationships, and vice versa. To most robustly understand such interrelations, the field must first devote efforts to better understanding specific factors implicated in the change process proposed by the prosocial classroom (i.e., teacher-student interactions, teachers' psychological adjustment) – an aim addressed by the three manuscripts in this dissertation.

Considering Multiple Perspectives of the Teacher-Student Relational System

Teacher-student relationships are integral to students' adjustment to (Baker, 2006) and success in the classroom (O'Connor & McCartney, 2007; Pianta & Stuhlman, 2004). Applied to teacher-student relationships (Pianta et al., 2003), attachment theory (Ainsworth, Blehar, Water,

& Wall, 1978; Bowlby, 1969) suggests that quality is paramount; warm and supportive relationships foster a sense of security for students, allowing them to feel comfortable engaging in academic risks (e.g., attempting an unfamiliar math problem), whereas relationships characterized by conflict or disengagement leave students feeling insecure and less willing to take such risks, limiting their opportunities to learn. Indeed, extant research shows that students tend to experience increased academic achievement when in high quality relationships with their teacher (O'Connor & McCartney, 2007; Pianta & Stuhlman, 2004).

A wealth of evidence has demonstrated the importance of teachers' perceptions of relational quality with students for students' academic and social-emotional development (Crosnoe et al., 2010; O'Connor & McCartney, 2007; Pianta & Stuhlman, 2004; Wu, Hughes, & Kwok, 2010). Comparatively less is known about how students – especially elementary aged students – perceive these relationships and what contributes to the development of those perceptions over time (for work related to middle and high school students, see Erstevåg & Havik, 2019; Ruzek & Schenke, 2019; Schenke, Ruzek, Lam, Karabenick, & Eccles, 2018), and how teacher-student relationships are interrelated with characteristics of teachers (e.g., psychological adjustment; Spilt, Koomen, & Thijs, 2011). Addressing these gaps will provide the field with a more robust understanding of student-teacher relationships and how they might be leveraged as a proximal resource for students and teachers.

Foundational to teacher-student relationships and integral to their development over time are the interactions that undergird them (Hinde & Stevenson-Hinde, 1987; Pianta et al., 2003). Observed classroom interactions have been associated with myriad outcomes including students' aggression and behavioral self-control (Merritt, Wanless, Rimm-Kaufman, Cameron, & Peugh, 2012), engagement (Rimm-Kaufman, Baroody, Larsen, Curby, & Abry, 2014), and academic

achievement (Hamre & Pianta, 2005). However, DST postulates that interactions are best understood from multiple perspectives (Pianta et al., 2003); how individuals make meaning of an interaction influences how future interactions will be approached (Clark & Lemay, 2010), setting the stage for patterns of interactions that characterize more or less adaptive relationships over time (O'Connor, 2010; Spilt et al., 2015). While observations of interactions provide significant insight to how classrooms function to support students, important information that would bolster the field's understanding of the teacher-student relational system is missed in the absence of other perspectives. Emerging work has shown characteristics including students' gender, observed classroom interactions, and engagement to be important related to middle school students' perceptions of interactions with their teacher (Ruzek & Schenke, 2019; Schenke, 2018; Schenke et al., 2018); whether or not similar trends are found among elementary students remains an open question.

Understanding Teachers' Psychological Adjustment as Multifaceted and Co-Developing

One important teacher characteristic implicated in the prosocial classroom is teachers' psychological adjustment. Recent work has shown negative associations between teachers' diminished psychological adjustment and students' academic achievement (Klusman et al., 2016; McLean & O'Connor, 2015) and social-emotional development (Hindman & Bustamante, 2019; Jeon, Buettner, Grant, & Lang, 2019). Though multifaceted, teachers' psychological adjustment is most frequently operationalized as only a few constructs (e.g., depression, burnout; Herman, Hickmon-Rosa, Reinke, 2018; Roberts, Gallagher, Daro, & Iruka, 2019), and little work has investigated their interrelations (Bakker et al., 2000; Shin, Noh, Jang, Park, & Lee, 2013), leaving questions regarding how to best support the healthy functioning and development of teachers and students.

While there is value in understanding teachers' psychological adjustment as multifaceted, it must also be understood as developing among and thus being influenced by other classroom processes (Jennings & Greenberg, 2009). Emerging work considers teacher-student relationships, most often examined related to students' development (Anhert, Harwardt-Heinecke, Kappler, Eckstein-Madry, & Miltz, 2012; Crosnoe et al., 2010; Hughes, Luo, Kwok, & Loyd, 2008; O'Connor & McCartney, 2007; Pianta & Stuhlman, 2004; Stipek & Miles, 2008), to be a proximal resource for teachers (Chang, 2009). Spilt et al. (2011) theoretically linked teacher-student relationships to teachers' psychological adjustment, suggesting that teachers process contextual information (e.g., relationships) through stages of appraisals culminating in either positive or negative emotions (Lazarus, 1991). There is a paucity of work, however, empirically probing the power of teacher-student relationships to support or inhibit teachers' psychological adjustment (for exception see Milatz, Lüftenegger, & Schober, 2015). Aiming to address these gaps, two manuscripts of this dissertation consider multiple components of teachers' psychological adjustment to better understand its development and associations with teacher-student relationships.

A Three Manuscript Approach

All three manuscripts of this dissertation draw from a racially/ethnically diverse sample of teachers and students in urban elementary schools participating in a large-scale randomized-controlled efficacy trial of a social-emotional learning (SEL) and literacy intervention (Reading, Writing, Respect, and Resolution; 4Rs) paired with an intensive teacher coaching model designed to improve curricular effectiveness (MyTeachingPartner™; MTP). Using DST (Lerner, 1998; Pianta et al., 2003) to center students' as active agents in the teacher-student relational system, the first manuscript in this dissertation leverages two time points within an academic

year to investigate whether stable student and teacher characteristics (e.g., age, sex) and observed quality of classroom interactions contribute to change in elementary students' perceptions of positive interactions with their teacher. This manuscript received a revise and resubmit from *Journal of Applied Developmental Psychology*, and is currently back under review. Acknowledging that teacher-student relationships are best understood from multiple perspectives (Pianta et al., 2003) and may exert unique influence on teachers' functioning in the classroom (Spilt et al., 2011), the second manuscript – published in *Journal of School Psychology* – examines the association between teachers' perception of relational quality with students in their classroom and change in teachers' experience of emotional exhaustion and personal accomplishment over the course of one academic year. While manuscript two provides important insight to the development of two aspects of teachers' psychological adjustment, what interrelations might have emerged had we considered other aspects of psychological adjustment remains an open question. With this in mind, the third manuscript of this dissertation adopts a multifaceted understanding of teachers' psychological adjustment by investigating the bidirectional associations among three of its most commonly studied components (psychological distress as characterized by symptoms of depression, anxiety, and stress; emotional exhaustion; and personal accomplishment) across an academic year.

Each of these three manuscripts innovates on prior work in several ways. Manuscript one expands on work utilizing observations of teacher-student interactions (Hamre & Pianta, 2005) and older populations of students (Ruzek & Schenke, 2019) by centering elementary students' perceptions of interactions with their teacher. This work represents an important step in supporting a more holistic understanding of teacher-student relationships. As previously noted, recent work has emerged theoretically linking teacher-student relationships to teachers'

psychological adjustment (Chang, 2009; Spilt et al., 2011). Milatz et al. (2015) found that consistently high relational closeness was significantly associated with decreased emotional exhaustion among teachers, however sample size constraints limited the authors' capacity to empirically investigate the association between relational quality and personal accomplishment. Rigorous empirical work is foundational to developing effective supports for teachers and students. In this vein, manuscript two of this dissertation leveraged a larger sample of teachers and students to provide an important test of the theoretical link between teacher-student relational quality and components of teachers' psychological adjustment. Finally, manuscript three significantly contributes to the field by defining and investigating teachers' psychological adjustment as multifaceted – an underutilized approach (Jennings et al., 2017; Shin et al., 2013), which limits the field's understanding of how and where to best support teachers and the students they serve.

This dissertation represents a program of research that understands teacher-student relationships and teachers' psychological adjustment as multifaceted and co-developing processes (Jennings & Greenberg, 2009; Lerner, 1998; Pianta et al., 2003). Taken together, the three manuscripts of this dissertation posit that considering relationships from multiple perspectives and defining teachers' psychological adjustment as multidimensional are foundational to moving toward an integrated understanding of how the two are interrelated, and ultimately how relationships might best be leveraged to foster the healthy functioning and development of *both* teachers and students.

References

Ainsworth, M. D., Blehar, M. C., Waters, E., & Wall, D. (1978). *Patterns of attachment: A psychological study of the strange situation.* Hillsdale: Erlbaum.

Anhert, L., Harwardt-Heinecke, E., Kappler, G., Eckstein-Madry, T., & Milatz, A. (2012). Student-teacher relationships and classroom climate in first grade: How do they relate to students' stress regulation? *Attachment & Human Development, 14,* 249-263. http://dx.doi.org/10.1080/14616734.2012.673277

Baker, J. A. (2006). Contributions of teacher-child relationships to positive school adjustment during elementary school. *Journal of School Psychology, 44,* 211-229. doi: 10.1016/j.jsp.2006.02.002

Bakker, A. B., Schaufeli, W. B., Demerouti, E., Janssen, P. P. M., Van Der Hulst, R., & Brouwer, J. (2000). Using equity theory to examine the difference between burnout and depression. *Anxiety, Stress, & Coping, 13,* 247-268. https://doi.org/10.1080/10615800008549265

Bowlby, J. (1969). *Attachement and loss: Vol. 1. Attachment.* New York: Basic Books.

Bronfenbrenner, U. (1994). Ecological models of human development. In *International Encyclopedia of Education, Vol. 3, 2nd Ed.* Oxford: Elsevier. Reprinted in: Gauvain, M. & Cole, M. (Eds.), *Readings on the development of children, 2nd Ed.* (1993, pp. 37-43). NY: Freeman.

Bronfenbrenner, U., & Morris, P. A. (2006). The bioecological model of human development. In R. M. Lerner (Ed.) *Handbook of child development: Vol. 1. Theoretical models of human development* (6th ed., pp. 793-828). Hoboken: NJ: Wiley.

Chang, M. (2009). An appraisal perspective of teacher burnout: Examining the emotional work

of teachers. *Educational Psychology Review, 21,* 193-218. doi: 10.1007/s10648-009-9106-y

Claessens, A., & Engel, M. (2013). How important is where you start? Early mathematics knowledge and later school success. *Teachers College Record, 115,* 1-29.

Clark, M. S., & Lemay, E. P., Jr. (2010). Close relationships. In S. T. Fiske, D. T. Gilbert, & G. Lindzey (Eds.), *Handbook of social psychology: Vol 2. Handbook of social psychology* (5th ed. pp. 898-940).

Crosnoe, R., Morrison, F., Burchinal, M., Pianta, R., Keating, D., Friedman, S. L., & Clarke-Stewart, K. A. (2010). Instruction, teacher-student relations, and math achievement trajectories in elementary school. *Journal of Educational Psychology, 103,* 407-417. doi: 10.1037/a0017762

Erstevåg, S. K., & Havik, T. (2019). Students' proactive aggressiveness, mental health problems and perceived classroom interaction. *Scandinavian Journal of Educational Research,* 1-20.

Grimm, K. (2008). Longitudinal associations between reading and mathematics achievement. *Developmental Neuropsychology*, *33*(3), 410-426. https://doi.org/10.1080/87565640801982486

Hamre, B. K., & Pianta, R. C. (2005). Can instructional and emotional support in the first-grade classroom make a difference for children at risk of school failure? *Child Development, 76*(5), 949-967.

Hinde, R. A., & Stevenson-Hinde, J. (1987). Interpersonal relationships and child development. *Developmental Review, 7,* 1-21.

Hindman, A. H., & Bustamante, A. S. (2019). Teacher depression as a dynamic variable:

Exploring the nature and predictors of change over the head start year. *Journal of Applied Developmental Psychology, 61,* 43-55. https://doi.org/10.1016/j.appdev.2018.09.004

Herman, K. C., Hickmon-Rosa, J., & Reinke, W. M. (2018). Empirically derived profiles of teacher stress, burnout, self-efficacy, and coping and association student outcomes. *Journal of Positive Behavioral Interventions, 20,* 90-100. Doi: 10.1177/1098300717732066

Hughes, J. N., Luo, W., Kwok, O., & Loyd, L. K. (2008). Teacher-student support, effortful engagement, and achievement: A 3-year longitudinal study. *Journal of Educational Psychology, 100,* 1-14. doi: 10.1037/0022-0663.100.1.1

Jennings, P. A., & Greenberg, M. T. (2009). The prosocial classroom: Teacher social and emotional competence in relation to student and classroom outcomes. *Review of Educational Research, 79*(1), 491-525.

Jennings, P. A., Brown, J. L., Frank, J. L., Doyle, S., Oh, Y., Davis, R., Rasheed, D., DeWeese, A., DeMauro, A. A., Cham, H., & Greenberg, M. T. (2017). Impacts of the CARE for Teachers program on teachers' social and emotional competence and classroom interactions. *Journal of Educational Psychology, 109,* 1010-1028. http://dx.doi.org/10.1037/edu0000187

Jeon, L., Buettner, C. K., Grant, A. A., & Lang, S. N. (2019). Early childhood teachers' stress and children's social emotional, and behavioral functioning. *Journal of Applied Developmental Psychology, 61,* 21-32. https://doi.org/10.1016/j.appdev.2018.02.002

Klusman, U., Richter, D., & Lüdtke, O. (2016). Teachers' emotional exhaustion is negatively related to students' achievement: Evidence from a large-scale assessment study. *Journal of Educational Psychology, 108,* 1193-1203. http://dx.doi.org/10.1037/edu0000125

Lee, J. (2012). College for all: Gaps between desirable and actual p-12 math achievement trajectories for college readiness. *Educational Researcher, 41,* 43-55. doi: 10.3102/0013189X11432746

Lerner, R. M. (1998). Theories of human development: Contemporary perspectives. In W. Damon & R. M. Lerner (Eds.), *Handbook of child psychology: Vol. 1. Theoretical models of human development* (5th ed. pp. 1-24).

McLean, L., & O'Connor, C. M. (2015). Depressive symptoms in third-grade teachers: Relations to classroom quality and student achievement. *Child Development, 86,* 945-954. doi: 10.1111/cdev.12344

Merritt, E. G., Wanless, S. B., Rimm-Kaufman, S. E., Cameron, C., & Peugh, J. L. (2012). The contributions of teachers' emotional support to children's social behaviors and self-regulatory skills in first grade. *School Psychology Review, 41,* 141-159. doi: 10.1080/02796015.2012.12087517

Milatz, A., Lüftenegger, M., & Schober, B. (2015). Teachers' relationship closeness with students as a resource for teacher wellbeing: A response surface analytical approach. *Frontiers in Psychology, 6,* doi: 10.3389/fpsyg.2015.01949

Murnane, R. J., Willett, J. B., & Levy, F. (1995). The growing importance of cognitive skills in wage determination. *The Review of Economics and Statistics*, *77*(2), 251-266.

O'Connor, E. (2010). Teacher-child relationships as dynamic systems. *Journal of School Psychology, 48,* 187-218. https://doi.org/10.1016/j.jsp.2010.01.001

O'Connor, E., & McCartney, K. (2007). Examining teacher-child relationships and achievement as part of an ecological model of development. *American Educational Research Journal, 44*, 340-369. doi: 10.3102/0002831207302172

Pianta, R. C., Hamre, B., & Stuhlman, M. (2003). Relationships between teachers and children. In W. M. Reynolds & G. E. Miller (Eds.), *Comprehensive handbook of psychology* (Vol. 7, pp. 199-234). New York: Wiley.

Pianta, R. C., & Stuhlman, M. W. (2004). Teacher-child relationships and children's success in the first years of school. *School Psychology Review, 33*(4), 444-458.

Rimm-Kaufman, S. E., Baroody, A. E., Larsen, R. A. A., Curby, T. W., & Abry, T. (2014). To what extent do teacher-student interaction quality and student gender contribute to fifth graders' engagement in mathematics learning? *Journal of Educational Psychology, 107,* 170-185. http://dx.doi.org/10.1037/a0037252

Roberts, A. M., Gallagher, K. C., Daro, A. M., & Iruka, I. U. (2019). Workforce well-being: Personal and workplace contributions to early educators' depression across settings. *Journal of Applied Developmental Psychology, 61,* 4-12. http://dx.doi.org/10.1016/j.appdev.2017.09.007

Ruzek, E. A., Hafen, C. A., Allen, J. P., Gregory, A., Mikami, A. Y., & Pianta, R. C. (2016). How teacher emotional support motivates students: The mediating roles of perceived peer relatedness, autonomy support, and competence. *Learning and Instruction, 42,* 95-103. http://dx.doi.org/10.1016/j.learninstruc.2016.01.004

Schenke, K. (2018). From structure to process: Do students' own construction of their classroom drive their learning? *Learning and Individual Differences, 62,* 36-48. https://doi.org/10.1016/j.lindif.2018.01.006

Schenke, K., Lam, A. C., Conley, A. M., & Karabenick, S. A. (2015). Adolescents' help seeking

in mathematics classrooms: Relations between achievement and perceived classroom environmental influences over on school year. *Contemporary Educational Psychology, 41,* 133-146.

Schenke, K., Ruzek, E., Lam. A. C., Karabenick, S. A., & Eccles, J. S. (2018). To the means and beyond: Understanding variation in students' perceptions of teacher emotional support. *Learning and Instruction, 55,* 13-21. https://doi.org/10.1016/j.learninstruc.2018.02.003

Shin, H., Noh, H., Jang, Y., Park, Y. M., & Lee, S. M. (2013). A longitudinal examination of the relationship between teacher burnout and depression. *Journal of Employment Counseling, 50,* 124-137. doi: 10.1002/j.2161-1920.2013.00031.x

Spilt, J. L., Hughes, J. N., Wu, J. N., & Kwok, O. (2012). Dynamics of teacher-student relationships: Stability and change across elementary school and the influence on children's academic success. *Child Development, 83,* 1180-1195. doi: 10.1111/j.1467-8624.2012.01761.x

Stipek, D., & Miles, S. (2008). Effects of aggression on achievement: Does conflict with the teacher make it worse? *Child Development, 79*(6), 1721-1735.

Wu, J., Hughes, J. N., & Kwok, O. (2010). Teacher-student relationship quality type in elementary grades: Effects on trajectories for achievement and engagement. *Journal of School Psychology, 48,* 357-387. doi:10.1016/j.jsp.2010.06.004

Correlates of Change in Elementary Students' Perceptions of Interactions with their Teacher

Catherine M. Corbin[1], Jason T. Downer[1], Erik A. Ruzek[1], Amy E. Lowenstein[2], Joshua L. Brown[2]

[1]The University of Virginia, [2]Fordham University

Corbin, C. M., Downer, J. T., Ruzek, E. A., Lowenstein, A. E., & Brown, J. L. (revise and resubmit). Correlates of change in elementary students' perceptions of interactions with their teacher. *Journal of Applied Developmental Psychology.*

Abstract

Students' perceptions of interactions with their teacher lay the stage for future interactions, ultimately influencing students' success in school. While prior work has elucidated what individual and contextual factors contribute to the development of middle and high school students' perceptions, less is known about elementary students' perceptions. As such, the present study leveraged a racially/ethnically diverse sample of third and fourth grade students and teachers in a large, urban district to investigate whether stable student and teacher characteristics (e.g., sex) and observed quality of classroom interactions influenced change in students' perceptions of interactions with their teacher. Results indicated that students rated their teacher more positively from Time 1 to Time 2 when female and in classrooms characterized by positive teacher-student interactions. Unexpectedly, students in classrooms characterized by high Instructional Support rated their teachers less positively over time. Implications for teacher-student relationships and students' academic and social-emotional achievement are discussed.

Keywords: Teacher-Student Interactions, Student Perceptions, Classroom Observations, Elementary School

Correlates of Change in Elementary Students' Perceptions of Positive Interactions with their Teacher

Teacher-student relationships are foundational to students' success in school. Relationships characterized by warmth, connection, and trust help to bolster students' academic achievement (O'Connor & McCartney, 2007) and social-emotional development (Pianta & Stuhlman, 2004), particularly among academically and behaviorally at-risk students (Crosnoe et al., 2010; Hamre & Pianta, 2001). The benefits of such high-quality relationships may play a unique role in supporting middle grade elementary students as the focus of instruction becomes more academically rigorous and they begin engaging with high stakes testing. Critical to the development of these relationships are the interactions that undergird them, which have themselves been shown to positively influence students' ability to thrive in school (Hamre & Pianta, 2005). Unlike relationships, however, teacher-student interactions are most often studied at the classroom-level (Cadima, Leal, & Burchinal, 2010; Cameron-Ponitz, Rimm-Kaufman, Grimm, & Curby, 2009; Curby et al., 2011; Jennings et al., 2017) rather than dyadically, which has resulted in a vague empirical understanding of how individual students perceive interactions with their teacher.

According to developmental systems theory (DST; Lerner, 1998), these interactions are best understood from multiple perspectives (e.g., students). While there is some evidence to support the link between elementary school students' perceptions of interactions with their teacher and academic (Schenke, 2018) and social-emotional development (Rucinski, Brown, & Downer, 2016), what work exists probing factors that may contribute to students' perceptions has largely been conducted using samples of

middle and high school students (Erstevåg & Havik, 2019; Ruzek & Schenke, 2019; Schenke, Ruzek, Lam, Karabenick, & Eccles, 2018) – samples developmentally distinct from younger students in elementary school. Better understanding what influences the development of younger students' perceptions of interactions with their teacher is important because students ascribe meaning to these perceptions that outline expectations for future interactions (Clark & Lemay, 2010) and have implications for the development of teacher-student relationships (Pianta, 1999). The present study addresses this gap by investigating what student and teacher characteristics are associated with third and fourth grade students' perceptions of interactions with their teacher.

DST also posits that teacher-student interactions be understood within the classroom context in which they most often occur (Pianta & Allen, 2008). While extant research shows that classrooms characterized by emotionally, organizationally, and instructionally supportive interactions support students' academic and social-emotional development (Curby, Brock, & Hamre, 2013), emerging research provides evidence suggesting that simply being in these classrooms is not enough – students must perceive this support themselves to experience the positive effects (Brock, Nishida, Chiong, Grimm, & Rimm-Kaufman, 2008; Ruzek, Hafen, Allen, Gregory, Mikami, & Pianta, 2016; Schenke, 2018). As such, the second aim of this study is to investigate whether observed classroom quality was related to individual students' perceptions of interactions with their teacher.

Theoretical Perspectives on Teacher-Student Interactions

According to developmental systems theory (DST; Lerner, 1998), students' development can be understood as the result of myriad systems (e.g., relationships) that

interact within and across different levels (e.g., individual, classroom) that are more (e.g., biological) or less (e.g., social policies) proximal to the individual (Pianta, Hamre, & Stuhlman, 2003). From this perspective, teacher-student relationships, and the social, emotional, and academic interactions that undergird them (Pianta, 1999), are one of many systems that define the contextual landscape that support or inhibit students' academic and social-emotional development. In this paper, we investigated how stable student and teacher characteristics and observed classroom quality contributed to change in elementary-aged students' perceptions of interactions with their teacher. The following sections summarize research relevant to these research aims, which we situate within DST.

Students' Perceptions of Interactions with Their Teacher

Like all systems, teacher-student relationships are made up of component parts (Pianta et al., 2003); foundational among these are the interactions that take place over time (Pianta, 1999). Each interaction, and impressions of interactions over time, are dynamically defined. How a student or teacher makes meaning of an interaction is largely dependent on individual perceptions that shape memories of past and expectations for future interactions (Clark & Lemay, 2010), all of which may result in more or less stable perceptions over time. These perceptions are influenced by, among other things, the stable (e.g., sex, race/ethnicity) and variable (e.g., beliefs, values) characteristics of teachers and students (Pianta et al., 2003). For example, female teachers may interact differently with male and female students, dependent on understanding of and expectations for different gendered roles (Spilt, Koomen, & Jak, 2012). Thus, interactions are most robustly understood when considered from multiple perspectives.

Increasingly, late elementary through high school-aged students are being asked to report on the supportive, organizational, and instructional qualities of interactions with their teacher that support or inhibit learning in the classroom (Chaplin, Gill, Thompkins, & Miller, 2014; Ross et al., 2017). These perceptions are most often leveraged to describe the classroom as opposed to any individual student's experience within it (Lüdtke, Robitzsch, Trautwein, & Kutner, 2009). For example, middle school teachers had higher value-added scores when students in their classroom reported them to be more organized around classroom management (e.g., effective use of instructional time; Wallace, Kelsey, & Ruzek, 2016), and reading and math achievement among fourth and fifth grade students increased in classrooms where students reported their teachers to be more academically challenging (e.g., "My teacher pushes everybody to work hard"; Sandilos, Rimm-Kaufman, & Cohen, 2017).

Most measures of students' perceptions of interactions with their teacher, including the one used in both the Wallace et al. (2016) and Sandilos et al. (2018) studies, indicate that the vast majority of variation resides between students, not classrooms (Downer, Stuhlman, Schweig, Martinez, & Ruzek, 2014; Fauth, Decristan, Rieser, Klieme, & Büttner, 2014). This means that students in the same classroom are experiencing it differently from one another, and these differences have been found to influence students' academic and social-emotional development. For example, elementary students who reported feeling academically encouraged by their teacher had higher math achievement at the end of the year compared to students who felt less encouraged (Schenke, 2018). Another study found that elementary students reported

lower levels of depression when they perceived interactions with their teacher to be characterized by warmth and support (Rucinski et al., 2016).

There is ample evidence that elementary-aged students report experiencing different interactions with their teacher (Downer et al., 2014; Fauth et al., 2014; Wallace et al., 2016), and that these perceptions of interactions contribute to a host of other student outcomes (Sandilos et al., 2017). What remains virtually unknown is what factors relate to change in elementary school students' perceptions of interactions with their teacher (for findings related to middle and high school students, see Summers, Davis, & Hoy, 2017; Ruzek & Schenke, 2019), and there are developmental reasons to investigate this specifically among younger students. Compared to middle and high school students, elementary-aged students spend the majority of each school day with one teacher, resulting in more time over which interactions with their teacher occur, but also increasing the influence that those interactions are likely to have for students (Hughes & Cao, 2018). That there is more time over which interactions might exert influence is important context, given that elementary students rely more on co-regulation to effectively regulate their behaviors and emotions, which means they depend more heavily on their teacher to support their positive experience in the classroom (Baker, Grant, & Morlock, 2008; Zee & de Bree, 2015). Further, elementary school students have less well-developed cognitive skills (e.g., working memory, abstract reasoning; Eisenberg et al., 1989; Luna, Garver, Urban, Lazar, & Sweeney, 2004) than older students, placing constraints on what (e.g., one's own experience versus inferences or judgements of what others experience) and how (e.g., complexity of Likert-scale response options) they are able to report on their experiences. Given these developmental differences between

elementary and middle or high school students, investments in understanding elementary students' perceptions of interactions is warranted.

Because interactions are interdependent and dynamically defined, how one interaction is perceived holds implications for the next, and stable characteristics of individuals are theorized to influence those perceptions (Pianta et al., 2003). For example, a recent meta-analysis showed that girls attained higher grades than boys (Voyer & Voyer, 2014). This could be an indicator that teachers are interacting differently with boys and girls in the classroom, which may become more apparent and salient related to students' perceptions as those interactions unfold throughout the school year. Alternatively, it could be that achievement, as measured by grades, influences other behaviors in the classroom (e.g., engagement, acting out), which may create patterns of teacher-student interactions that iteratively influence students' perceptions. Regardless, individuals' stable characteristics (e.g., sex) help to define perceptions of and expectations for interactions that take place over time. With this in mind, this study leverages students' perceptions of positive interactions with their teacher at two time points to explore whether stable (i.e., demographic) student and teacher characteristics are associated with change in perceptions of interactions over time.

The Classroom as Context for Teacher-Student Interactions

One central tenet of DST is that systems themselves interact in interdependent ways; that smaller systems (e.g., interactions) are best understood in relation to the larger systems (e.g., classrooms) in which they function (Pianta et al., 2003). Following from this, characteristics of the classroom (e.g., how well the teacher is able to manage students' behavior) provide important context for understanding the teacher-student

interactions that take place within it – a particularly important point since elementary students spend the majority of their time at school within one classroom.

The observed quality of classroom interactions has emerged as integral for students' success. For example, classrooms characterized by emotionally (e.g., warm, caring) and instructionally (e.g., cognitively stimulating) supportive interactions mitigated low achievement for first grade students identified as at risk (Hamre & Pianta, 2005). Similarly, students entering pre-kindergarten with low math skills showed significant improvement when in classrooms with strong behavior management and effective use of instructional time (Cadima, et al., 2010). It could be, however, that what is observed for the classroom generally is not what individual students experience.

In fact, recent work has provided evidence that classroom quality operates through elementary students' perceptions to influence outcomes (Brock et al., 2008; Schenke, 2018). Thus, it is not enough for students to be exposed to a warm, organized, and instructionally rigorous classroom – they must experience it as such to reap the benefits. Observed classroom quality has been shown to be stable over an academic year (Casabianca, Lockwood, & McCaffrey, 2015). Curby, Rimm-Kaufmann, and Abry (2013) found that observed mean scores (standard deviations in parentheses) for third and fourth grade classrooms rated on a 7-point scale ranged from 5.03 (0.53) - 5.19 (0.57), 5.74 (0.52) - 5.89 (0.54), and 2.74 (0.69) – 2.88 (0.76) across five time points for emotional support, classroom organization, and instructional support, respectively. Given the relative stability, it is likely that students' perceptions of the quality of classroom interactions become reinforced the longer they are exposed to it – students continuously exposed to a warm and supportive environment may more strongly perceive it as such as

the year progresses. Some work has linked observed classroom quality to classroom-level teacher-student interactions, as perceived by elementary students (Downer et al., 2014; Schenke, 2018), but no study that we are aware of has investigated the association between observed classroom quality and individual elementary-aged students' perceptions of interactions with their teacher over time. The present study adds to this growing evidence base by investigating the association between observed classroom interactions and change in individual elementary students' perceptions of positive interactions with their teacher.

The Present Study

Using a diverse sample of third and fourth grade students and teachers in urban schools, the present study explored the associations between student (i.e., age, sex, poverty, and race/ethnicity) and teacher (i.e., sex, race/ethnicity, and years of teaching experience) demographic characteristics, observed classroom quality, and students' perceptions of positive interactions with their teacher. Due to the lack of prior research investigating student and teacher factors related to elementary students' perceptions of interactions, we viewed this work as exploratory and had no specific hypotheses. Regarding observed classroom quality, we hypothesized that classrooms characterized by emotionally, organizationally, and instructionally supportive interactions would be positively associated with change in students' perceptions of positive interactions with their teacher.

Method

Data and Participants

Data for this study come from cohort one (2015-2016) of a two cohort large-scale cluster randomized controlled efficacy trial[1] of a social-emotional learning (SEL) and literacy intervention (Reading, Writing, Respect, and Resolution; 4Rs) paired with an intensive teacher coaching model designed to improve curricular effectiveness (MyTeachingPartner™; MTP). The 4Rs+MTP program integrates these two well-validated interventions to support teachers' knowledge and use of effective practices, as well as students' social-emotional learning in the classroom. The 4Rs component of the program is a universal, school-based intervention that centers content on conflict resolution and intergroup relations, while integrating social-emotional learning into the language arts curriculum for students in grades K-5 (Jones, Brown, & Aber, 2011). MTP is an innovative approach to professional development that leverages two modes through which teachers receive feedback about their practice – shared viewing of enacted classroom practice with a coach, and written feedback and questions from their coach intended to prompt teachers' self-reflection on practice successes and challenges (Allen, Pianta, Gregory, Mikami, & Lun, 2011). The study was conducted in third and fourth grade classrooms in a large, urban city located in the northeastern United States. Program implementation occurred over the course of one academic year.

The total analytic sample for the current study included 2,047 third and fourth grade students taught by 145 teachers (synonymous with classrooms) in 27 schools (see Table 1 for sample counts by treatment status). The sample was evenly distributed across third (49%) and fourth (45.5%) grade classrooms, with a small proportion of mixed grade classrooms (5.5%). Just over half of the students were female (54%) with an average age

[1] In this design, schools were considered clusters and randomized within each cohort to treatment or control conditions.

of 9 years (*SD* = .81). There was a high rate of economic disadvantage, with 85% of students eligible for free or reduced price lunch (FRPL). Just over one quarter of students (28%) were identified as having special education (SPED) status (19 classrooms consisted of 100% students identified as having an Individualized Education Program [IEP]), and 15% were identified as English Language Learners (ELL). The majority of students were identified as Hispanic or Latino (65%) with the remaining identified as Black (26%), White (5%), or Other (4%).

The majority of teachers were female (93%) and reported an average of 11 years of teaching experience (*SD* = 7.52). This was a highly qualified sample of teachers with the majority (93%) holding a master's degree. Teachers were racially/ethnically diverse; approximately 34% identified themselves as White, 25% as Hispanic or Latino, 30% as Black or African American, 6.5% as Multiracial, 3.5% as Asian, and 1% as Other. The average class size was 22 students (*SD* = 5.48; Range = 8 – 33).

Procedures

All full-time third and fourth grade teachers in participating treatment and control schools were eligible for the study. Out of all eligible teachers (*n* = 177), 153 (86.4%) consented to participate (90.5% of teachers who returned a consent form). Seven of these teachers later withdrew their consent, either because they no longer wanted to participate or because they had personal or health reasons that prevented them from continuing to participate. Active parental consent was obtained through permission forms that research study staff distributed to classrooms of students between September and December. Out of all eligible students (*n* = 3,356), 2,364 (70.4%) received parental permission to

participate in the study (82.3% of students who returned a parent permission form). One parent later withdrew consent to have their child participate.

The majority of participating teachers (93%) reported on their demographic characteristics via a self-report survey administered in the summer (August) prior to the start of the academic year. A small number of teachers (n = 10) completed the self-report survey between August and December. Students reported on their perceptions of interactions with their teacher via a self-report survey administered in the winter (January - April). The majority of students (85%) completed the survey by March. Summer and winter data are subsequently referred to as Time 1. All participating students also reported on their perceptions of interactions with their teacher at the end of the academic year (May), which will be referred to as Time 2. In order to account for the wide Time 1 data collection window in relation to Time 2 data collection, a time lag variable was created and included in all predictive models. This variable is described in detail in the analytic plan. Following is a detailed description of procedures related to student survey administration and classroom observations.

Procedures for student survey administration. The student self-report survey was administered at Time 1 and 2 to students in each participating teacher's classroom who had received active parental consent to participate in the study. Two trained field researchers visited each classroom and administered the survey to students as a group during one class period (approximately 45 minutes). One field researcher read each survey item aloud while the other walked around the classroom to answer questions and assist students as needed. Before administering the survey, each student was asked to provide written assent indicating whether they agreed to participate in the study and

complete the survey. At Time 1, 133 consented students (6%) refused assent and did not complete the survey. At Time 2, 184 consented students (10%) refused assent and did not complete the survey.

For students whose primary language was Spanish, survey administration was conducted in Spanish (n = 40 or 2% of students at Time 1; n = 34 or 2% of students at Time 2), either with individual students or in small groups, usually at the back of the classroom. When one or more students in a classroom were absent on the initial survey administration day, at least one attempt was made to return to the classroom at a later date to administer the survey to those students. These make-up sessions were conducted individually or in small groups, usually at the back of the classroom.

Procedures for classroom observations. A live classroom observation was conducted in each participating teacher's classroom at Time 1 and 2. Because only Time 1 classroom observations were included in analyses, all following information pertains to those in particular. A team of 18 classroom observers who were trained to reliability and certified on the Classroom Assessment Scoring System-Upper Elementary (CLASS-UE; Pianta, Hamre, & Mintz, 2012) conducted the observations between January and May, with 85% having been completed by April. Reliability certification required scoring within one scale point of the master-coded score on 80% of the dimension scores and scoring within one scale point of the master-coded score on at least two out of five codes within each dimension. With the exception of classrooms that were double-coded (see Measures section for more detail), each classroom observation was conducted by one observer and included four 20-minute cycles, with each cycle followed by a ten-minute coding period. The vast majority of observations were completed in a single two-hour

session, but a small number had to be split across two or three sessions, either on one day or across two different days (n = 5 classrooms at Time 1).

Classroom observers were blind to the 4Rs+MTP random assignment status of the schools in which they conducted observations. At each time point, CLASS scores were averaged across all four cycles to create 11 dimension scores, which were the data points used to specify exploratory structural equation models (ESEM) that yielded superordinate domains used in this study (described in more detail under Measures).

Measures

Students' perceptions of positive interactions with their teacher. Students' perceptions of positive interactions with their teacher were measured using 30 items from the Learning about Teacher-Student Interactions survey (LATSI; Downer et al., 2014). In order to create a measure of students' perceptions of positive interactions with their teacher, only items that oriented the students to their teacher were retained. For example, the item "My teacher helps me to solve this problem" was retained, whereas the item "I feel comfortable in this class," which requires the student to consider the classroom as a whole, was not. Students responded to these 21 items using a 5-point Likert scale ranging from 1-*Almost Never* to 5-*Almost Always*. LATSI has shown construct validity (Downer et al., 2014) and predictive validity using a smaller subset of items (Rucinski et al., 2018).

LATSI was developed to align with the Teaching Through Interactions (Hamre & Pianta, 2007) framework, such that items represented three conceptual domains: Emotional Support, Classroom Organization, and Instructional Support. Downer et al. (2014) provided empirical evidence that a larger set of LATSI items organized into three latent factors represented these domains. Considering the present sample, confirmatory

factor analysis (CFA) showed identical fit between a one- and three-factor solution[2] (CFI = .92, TLI = .91, RMSEA = .04, SRMR = .04). The latent factors defined in the three factor solution were highly correlated (between r = .88 and r = .95) suggestive of a single underlying construct. As such, we proceeded with the one-factor solution. The single LATSI factor showed metric (ΔCFI = .00) and partial scalar invariance between Time 1 and Time 2 (ΔCFI = .004; Cheung & Rensvold, 2002). With evidence that the LATSI measures the same underlying construct across time, we opted to utilize mean scores in place of factor scores or a latent variable, such that results could be interpreted on the scale used by students to respond to LATSI items (e.g., point increases or decreases on the 1-5 scale). As such, the mean of these 21 LATSI items was used to represent students' perceptions of positive interactions with their teacher oriented toward emotional, organizational, and instructional support. In the current sample, LATSI items showed acceptable internal consistency at both Time 1 (α = .88) and Time 2 (α = .90). While the sample means (see Table 2 univariate statistics for all key study variables) did not differ substantially from Time 1 (M = 3.69, SD = .71) to Time 2 (M = 3.73, SD = .75), students' perceptions were moderately positively correlated (r = .62, p < .001; see Table 3 for bivariate correlations among all study variables) indicating that some students' perceptions became more or less positive between time points.

Observed classroom interactions. Observations of the general quality of teacher-student interactions in the classroom was measured using the CLASS-UE (Pianta et al., 2012). The CLASS-UE consists of three domains under which lie 11 dimensions

[2] There were a total of 23 LATSI items that prompted students to explicitly reflect on their teacher. However, two of these items (one positive climate and one negative climate) were found to function poorly. As such, both items were removed from all measurement models and from the construction of mean scores. Results did not vary dependent upon their inclusion.

(listed in parentheses) that align with the Teaching Through Interactions framework (Hamre & Pianta, 2007): *Emotional Support (positive climate, negative climate, teacher sensitivity, regard for student perspectives)*, which describes the affective quality of teacher-student interactions, how attuned the teacher is to the individual needs of students, and how effective the teacher is at facilitating and supporting students' autonomy in the classroom; *Classroom Organization (behavior management, productivity, instructional learning formats)*, which measures how well the teacher is able to manage student behavior, effective use of instructional time, and the extent to which the teacher is able to organize materials and activities to engage students; and *Instructional Support (content understanding, analysis and inquiry, quality of feedback, instructional dialogue)*, which describes the teachers' use of cognitively stimulating instruction, targeted feedback, and facilitated discussion to increase students' learning.

Observers rated each CLASS-UE dimension (1 – *very low* to 7 – *very high)*. Interrater reliability (IRR) was calculated using the 38 observations (13%) that were double-coded across the data collection year. IRR was calculated using a one-way random intraclass correlation (ICC), which captures rater consistency across two measured constructs (Shrout & Fleiss, 1979). The ICC is a conservative measure of interrater reliability, as it includes both the variability within and across observers. ICCs can range from -1 to +1, with values less than .5 indicating poor reliability, values between .50 and .75 indicating moderate reliability, values between .75 and .90 indicating good reliability, and values greater than .90 indicating excellent reliability (Koo & Li, 2016). In the current study, ICCs were 0.62 for the Emotional Support domain, 0.20 for the Classroom Organization domain, and 0.54 for the Instructional Support domain. The

low ICC for Classroom Organization reflects the fact that there was limited variability in the double-coded scores and not that there was low agreement among observers. Indeed, agreement was relatively high for Classroom Organization, with 81% of double-coded scores for the domain falling within one scale point of each other.

In order to attain a measure of global quality of classroom interactions, bifactor exploratory structural equation modeling (Bi-ESEM) was used to define a global latent factor in addition to the three conceptual domains described. This approach was taken for two reasons. First, defining generally positive classroom interactions aligned with the student perception measure, which allowed for the examination of the extent to which students exposed to generally positive classroom interactions perceived generally positive interactions with their teacher, over and above other types of classroom interactions. Second, an examination of the three factor CFA (e.g., Emotional Support, Classroom Organization, and Instructional Support) showed poor fit to the data (CFI = .81, RMSEA = .16, SRMR = .11) and a traditional bifactor solution failed to converge. Unlike confirmatory approaches, Bi-ESEM models cross-loadings of indicators such that an indicator could appreciably load onto more than one latent factor (Morin, Arens, & Marsh, 2016). The benefit of this method is that it uses all available data to define latent factors instead of constraining the factor loadings of indicators onto their non-dominant latent factor to zero. This is appropriate when applied to the CLASS-UE because, for example, it is reasonable to think that the dimension of Positive Climate (i.e., warm and respectful teacher-student interactions and relationships) would significantly contribute variation to more than just the domain of Emotional Support.

The Bi-ESEM model showed acceptable fit to the data (CFI = .99, TLI = .98, RMSEA = .05, SRMR = .01). With the exception of negative climate (factor loading = .23) and analysis and inquiry (factor loading = .36), all CLASS dimension factor loadings ranged from .51 to .72 (see Table 4 for all factor loadings) indicating that (1) these dimensions contributed substantial variation to the global factor and (2) the underlying global factor was not disproportionately defined by some smaller subset of dimensions. As such, we interpret the global factor as Global Quality of Classroom Interactions, though we limit our discussion of characteristics related to negative climate and analysis and inquiry due to the comparatively small amount of variance each contributed. The pattern of factor loadings across the three sub-factors supported interpreting them as Emotional Support, Classroom Organization[3], and Instructional Support. Further, the factor determinacy scores for each latent factor ranged from .82 - .93, suggesting the estimated factor scores were reliable representations of the underlying factors. As such, factor scores[4] from the four Bi-ESEM latent factors were exported and used in all predictive models.

Student and teacher demographics. Student demographic data including age, sex, and race/ethnicity were collected via school records provided by the local Department of Education. Teachers reported on their years of experience and

[3] Two dimensions conceptualized to define the domain of Instructional Support significantly crossloaded onto Classroom Organization. The size of the crossloadings were small (< .30), which means that each was contributing a relatively small amount of variance to the sub-factor. In addition, the largest factor loadings for this sub-factor belonged to dimensions conceptualized to define Classroom Organization, supporting our interpretation of that sub-factor as such.

[4] Mean scores for Global Quality of Classroom Interactions, Emotional Support, Classroom Organization, and Instructional Support could not be used because a bifactor model allows all items to first load onto a global factor after which remaining variance is used to model subfactors. It would not be a synonymous approach, nor methodologically justifiable to use the same item-level variance to generate mean scores for each of these domains.

race/ethnicity via a survey administered at Time 1. In order to investigate between-group differences in changes in students' perceptions of positive interactions with their teacher that may stem from racial/ethnic group identification, initial attempts were made to include the following racial/ethnic categories for students and teachers in all models: Black, Hispanic or Latino, White, and Other. Unfortunately, multiple imputation models constructed to include these racial/ethnic categories for students, teachers, or both failed to converge. As such, the decision was made to dichotomize student and teacher race to represent Non-white (vs. White).

Analytic Plan

Results from an unconditional two-level model[5] indicated that 16% of the variance in students' perceptions was attributable to classrooms, indicating multilevel modeling to be the appropriate methodological approach (Raudenbush & Bryk, 2002). To interpret the intercept as Time 2 students' perception of positive interactions with their teacher in a classroom at its average perception, all continuous level-1 variables were group-mean centered (e.g., centered on each classroom's average; Hoffman & Gavin, 1998). Level-1 covariates themselves might have a nested structure (i.e., the ICC of Time 1 student perceptions was .10 indicating that 10% of the variance existed between classrooms) resulting in a unique association with the level-1 and level-2 variance in the outcome (i.e., Time 2 student perceptions; Hoffman, 2015). As such, all continuous level-1 covariates were modeled at level-1, and included as covariates (i.e., aggregated to the classroom-level) predicting the random intercept at level-2. The equations below

[5] Because the study design randomized treatment at the school-level, a three-level unconditional model was initially investigated. Results indicated there to be virtually no (ICC = .004) between school variation in students' perceptions of positive interactions with their teacher. As such, we proceeded with a two-level model, including treatment status as a covariate at level-two.

represent those specified to examine correlates of change in students' perceptions of positive interactions with their teacher:

Level-1 Equation (student-level):

$$Y_{ij} = \beta_{0j} + \beta_1 Covariates_{ij} + r_{ij}$$

Level-2 Equation (classroom-level):

$$\beta_{0j} = \gamma_{00} + \gamma_{0p} StAggCov_j + \gamma_{0q} L2Covariates_j + \gamma_{0r} CLASS_j + u_{0j}$$

Where Y_{ij} is the perception of positive interactions with the teacher for student *i* in classroom *j*, β_{0j} is the average students' perception for classroom *j*, β_1 is the effect of level-1 (i.e., Time 1 student perceptions; students' age, sex, poverty status, and race/ethnicity; and time lag for survey completion), and r_{ij} is the deviation from the classroom mean perception for student *i* in classroom *j*, holding constant the vector of covariates. At level-2, the intercept from level-1 (β_{0j}) becomes the outcome, γ_{00} is the grand mean of students' perceptions, γ_{0p} are the effects of covariates that have been aggregated from level-1 (i.e., classroom mean student perceptions and age), γ_{0q} are the effects of other level-2 covariates (i.e., treatment status, teacher race/ethnicity, teacher's years of experience), γ_{0r} are the effects of CLASS-UE domains, and u_{0j} is classroom *j*'s deviation from the grand mean of students' perceptions holding constant the vector of covariates.

As previously mentioned, the Time 1 and Time 2 data collection windows spanned three months and one month, respectively. As such, some students had a longer lag between Time 1 and Time 2 self-reports than others. To account for this, we controlled for the number of days between Time 1 and Time 2 student survey completion

dates. This lag variable (subsequently referred to as time lag) was included in all predictive models.

Missing data, the prevalence of which ranged from less than 1% to 22.5%, was dealt with using multilevel multiple imputation. Applied to these data, this approach allows imputed values to vary as a function of classroom-specific slopes resulting in more precise estimation (Keller & Enders, 2017). Twenty imputed datasets were created using Blimp (Keller & Enders, 2017) and analyzed in Mplus version 7 to estimate the associations between student and teacher demographic characteristics, observed classroom interactions, and change in students' perceptions of positive interactions with their teacher. Two models were estimated. Model 1 investigated individual students' age, sex, race/ethnicity, and poverty status; teacher sex, race/ethnicity, and years of experience; classroom-level time 1 student perceptions and student age related to Time 2 students' perception of positive interactions with their teacher, controlling for Time 1. Because the intervention itself might have had a unique influence on students' perceptions of positive interactions with their teachers, treatment status[6] was also controlled for at level 2. Model 2 added observed classroom quality (Global Quality of Classroom Interactions, Emotional Support, Classroom Organization, Instructional Support) to Model 1. As previously noted, the time lag variable was included in both models to control for the timing of data collection.

[6] A sensitivity analysis was conducted in which all models were examined for treatment and control groups, respectively. Most results were not sensitive to treatment status. However, students' sex (i.e., female) and instructional support were not significantly associated with change in students' perceptions of positive interactions with their teacher among students in treatment group schools. The effect size for both sex (f^2 = .00) and instructional support (f^2 = .01) related to the outcome were small in the full sample. It is unlikely we were able to detect such effects with smaller samples ($N_{treatment} = 861, N_{control} = 1{,}186, N_{full} = 2{,}047$).

Several statistics were used to contextualize model fit and explanatory power. First, the within and between residual variance components were used to calculate the proportion of variance explained by all independent variables and covariates in each model, which we refer to as R_1^2 in tables and text (Snijders & Bosker, 2012). Second, the percent change in variance (PCV; Merli, Yang, Chaix, Lynch, & Råstam, 2005) was calculated for the within and between levels, respectively. More specifically, PCV values represent the amount of level-1 or level-2 variance explained that is attributable to specific independent variables and/or covariates included at either level. Finally, Cohen's f^2 was calculated as a measure of local effect size for statistically significant independent variables (Cohen, 1988; Selya, Rose, Dierker, Hedeker, & Mermelstein, 2012). In line with convention, values of .02, .15, and .35 indicate a small, medium, and large effect. The present study's sample (N = 2,053) is able to detect with 80% power effect sizes of .01 or higher.

Results

Associations between Student and Teacher Demographics and Students' Perceptions of Interactions with Their Teacher

Model 1 results indicate that student sex (female) was significantly positively associated with Time 2 student perceptions, controlling for Time 1 perceptions (b = .07, p < .05, f^2 = .00; see Table 5 for Model 1 and 2 results). This means that female students rated interactions with their teachers .07 units more positively from Time 1 to Time 2 than male students in their same classroom. Despite being statistically significant, the effect size was small. No other student or teacher demographic characteristics were significantly associated with change in students' perceptions. All covariates in Model 1

explained 40% of the variance in Time 2 students' perceptions of positive interactions with their teacher. The level-1 PCV was .35 indicating that 35% of the variation in Time 2 students' perceptions of positive interactions with their teacher was attributable to level-1 covariates. The level-2 PCV showed that 67% of the between classroom variation in students' perceptions was attributable to level-2 covariates (see Table 5 for a list of all level-1 and level-2 covariates).

Associations between Observed Classroom Interactions and Students' Perceptions of Interactions with Their Teacher

Model 2 results indicated global quality of classroom interactions to be significantly positively associated with Time 2 student perceptions, controlling for Time 1 perceptions (b = .08, p < .001, f^2 = .01). This means that each unit increase in global quality of classroom interactions was associated with a .08 point increase in students' perceptions of positive interactions with their teacher from Time 1 to Time 2. In contrast, Instructional Support was significantly negatively associated with Time 2 student perceptions, controlling for Time 1 (b = -.07, p < .05, f^2 = .01). This indicates that a one unit increase in observed Instructional Support was associated with a .07 point decrease in students' perception of positive interactions with their teacher from Time 1 to Time 2. The effect size for both of these associations was small (f^2 = .01). The domains of Emotional Support and Classroom Organization were not significantly associated with students' perceptions of positive interactions with their teacher. All covariates in Model 2 explained 41% of the variance in Time 2 students' perceptions of positive interactions with their teacher. The level-2 PCV showed that 74% of the between classroom variation in students' perceptions was attributable to level-2 covariates.

Discussion

The present study investigated stable demographic characteristics of students and teachers and quality of observed classroom interactions related to change in elementary students' perceptions of positive interactions with their teacher. We examined this in a historically racially/ethnically minoritized sample of third and fourth grade students – a population at particular risk of developing relationships characterized by more conflictual interactions over time (Spilt, Hughes, Wu, & Kwok, 2012). While student sex (female), global quality of classroom interactions, and Instructional Support emerged as significant predictors, the effect sizes for all were small. Both Model 1 and Model 2 explained approximately 40% of the variation in Time 2 student perceptions, controlling for Time 1. Further, level-1 covariates explained about one third (35%) of the variation between students and level-2 covariates explained between 67%-74% of between classroom variance. These represent some of the first empirical findings of what does and does not contribute to the development of elementary school students' perceptions of interactions with their teacher, helping to contextualize the teacher-student relational system that supports students' development (O'Connor & McCartney, 2007; Pianta & Stuhlman, 2004). The following sections empirically and practically situate these findings in the broader study of teacher-student relationships, highlight avenues for future research stemming from this work, and discuss limitations to consider.

Student and Teacher Demographic Characteristics Related to Students' Perceptions of Interactions with Their Teacher

The present study is among the first to empirically investigate what student and teacher demographic characteristics influence upper elementary school students'

perceptions of interactions with their teacher within an academic year. While developmental systems theory applied to teacher-student relationships posits that such characteristics help students make meaning of interactions (Pianta, et al., 2003), the present study found little evidence to support this related to changes in perceptions over time. The only student or teacher demographic characteristic to emerge as significantly associated with change in students' perceptions was student sex, such that female students rated interactions with their teachers more positively over time compared to male students. This finding aligns with extant work showing that teachers report more relational conflict and less closeness with male students (Jerome, Hamre, & Pianta, 2009; Koomen & Jellesma, 2015; Madill, Gest, & Rodkin, 2014). However, the small effect size (f^2 = .00) – indicating limited practical applicability – aligns with work that has shown no difference between boys and girls with regard to teacher-student relational quality (Murray & Murray, 2004). While students' age was not significantly associated with change in students' perceptions of positive interactions with their teacher, it is important to note that age in the present study was group (e.g., classroom) mean centered. Findings from this study suggest that variation in students' age *within* a classroom is unrelated to change in students' perceptions of interactions over time. Future work would benefit from other methodological approaches, like grand mean centering, to determine if there exist systematic differences in how younger versus older students in a sample perceive interactions with their teacher. Extant research has found a high-declining trajectory to be normative across elementary teachers reporting relational closeness with students in grades 1-5 (Spilt et al., 2012), and that students themselves report declining quality of relationships with their teachers as they transition to and through middle school

(Hughes & Cao, 2018). Whether synonymous longitudinal trends exist from elementary students' perspective remains an open question. Alternatively, it could be that stable individual characteristics like sex help students make meaning out of specific interactions, but are less salient related to meaning-making of interactions over time.

Though Model 1 (only student and teacher demographics) explained 40% of the overall variation in students' perceptions at Time 2, this was largely driven by Time 1 student perceptions, which explained the vast majority (97%) of the 35% of variance explained at level-1. That prior experiences of interactions would have such a large influence on later ones is in line with DST (Pianta et al., 2003; Pianta, 1999). How one makes meaning of an interaction informs how subsequent interactions are approached (Clark & Lemay, 2010; Hinde, 1987), leading to patterns of interactions that characterize relationships over time (O'Connor, 2010; Reis, Collins, & Berscheid, 2000; Spilt et al., 2012). This suggests that early impressions matter, and highlights the potential utility in supporting teachers and students to engage in positive interactions early in the school year. Promoting positive interactions early on is likely to set the expectation for future interactions – an especially important point considering the amount of time that elementary students spend with their teacher. Further, because third and fourth grade students are still fairly dependent on their teacher to support their positive behavior in the classroom (Baker et al., 2008; Zee & de Bree, 2015), students who perceive positive interactions with their teacher early on may be more likely to rely on them to co-regulate, putting in motion a positive feedback loop between teacher-student relationships and student behavior that ultimately supports students' success. Evidence from a randomized controlled trial of a school-wide intervention intended to support the development and

maintenance of positive teacher-student relationships revealed that the intervention led to a significant decrease in fourth and fifth grade students' observed disruptive behavior (Cook et al., 2018), highlighting the potential power of such feedback loops. Teachers' perceptions of relational quality may operate through students' perceptions to influence outcomes including student behavior. As such, the field would benefit from utilizing both teacher and student reports of interactional or relational quality in future intervention efforts. It is worth noting that the present study measured students' perceptions of interactions with their teacher mid-year and thus this study cannot speak to what proportion of variance perceptions at the start of year might explain related to those at the end of the year. However, the ICC (i.e., between classroom variability) for students' perceptions of interactions with their teacher increased from Time 1 to Time 2, indicating that perceptions of students within classrooms converged over time. It is reasonable to think that the convergence observed was more persistent from earlier in the school year than the present study observed.

While most stable characteristics of students and teachers were not found to influence change in students' perceptions of positive interactions with their teacher, present findings should not be viewed conclusively. It is worth noting, for example, that the present study's student sample was 95% non-white. Extant research provides evidence that students of color often have different relationships with their teachers compared to their white peers from pre-kindergarten and beyond (Garner & Mahatmya, 2015; Hughes & Kwok., 2007; Jerome, 2009; 2007; Spilt et al., 2012). It could be that such differences may be reflected in student reports of interactions with their teacher in more racially/ethnically diverse samples, though it could also be that between

racial/ethnic group differences did exist, but we were unable to detect them having grouped students identified as Black, Hispanic, and Other into one category. Relatedly, more measurement work needs to be done to confirm whether or not this student perception measure, and others like it, measure the same underlying construct(s) among students of different races/ethnicities. While the confirmatory measurement model fit our data well, we did not have the sample size to test multigroup models by race/ethnicity. Alternatively, it may be that these stable characteristics interact to influence changes in students' perceptions. For example, a growing literature on student-teacher race-match suggests pre-kindergarten and elementary school teachers perceive and interact differently with students dependent upon whether or not the students' race matches their own (Downer, Goble, Myers, & Pianta, 2016; Rasheed, Brown, Doyle, & Jennings, 2019; Saft & Pianta, 2001). Future work would benefit from replication in other samples, as well as investigations of interactive effects of student and teacher stable characteristics related to students' perceptions of interactions with their teacher.

In addition to stable demographics, DST postulates that variable characteristics (e.g., beliefs, psychological states) contribute to how students and teachers make meaning of and develop expectations for future interactions (Pianta et al., 2003, Clark & Lemay, 2010). While not a focus of the present study, this seems a fruitful avenue for future work. For example, there is a growing literature indicating that teachers experiencing higher levels of stress, depression, or burnout interact with students in less emotionally, organizationally, and instructionally supportive ways (Jennings et al., 2017; Sandilos, Goble, Rimm-Kaufman, & Pianta, 2018). Whether or not students perceive these differences related to how their teacher interacts with them is an open question. Abstract

reasoning and perspective-taking skills are still developing among third and fourth grade students (Eisenberg et al., 1987; Selman, 1974). As such, teacher states, like burnout, may only be perceived by elementary-aged students if they translate into concrete behaviors that influence interactions.

However, in this study only 16% of the variation in students' perceptions of positive interactions with their teacher was attributable to classrooms, and relatively little (33%) of that remained unexplained. While future work would certainly benefit from investigating things like teachers' wellbeing related to students' perceptions, there is more explanatory power to be leveraged in explaining differential perceptions *between* students in the same classroom. The majority (84%) of the variation in students' perceptions existed between students, and our models only explained about a third (35%) of that, even having controlled for time 1 student perceptions. As such, investigations focusing on variable characteristics of students is warranted. For example, one study found more disagreement between students reporting on their teacher's emotional support in classrooms observed to be unfair (Schenke et al., 2018). It is possible that students who experience unfairness or injustice directed toward them might perceive their teachers less positively compared to those who did not. This finding, however, was among a sample of middle schoolers – students who have more advanced perspective-taking (Choudhury, Blakemore, & Charman, 2006) and abstract reasoning skills (Eisenberg et al., 1987) than elementary students. Perceptions of fairness may only influence student perceptions of interactions with their teacher once these cognitive skills – which facilitate students' ability to make complex inferences about the circumstances of a peer whom they might compare themselves to – have developed, though this is an empirical question that merits

testing. Student behavior may also contribute to changes in students' perceptions of interactions. Extant work provides evidence that elementary students displaying externalizing behaviors tend to have more conflictual relationships as reported by teachers (Murray & Murray, 2004; Skalická, Stenseng, & Wichstrøm, 2015), which may translate into less positive interactions as perceived by students (see Erstevåg & Havik, 2019 for an example of how proactively aggressive fifth through tenth grade students differentially perceive interactions with teachers). Given that most of the variation in elementary students' perceptions of interactions with their teacher exists between students in the same classroom, the field would benefit from examining what student beliefs, values, classroom experiences, and psychological states influence how these perceptions change over time.

Observed Classroom Quality Related to Students' Perceptions of Interactions with Their Teacher

As hypothesized, global quality of classroom interactions was positively associated with change in elementary students' perceptions of positive interactions with their teacher. More specifically, students perceived interactions with their teacher more positively when their teacher created a warm and supportive environment, effectively managed student behavior, implemented routines to maximize learning time, and facilitated discussions to increase learning. This finding aligns with prior work that showed classroom quality to operate through elementary school students' perceptions to influence outcomes (Brock et al., 2008; Schenke, 2018). Though the effect size was small (f^2 = .01), global quality explained 5% of the 74% of total variance explained at level-2 – not an inconsequential amount given that Time 1 student perceptions accounted for

almost half (45%) of the variance. Extant research has shown observed classroom interactions to be particularly important for academically and behaviorally at-risk students (Cadima et al., 2009; Curby, Rudasill, Edwards, & Pérez-Edgar, 2011; Hamre & Pianta, 2005; Wilson, Pianta, & Stuhlman, 2007). As such, investigations of populations of elementary students for whom high quality global classroom interactions may be particularly beneficial is warranted related to students' perceptions of positive interactions with their teacher. For example, the association between global quality of classroom interactions and students' perceptions of positive interactions with their teacher may be dependent upon students' psychological state – perceptions of students experiencing depression or anxiety may become more positive when in a high quality classroom compared to students that are not. Future work would benefit from investigations of conditional benefits of classroom interactions.

Counter to our hypothesis, Instructional Support was negatively associated with students' perceptions of positive interactions with their teacher. This means that teachers who provided cognitively stimulating instruction, opportunities to engage with open-ended tasks, and structured dialogue to support students' learning were viewed less positively by their students compared to teachers who did not. The present study operationalized Instructional Support using a bifactor exploratory structural equation model, which means that instructional support must be understood as what variance relevant dimensions have left to contribute after having defined the global factor (Morin et al., 2016). It may be that what variance is shared between Instructional Support, Emotional Support, and Classroom Organization comprises more affective interactional qualities, leaving variance related to Instructional Support that might be interpreted as

"cognitive press" or how effective teachers are at delivering content to students (Hamre, Hatfield, Pianta, & Jamil, 2014).

Though unexpected, Schenke (2018) observed a negative association between observed Instructional Support and upper elementary students' perceptions of instructional support, indicating this to be a robust finding. It could be that instructionally rigorous teaching practices create discomfort for students, especially net of global quality, emotional support, and classroom organization. For example, Instructional Support includes the extent to which the teachers attend to and correct students' misconceptions and opportunities provided for students to explain their thoughts, self-evaluate, and reflect (Pianta et al., 2012). Students who misunderstand a concept and are corrected might feel disappointment in having gotten the answer wrong or embarrassment in having done so in front of the class. Similarly, having to share and revise your thoughts can be a vulnerable process during which students might feel anxious or insecure. Given that this negative association has now been found in two studies, future work would benefit from investigating specific classroom practices associated with Instructional Support related to students' perceptions of interactions with their teacher.

Limitations

The present study contributes to understanding how students' perceptions of positive interactions with their teacher change within an academic year. However, findings must be contextualized by several limitations. Because the majority of students first reported on positive interactions with their teacher between January and March, several months of the school year had passed during which students' perceptions of interactions had the opportunity to develop. While it is notable that significant

associations emerged related to change in students' perceptions over such a condensed period of time – raising questions about when in the academic year interventions might be effective – it is possible that stronger or different associations might have arisen had change in students' perceptions across a wider span of the academic year been investigated.

Measurement error in student reports of positive interactions with their teacher is included in the mean scores created for both Time 1 and Time 2, which may be biasing results. Though this is an important first glance into how elementary students' perceptions of interactions with their teacher change over time, future work should consider leveraging structural equation methodologies (e.g., latent change scores) to probe this topic with more precision. Issues of generalizability also need to be considered. Because the student sample leveraged for the present study included a high proportion of historically racially/ethnically minoritized students in an urban area, findings cannot be assumed to generalize to more racially/ethnically homogeneous student samples or those living in rural or suburban areas. Further, issues regarding multiple imputation model convergence constrained the number of student and teacher racial/ethnic categories that we were able to investigate in predictive models. It is possible that between racial/ethnic group differences in change in students' perceptions of positive interactions with their teacher existed that we were unable to observe due to this limitation.

Finally, while the present study provides insight into between student differences in how perceptions of teacher-student interactions change over time, the methodology employed does not investigate within person fluctuations over time (Hoffman, 2015).

Recent work leveraging a sample of middle and high school students showed a different pattern of results between students' mastery goal orientation and their perceptions of academic press dependent on whether between- or within- student changes were modeled (Ruzek & Schenke, 2019). Future work would benefit from similar approaches in younger student populations to determine whether rank order of perceptions (i.e., where a student's perceptions fall in comparison to other students) or an individual student's deviation from their own mean level of perceptions are stronger predictors of how their perceptions change over time.

Conclusion

Students' perceptions of interactions with their teacher are foundational for future interactions (Clark & Lemay, 2010), influencing the quality of teacher-student relationships (Brock et al., 2008) and ultimately students' success in school (Jamil et al., 2008). A growing base of evidence has developed providing insight into how perceptions of teacher-student interactions fluctuate among middle and high school students (Erstevåg & Havik, 2019; Ruzek & Schenke, 2019; Schenke et al., 2018). Adding to this, the present study contributes a better understanding related to change in elementary students' perceptions of interactions with their teacher, providing critical insight to the teacher-student relational system that might be leveraged to support teachers and students to thrive.

Acknowledgements

This study was supported by two Institute of Education Sciences U.S. Department of Education grants: Grant #R305A140559 to Fordham University and Grant #R305B140026 to the Rectors and Visitors of the University of Virginia. The opinions expressed are those of the authors and do not represent views of the Institute or the U.S. Department of Education.

References

Allen, J. P., Pianta, R. C., Gregory, A., Mikami, A. Y., & Lun, J. (2011). An interaction-based approach to enhancing secondary school instruction and student achievement. *Science, 333,* 1034-1037. doi: 10.1126/science.1207998

Baker, J. A., Grant, S., & Morlock, L. (2008). The teacher-student relationship as a developmental context for children with internalizing or externalizing behavior problems. *School Psychology Quarterly, 23,* 3-15. doi: 10.1037/1045-3830.23.1.3

Brock, L. L., Nishida, T. K., Chiong, C., Grimm, K. J., & Rimm-Kaufman, S. E. (2008). Children's perceptions of the classroom environment and social and academic performance: A longitudinal analysis of the contribution of the Responsive Classroom approach. *Journal of School Psychology, 46,* 129-149. https://doi.org/10.1016/j.jsp.2007.02.004

Cadima, J., Leal, T., & Burchinal, M. (2010). The quality of teacher-student interactions: Associations with first graders' academic and behavioral outcomes. *Journal of School Psychology, 48,* 457-482. doi: 10.1016/j.jsp.2010.09.001

Cameron-Ponitz, C., Rimm-Kaufman, S. E., Grimm, K. J., & Curby, T. W. (2009). Kindergarten classroom quality, behavioral engagement, and reading achievement. *School Psychology Review, 38*(1), 102-120.

Casabianca, J. M., Lockwood, J. R., & McCaffrey, D. F. (2015). Trends in classroom observations scores. *Educational and Psychological Measurement,* 75, 311-337. DOI: 10.1177/0013164414539163

Chaplin, D., Gill, B., Thompkins, A., & Miller, H. (2014). *Professional practice, student*

surveys, and value-added: Multiple measures of teacher effectiveness in the Pittsburgh Public Schools (REL 2014-024). Washington, DC: U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance, Regional Laboratory Mid-Atlantic. Retrieved from https://files.eric.ed.gov/fulltext/ED545232.pdf

Choudhury, S., Blakemore, S. J., & Charman, T., (2006). Social cognitive development during adolescence. *Social, Cognitive, and Affective Neuroscience, 1*(3), 165-174.

Cheung, G. W., & Rensvold, R. B. (2002). Evaluating goodness-of-fit indexes for testing measurement invariance. *Structural Equation Modeling: A Multidisciplinary Journal*, *9*(2), 233–255. https://doi.org/10.1207/S15328007SEM0902_5

Clark, M. S., & Lemay, E. P., Jr. (2010). Close relationships. In S. T. Fiske, D. T. Gilbert, & G. Lindzey (Eds.), *Handbook of social psychology: Vol 2. Handbook of social psychology* (5th ed. pp. 898-940).

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Lawrence Earlbaum Associates.

Cook, C. R., Coco, S., Zhang, Y., Duong, M. T., Renshaw, T. L., Long, A. C., & Frank, S. (2018). Cultivating positive teacher-student relationships: Preliminary evaluation of the Establish-Maintain-Restore (EMR) method. *School Psychology Review, 47,* 226-243. doi: 10.17105/spr-2017-0025.v47-3

Crosnoe, R., Morrison, F., Burchinal, M., Pianta, R., Keating, D., Friedman, S. L., &

Clarke-Stewart, K. A. (2010). Instruction, teacher-student relations, and math achievement trajectories in elementary school. *Journal of Educational Psychology, 103,* 407-417. doi: 10.1037/a0017762

Curby, T. W., Brock, L., & Hamre, B. (2013). Teachers' emotional support consistency predicts children's achievement gains and social skills. *Early Education and Development, 24,* 292-309. doi:10.1080/10409289.2012.665760

Curby, T. W., Rimm-Kaufman, S. E., & Abry, T. (2013). Do emotional support and classroom organization in the year set the stage for higher quality instruction? *Journal of School Psychology*, *51,* 557-569. http://dx.doi.org/10.1016/j.jsp.2013.06.001

Curby, T. W., Rudasill, K. M., Edwards, T., & Pérez-Edgar, K. (2011). The role of classroom quality in ameliorating the academic and social risks associated with difficult temperament. *School Psychology Quarterly*, *26*, 175-188. doi: 10.1037/a0023042

Curby, T. W., Stuhlman, M., Grimm, K., Mashburn, A., Chomat-Mooney, L., Downer, J., Hamre, B., & Pianta, R. C. (2011). Within-day variability in the quality of classroom interactions during third and fifth grade: Impliciations for children's experiences and conducting classroom observations. *The Elementary School Journal, 112*(1), 16-37.

Downer, J. T., Goble, P., Myers, S. S., & Pianta, R. C. (2016). Teacher-child racial/ethnic match within pre-kindergarten classrooms and children's early school adjustment. *Early Childhood Research Quarterly, 37,* 26-38. http://dx.doi.org/10.1016/j.ecresq.2016.02.007

Downer, J. T., Stuhlman, M., Schweig, H., Martinez, J. F., & Ruzek, E. (2014). Measuring effective teacher-student interactions from a student perspective: A multilevel analysis. *Journal of Early Adolescence, 35,* 1-37. doi: 10.1177/0272431614564059

Eisenberg, N., Shell, R., Pasternack, J., Lennon, R., Beller, R., & Mathy, R. M. (1987). Prosocial development in middle childhood: A longitudinal study. *Developmental Psychology, 23*(5), 712-718.

Erstevåg, S. K., & Havik, T. (2019). Students' proactive aggressiveness, mental health problems and perceived classroom interaction. *Scandinavian Journal of Educational Research,* 1-20.

Fauth, B., Decristan, J., Rieser, S., Klieme, E., & Büttner, G. (2014). Student ratings of teaching quality in primary school: Dimensions and prediction of student outcomes. *Learning and Instruction, 29,* 1–9. https://doi.org/10.1016/j.learninstruc.2013.07.001

Garner, P. W., & Mahatmya, D. (2015). Affective social competence and teacher-child relationship quality: Race/ethnicity and family income level as moderators. *Social Development, 24,* 678-697. doi: 10.1111/sode.12114

Hamre, B. K., & Pianta, R. C. (2001). Early teacher-child relationships and the trajectory of children's school outcomes through eighth grade. *Child Development, 72*(2), 625-638.

Hamre, B. K., & Pianta, R. C. (2005). Can instructional and emotional support in the first-grade classroom make a difference for children at risk of school failure? *Child Development, 76*(5), 949-967.

Hamre, B. K., & Pianta, R. C. (2007). Learning opportunities in preschool and early

elementary classrooms. In R. Pianta, M. Cox, & K. Snow (Eds.), *School readiness and the transition to kindergarten in the era of accountability* (pp. 49-84). Baltimore: Brookes.

Hinde, R. A., & Stevenson-Hinde, J. (1987). Interpersonal relationships and child development. *Developmental Review, 7,* 1-21.

Hoffman, L. (2015). *Longitudinal analysis: Modeling within-person fluctuation and change.* New York, NY: Routledge.

Hoffman, D. A., & Gavin, M. B. (1998). Centering decision in hierarchical linear models: Implications for research in organizations. *Journal of Management, 24*(5), 623-641.

Hughes, J. N., & Cao, Q. (2018). Trajectories of teacher-student warmth and conflict at the transition to middle school: Effects on academic engagement and achievement. *Journal of School Psychology, 67,* 148-162. doi: 10.1016/j.jsp.2017.10.003

Hughes, J., & Kwok, O. (2007). Influence of student-teacher and parent-teacher relationships on lower achieving readers' engagement and achievement in the primary grades. *Journal of Educational Psychology, 99,* 39-51. doi: 10.1037/0022-0663.99.1.39

Jennings, P. A., Brown, J. L., Frank, J. L., Doyle, S., Oh, Y., Davis, R., Rasheed, D., DeWeese, A., DeMauro, A. A., Cham, H., & Greenberg, M. T. (2017). Impacts of the CARE for Teachers program on teachers' social and emotional competence and classroom interactions. *Journal of Educational Psychology, 109,* 1010-1028. http://dx.doi.org/10.1037/edu0000187

Jerome, E. M., Hamre, B . K., and Pianta, R. C. (2009). Teacher-child relationships from kindergarten to sixth grade: Early childhood predictors of teacher-perceived conflict and closeness. *Social Development, 18,* 915-945. https://doi.org/10.1111/j.1467-9507.2008.00508.x

Jones, S. M., Brown, J. L., & Aber, L. J. (2011). Two-year impacts of a universal school-based social-emotional and literacy intervention: An experiment in translational development research. *Child Development, 82,* 533-554. doi: 10.1111/j.1467-8624.2010.01560.x

Keller, B. T., & Enders, C. K. (2017). *Blimp User's Manual (Version 1.0).* Los Angeles, CA.

Koo, T. K., & Li, M. Y. (2016). A guideline of selecting and reporting intraclass correlation coefficients for reliability research. *Journal of Chiropractic Medicine, 15,* 155-63. doi: 10.1016/j.jcm.2016.02.012.

Koomen, H. M. Y., & Jellesma, F. C. (2015). Can closeness, conflict, and dependency be used to characterize students' perceptions of the affective relationship with their teacher? Testing a new child measure in middle childhood. *British Journal of Educational Psychology, 85,* 479-497. doi: 10.1111/bjep. 12094

Lerner, R. M. (1998). Theories of human development: Contemporary perspectives. In W. Damon & R. M. Lerner (Eds.), *Handbook of child psychology: Vol. 1. Theoretical models of human development* (5th ed. pp. 1-24).

Lüdtke, O., Robitzsch, A., Trautwein, U., & Kunter, M. (2009). Assessing the impact of learning environments: How to use student ratings of classroom or school characteristics in multilevel modeling. *Contemporary Educational Psychology, 34,*

120–131. https://doi.org/10.1016/j.cedpsych.2008.12.001

Luna, B., Garver, K. E., Urban, T. A., Lazar, N. A., & Sweeney, J. A. (2004). Maturation of cognitive processes from late childhood to adulthood. *Child Development, 75*, 1357-1372. https://doi.org/10.1111/j.1467-8624.2004.00745.x

Madill, R. A., Gest, S. D., & Rodkin, P. C. (2014). Students' perceptions of relatedness in the classroom: The roles of emotionally supportive teacher-child interactions, children's aggressive behaviors, and peer social preference. *School Psychology Review, 41,* 86-105.

Merlo, J., Yang, M., Chaix, B., Lynch, J., & Råstam, L. (2005). A brief conceptual tutorial on multilevel analysis in social epidemiology: Investigating contextual phenomena in different groups of people. *Journal of Epidemiology & Community Health, 59,* 729-736. doi: 10.1136/jech.2004.023929

Morin, A. J. S., Arens, J. A., & Marsh, H. W. (2016). A bifactor exploratory structural equation modeling framework for the identification of distinct sources of construct-relevant psychometric multidimensionality. *Structural Equation Modeling: A Multidisciplinary Journal, 23,* 116-139. https://doi.org/10.1080/10705511.2014.961800

Murray, C., & Murray, K. M. (2004). Child level correlates of teacher-student relationships: An examination of demographic characteristics, academic orientations, and behavioral orientations. *Psychology in the Schools, 41,* 751-762. doi: 10.1002/pits.20015

O'Connor, E. (2010). Teacher-child relationships as dynamic system. *Journal of School Psychology, 48,* 187-218. doi: 10.1016/j.jsp.2010.01.001

O'Connor, E., & McCartney, K. (2007). Examining teacher-child relationships and achievement as part of an ecological model of development. *American Educational Research Journal, 44*, 340-369. doi: 10.3102/0002831207302172

Pianta, R. C. (1999). How the parts affect the whole: Systems theory in classroom relationships. In *Enhancing relationships between children and teachers* (pp. 23-43). Washington, DC: American Psychological Association.

Pianta, R. C., Hamre, B. K., & Mintz, S. (2012). *Classroom Assessment Scoring System (CLASS) Upper Elementary Manual*. Charlottesville, VA: Teachstone.

Pianta, R. C., Hamre, B., & Stuhlman, M. (2003). Relationships between teachers and children. In W. M. Reynolds & G. E. Miller (Eds.), *Comprehensive handbook of psychology* (Vol. 7, pp. 199-234). New York: Wiley.

Pianta, R. C., & Stuhlman, M. W. (2004). Teacher-child relationships and children's success in the first years of school. *School Psychology Review, 33*(4), 444-458.

Rasheed, D., Brown, J.L., Doyle, S., & Jennings, P.A. (2019). The effect of teacher-child race/ethnicity matching and classroom diversity on children's socioemotional and academic skills. *Child Development.* doi: 10.1111/cdev.13275

Raudenbush, S. W., & Bryk, A. S. (2002). *Hierarchical linear models: Applications and data analysis methods* (2nd ed.). Thousand Oaks, CA: Sage.

Reis, H. T., Collins, W. A., & Berscheid, E. (2000). The relationship context of human

behavior and development. *Psychological Bulletin, 126*, 844-872. Doi: 10.1037//0033-2909.126.6.844

Ross, E., Gerber, N., Jarmolowski, H., Lakis, K., Ledyard, N., Staresina, L., & Worth, C. (2017). *2017 state teacher policy yearbook: National summary.* Washington, DC: National Council on Teacher Quality.

Rucinski, C. L., Brown, J. L., & Downer, J. T. (2018). Teacher-child relationships, classroom climate, and children's social-emotional and academic development. *Journal of Educational Psychology, 110*, 992-1004. http://dx.doi.org/10.1037/edu0000240

Ruzek, E. A., Hafen, C. A., Allen, J. P., Gregory, A., Mikami, A. Y., & Pianta, R. C. (2016). How teacher emotional support motivates students: The mediating roles of perceived peer relatedness, autonomy support, and competence. *Learning and Instruction, 42*, 95-103. http://dx.doi.org/10.1016/j.learninstruc.2016.01.004

Ruzek,. E. A., & Schenke, K. (2019). The tenuous link between classroom perceptions and motivation: A within-person longitudinal study. *Journal of Educational Psychology, 111*(5), 903-917. https://doi.org/10.1037/edu0000323

Saft, E. W., & Pianta, R. C. (2001). Teachers' perceptions of their relationships with students: Effects of child age, gender, and ethnicity of teachers and children. *School Psychology Quarterly, 16*(2), 125-141.

Sandilos, L. E., Goble, P., Rimm-Kaufman, S. E., & Pianta, R. C. (2018). Does professional development reduce the influence of teacher stress on teacher-child interactions in pre-kindergarten classrooms? *Early Childhood Research Quarterly, 42*, 280-290. https://doi.org/10.1016/j.ecresq.2017.10.009

Sandilos, L. E., Rimm-Kaufman, S. E., & Cohen, J. J. (2017). Warmth and demand: The relation between students' perceptions of the classroom environment and achievement growth. *Child Development, 88,* 1321-1337. doi: 10.1111/cdev.12685

Schenke, K. (2018). From structure to process: Do students' own construction of their classroom drive their learning? *Learning and Individual Differences, 62,* 36-48. https://doi.org/10.1016/j.lindif.2018.01.006

Schenke, K., Ruzek, E., Lam. A. C., Karabenick, S. A., & Eccles, J. S. (2018). To the means and beyond: Understanding variation in students' perceptions of teacher emotional support. *Learning and Instruction, 55,* 13-21. https://doi.org/10.1016/j.learninstruc.2018.02.003

Selman, R. (1974). A structural-developmental analysis of levels of role taking in middle childhood. *Child Development, 45*(3), 803-806.

Selya, A. S., Rose, J. S., Dierker, L. C., Hedeker, D., & Mermelstein, R. J. (2012). A practical guide to calculating Cohen's f^2, a measure of local effect size, from PROC MIXED. *Frontiers in Psychology, 3,* 1-6. doi: 10.3389/fpsyg.2012.00111

Skalická, V., Stensenfg, F., & Wichstrøm, L. (2015). Reciprocal relations between student-teacher conflict, children's social skills and externalizing behavior: A three-wave longitudinal study from preschool to third grade. *International Journal of Behavioral Development, 39,* 413-425. doi: 0.1177/0165025415584187

Shrout, P. E., & Fleiss, J. L. (1979). Intraclass correlations: Uses in assessing rater reliability. *Psychological Bulletin, 86,* 420-428. doi:10.1037/0033-2909.86.2.420.

Snijders, T. A. B., & Bosker, R. J. (2006). *Multilevel analysis: An introduction to basic*

and advanced multilevel modeling (2nd ed.). Thousand Oaks, CA: Sage.

Spilt, J. L., Hughes, J. N., Wu, J. N., & Kwok, O. (2012). Dynamics of teacher-student relationships: Stability and change across elementary school and the influence on children's academic success. *Child Development, 83,* 1180-1195. doi: 10.1111/j.1467-8624.2012.01761.x

Spilt, J. L., Koomen, H. M., & Jak, S. (2012). Are boys better off with male and girls with female teachers? A multilevel investigation of measurement invariance and gender match in teacher-student relationships quality. *Journal of School Psychology, 50*(3), 363-378. doi: 10.1016/j.jsp.2011.12.002

Summers, J. J., Davis, H. A., & Hoy, A. W. (2017). The effects of teachers' efficacy beliefs on students' perceptions of teacher relationship quality. *Learning and Individual Differences, 53,* 17-25. https://doi.org/10.1016/j.lindif.2016.10.004

Voyer, D., & Voyer, S. D. (2014). Gender differences in scholastic achievement: A meta-analysis. *Psychological Bulletin, 140,* 1174-1204. http://dx.doi.org/10.1037/a0036620

Wallace, T. L., Kelcey, B., & Ruzek, E. (2016). What can student perception surveys tell us about teaching? Empirically testing the underlying structure of the Tripod Student Perception Survey. *American Educational Research Journal, 53,* 1834–1868. https://doi.org/10.3102/0002831216671864

Wilson, H. K., Pianta, R. C., & Stulman, M. (2007). Typical classroom experiences in first grade: The role of classroom climate and functional risl in the development of social competencies. *The Elementary School Journal, 108*(2), 81-96.

Zee, M., & de Bree, E. (2016). Students' self-regulation and achievement in basic reading

and math skills: the role of student-teacher relationships in middle childhood. *European Journal of Developmental Psychology*, *12*, 265-280. https://doi.org/10.1080/17405629.2016.1196587

Table 1.
Analytic sample counts by treatment status.

	Treatment	Control	Total Sample
Students	861	1,186	2,047
Teachers/Classrooms	66	79	145
Schools	14	13	27

Table 2.
Univariate statistics for key study variables.

	Mean	SD	Min	Max
T1 St. Perc.	3.69	0.71	1.00	5.00
T2 St. Perc.	3.73	0.75	1.00	5.00
CLASS-GL	0.00	0.92	-2.68	1.82
CLASS-ES	0.01	0.81	-3.79	2.25
CLASS-CO	0.01	0.85	-2.21	1.89
CLASS-IS	0.01	0.81	-1.73	2.44

Note. SD = standard deviation, T1 = time 1, T2 = time 2, St. Perc. = students' perceptions of interactions with their teacher, CLASS-GL= CLASS global factor scores, CLASS-ES = CLASS emotional support factor scores, CLASS-CO = CLASS classroom organization factor scores, CLASS-IS = CLASS instructional support factor scores.

Table 3.
Bivariate correlations for all study variables.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. T2 St. Perc.	1														
2. T1 St. Perc.	.62***	1													
3. St. Age	.01	.06**	1												
4. St. Female	.10***	.10***	-.08***	1											
5. St. Poverty	.05*	.07**	.06**	.01	1										
6. St. Non-White	.03	.05*	.05*	-.02	.30***	1									
7. Time Lag	.03	.05*	-.07**	-.01	.01	.01	1								
8. TX	.04	.01	.03	.02	.17***	.10***	-.03	1							
9. Tch. Yrs. Exp.	.07**	.03	.03	.02	.05**	.05*	-.10***	.19***	1						
10. Tch. Female	.04	.02	-.04	.01	.02	.01	.01	.08***	.11***	1					
11. Tch. Non-White	.09**	.05	-.05*	.00	.17***	.18***	-.08**	.12***	.24***	.09***	1				
12. CLASS-GL	.11***	.06**	.04	-.02	-.07**	-.06*	.01	-.22***	-.07**	-.07**	-.04	1			
13. CLASS-ES	.05	.02	-.02	.02	-.06**	.00	.06*	.08***	.02	-.09***	.00	.13***	1		
14. CLASS-CO	.07**	.06**	-.02	.02	.00	.01	-.15***	.06**	.07**	.00	-.03	.11***	-.00	1	
16. CLASS-IS	-.08**	-.03	.02	-.02	-.07**	.10***	.04	-.19***	-.09***	-.08***	-.03	.15***	-.16***	-.17	1

Note. $N_{classrooms} = 145$. Bivariate correlations were conducted prior to imputation. T1 = time 1, T2 = time 2, St. Perc. = students' perceptions of interactions with their teacher; St. = student, Time Lag = time lag in days between Time 1 and Time 2 survey completion, TX = treatment status (1=treatment), Tch Yrs. Exp. = teacher's years of experience, Tch. = teacher, CLASS-GL= CLASS global factor scores, CLASS-ES = CLASS emotional support factor scores, CLASS-CO = CLASS classroom organization factor scores, CLASS-IS = CLASS instructional support factor scores.
*** $p \leq .001$. ** $p \leq .01$. * $p \leq .05$.

Table 4.
Factor loadings resulting from the Classroom Assessment Scoring System – Upper Elementary Bifactor Exploratory Structural Equation measurement model.

	CLASS-G	CLASS-ES	CLASS-CO	CLASS-IS
Positive Climate	.67***	.53***	.13	-.07
Teacher Sensitivity	.68***	.38***	.11	-.12
Regard for Student Perspectives	.51***	.34*	-.22	.25
Negative Climate	.23***	.36***	.07	-.02
Behavior Management	.53***	.15	.58***	-.10
Productivity	.51***	.01	.59***	.00
Instructional Learning Formats	.69***	-.05	.08	.08
Content Understanding	.72***	-.21	-.07	.37**
Analysis and Inquiry	.36**	-.03	-.08	.66***
Quality of Feedback	.58***	.07	-.26**	.29
Instructional Dialogue	.67***	.14	-.23***	.52***
Factor Determinacy Score	.94	.82	.86	.82

Note. Standardized factor scores are reported. CLASS-GL= CLASS global, CLASS-ES = CLASS emotional support, CLASS-CO = CLASS classroom organization, CLASS-IS = CLASS instructional.
*** $p \leq .001$. ** $p \leq .01$. * $p \leq .05$.

Table 5.
Results for multilevel models examining the associations between student and teacher demographics, observed quality of classroom interactions, and change in students' perceptions of interactions with their teacher.

	Model 1			Model 2		
	Estimate	(S.E)	f^2	Estimate	(S.E.)	f^2
Level-1						
Time 1 St. Perc.	.61***	(.02)	.63[7]	.61***	(.02)	.61
St. Age	-.04	(.03)		-.04	(.03)	
St. Female	.07*	(.03)	.00	.07*	(.03)	.00
St. Poverty	.01	(.04)		.01	(.04)	
St. Non-White	-.03	(.08)		-.04	(.08)	
Time Lag	.00	(.00)		.00	(.00)	
Level-2						
CL Time 1 St. Perc.	.87***	(.08)		.82***	(.08)	
CL St. Age	-.02	(.03)		-.02	(.03)	
Treatment	.02	(.05)		.04	(.04)	
Tch. Non-White	.05	(.05)		.05	(.05)	
Tch. Female	.04	(.08)		.05	(.08)	
Tch. Yrs. Exp.	.00	(.00)		.00	(.00)	
CLASS-G	-			.08***	(.02)	.01
CLASS-ES	-			-.02	(.03)	
CLASS-CO	-			.00	(.02)	
CLASS-IS	-			-.07**	(.02)	.01
R_1^2		.40			.41	

Note. All estimates are unstandardized. Local effect sizes (f^2) are reported for significant associations. Models were estimated across 20 imputation datasets. S.E. = standard error; St. Perc. = students' positive perceptions of interactions with their teachers; St. = student; CL = classroom-level; Tch. = teacher; CLASS-G = CLASS global; CLASS-ES = CLASS emotional support; CLASS-CO = CLASS classroom organization; CLASS-IS = CLASS instructional support.
*** $p \leq .001$. ** $p \leq .01$. * $p \leq .05$.

[7] The local effect sizes reported for Time 1 student perceptions represents the effect of that variable at both level-1 and 2.

The Role of Teacher-Student Relationships in Predicting Teachers' Personal Accomplishment and Emotional Exhaustion

Catherine M. Corbin[1], Pilar Alamos[1], Amy E. Lowenstein[2], Jason T. Downer[1], Joshua L. Brown[2]

[1] The University of Virginia, [2] Fordham University

(Published in *Journal of School Psychology*)

Corbin, C. M., Alamos, P., Lowenstein, A. E., Downer, J. T., & Brown, J. L. (2019). The role of teacher-student relationships in predicting teachers' personal accomplishment and emotional exhaustion. *Journal of School Psychology*, *77*, 1-12. https://doi.org/10.1016/j.jsp.2019.10.001

Abstract

Teaching is a uniquely stressful profession. Though previous work has drawn attention to the high levels of burnout teachers report experiencing and its impact on students, comparatively less work has investigated what influences teachers' burnout itself. Guided by Lazarus' (1991) transactional model of stress and coping, the present study explored the links between the proximal resource of teachers' relationships with students and burnout. Specifically, we investigated the association between classroom aggregated teacher reports of relational closeness and conflict, and two components of burnout: personal accomplishment and emotional exhaustion. Results indicated that teachers who reported close relationships with their students also reported higher levels of personal accomplishment over the academic year, whereas more conflictual relationships were associated with increased emotional exhaustion. Implications for relational quality with students as a central influence on teachers' wellbeing are discussed.

Keywords: Teacher-student Relationships, Burnout, Wellbeing, Teacher, Classroom, Elementary School

The Role of Teacher-Student Relationships in Predicting Teachers' Personal Accomplishment and Emotional Exhaustion

Teaching is one of the most cognitively and emotionally demanding professions (Roeser, Skinner, Beers, & Jennings, 2012). When in the classroom, teachers are expected to frequently shift their attention from the learning needs of specific students to the needs of the entire group, problem solve in the moment, and regulate their own emotions without being able to leave or otherwise disengage from the classroom (Day & Leitch, 2001; O'Connor, 2008). A recent study highlighted that teachers receive inadequate training to cope with these demands (Schonert-Reichl, Kitil, & Hanson-Peterson, 2017), further taxing teachers' resources. It is unsurprising then that 59% of teachers report being under great stress (Markow, Macia, & Lee, 2013), the persistence of which can elevate feelings of job-related burnout (Herman, Hickmon-Rosa, & Reinke, 2018; Hoglund, Klingle, & Hosan, 2015). This is concerning if we consider that high levels of stress and burnout are one of the reasons why teachers leave their profession (Belcastro & Gold, 1983; Liu & Onwuegbuzie, 2012), which in turn destabilizes schools and negatively affects educational quality, particularly for low-performing schools (Ronfeldt, Loeb, & Wyckoff, 2013).

Teachers who report high levels of stress tend to have difficulty managing classroom dynamics and remaining focused on learning goals (Clunies-Ross, Little, & Kienhuis, 2008; Downer, Jamil, & Maier, 2012). As a result, students in these classrooms demonstrate lower academic achievement, more behavior problems (Greenberg, Brown, & Abenavoli, 2016), and higher levels of stress, as evidenced by their morning cortisol (Oberle & Schonert-Reichl, 2016). Given the negative influence of high levels of teacher stress on students' learning (e.g., Curbow, Spratt, Ungaretti, McDonnell & Breckler, 2000; Friedman-Krauss, Raver, Morris, & Jones, 2014; Yoon, 2002), and considering that teachers spend most of their working time in the classroom, it is critical to understand classroom factors that affect teachers' mental health and wellbeing.

One such classroom factor is the quality of relationships teachers have with their students (Klassen, Perry, & Frenzel, 2012). For teachers, conflictual relationships with their students are a key source of stress (Friedman, 2006; Spilt, Koomen, & Thijs, 2011), whereas teachers identify close relationships with students as their main source of enjoyment, satisfaction, and professional motivation (Hargreaves, 2000; Quan-McGimpsey, Kuczynski & Brophy, 2013). As such, Spilt et al. (2011) theorize that relationships with students have an emotional and psychological value for teachers, thus highlighting the relevance that relationships with students have for teachers' mental health and wellbeing. The present study sought to empirically examine this idea by exploring key aspects of teacher-student relationship quality with the potential to influence teachers' mental health, operationalized as teacher burnout (Maslach, 1993). To do so, we applied Lazarus's (1991) transactional model of stress and coping to hypothesize and test how the quality of teacher-student relationships may contribute to systematic differences in teachers' burnout. Understanding this association is important to discerning how to prevent teacher burnout as a path toward improving educational quality.

Theoretical Perspective on Teacher-Student Relationships and Teachers' Burnout

The quality of teacher-student relationships is typically operationalized based on teacher perceptions of the closeness (e.g., warmth, connection, and openness) and conflict (e.g., negativity or lack of rapport) they experience in their relationship with a particular student (Sabol & Pianta, 2012). To understand how the quality of teacher-student relationships can play a role in teachers' occupational stress, and consequently in their experience of burnout, we rely on Lazarus' transactional model of stress and coping (1991). Applied to teachers (McCarthy, Lambert, O'Donnell, & Melendres, 2009; Spilt et al., 2011), this model posits that stress derives from transactions between the teacher and the classroom environment in which the classroom provides the teacher with information (e.g., students are actively participating in the classroom activity, one student is constantly interrupting the lesson, some students spontaneously share information about themselves), and the teacher evaluates that information through two appraisals.

The *first appraisal* involves teachers judging whether the information is relevant to them and congruent with their goals. Only relevant information elicits emotions, and the valence of the emotions will depend on the congruency of the information with the teacher's goals; a teacher will experience positive emotions when the information is congruent with their goals (e.g., students are engaged in the instructional activity for a teacher who values students' participation), and negative emotions when it is incongruent (e.g., two students are misbehaving and constantly interrupting the lesson of a teacher who needs to ensure covering certain content in a specific timeframe). The experience of negative emotions leads to a *second appraisal*, in which teachers judge their ability to cope with the information that elicited the negative emotions, and experience stress when they appraise that they are unable to cope (e.g., feels defeated managing a specific student's misbehavior, not being able to leave the classroom when they need it). The experience of occupational stress over long periods of time may lead to burnout (Friedman, 2006).

Burnout (Maslach, 1993) is a psychological condition characterized by a lack of personal accomplishment – a positive trait that refers to feelings of competence and successful achievement in one's work –, feelings of emotional exhaustion (i.e., emotional frustration, fatigue, and strain), and a detached response to or cynicism about various aspects of the job (i.e., depersonalization)[1]. In this paper, we examined how the quality of teachers' relationships with students is associated with their feelings of personal accomplishment and emotional exhaustion. Next, we briefly describe our hypotheses and summarize the research supporting the links between teacher-student relational closeness and conflict, and teachers' personal accomplishment and emotional exhaustion, respectively.

Teacher-Student Relationship Quality and Teachers' Personal Accomplishment

Following Lazarus' (1991) first appraisal, as applied to teachers, teachers who perceive

[1] Data on depersonalization were not collected in the present study. The personal accomplishment and emotional exhaustion subscales of the Maslach Burnout Inventory (MBI) have demonstrated better internal consistency than the depersonalization subscale (Schaufeli, Bakker, Hoogduin, Schaap, & Kladler, 2001), and thus were prioritized for data collection.

high levels of closeness in their relationships with students may experience positive emotions, as developing close relationships with students is relevant for teachers and congruent with their professional goals (Chang, 2013). Given that positive emotions likely influence teachers' feelings of personal accomplishment, we hypothesize that when teachers experience high levels of relational closeness with their students, they will report high levels of personal accomplishment. Aligned with our hypothesis, when middle school teachers are observed to provide high quality classroom-level interactions to students, they report higher job satisfaction (Virtanen, Vaaland, & Ertesvåg, 2019). In contrast, Milatz, Lüftenegger and Schober (2015) did not find evidence supporting the link between relational closeness and personal accomplishment in a sample of elementary school teachers. However, two limitations of their study should be noted. First, the small sample size (i.e., 88 teachers and two students per classroom) may explain why the estimated response surface analysis model exploring these associations did not fit the data. Second, the cross-sectional nature of their design did not account for the fact that teachers' experiences of relational closeness with their students may need time to contribute to their feelings of professional competence. As a result of these mixed findings, the extent to which teachers who experience high relational closeness with their students report high levels of personal accomplishment remains unclear.

In keeping with the first appraisal (Lazarus, 1991) as applied to teachers, teachers who perceive high levels of conflict in their relationships with students may experience negative emotions, as conflict represents a threat to teachers' goals (e.g., conducting instructional activities; Chang, 2013). Conversely, experiencing negative emotions may not necessarily result in lower feelings of personal accomplishment; this link will depend on other factors like teachers' attributions and perceptions. For instance, teachers may attribute their conflictual relationship with a student to factors external to themselves, like a student's personality or the education level of a student's parents (Chang, 2009). When teachers attribute conflict to these external factors, they report higher levels of personal accomplishment (Bibou-Nakou, Stogiannidou &

Kioseogglou, 1999). Therefore, it could be the case that conflict negatively predicts teachers' personal accomplishment only in classrooms where the teacher perceives relatively extreme levels of conflict with several students. In these classrooms, explanations relying on attributions to external factors may not be enough for the teacher to make meaning of the negative emotions experienced under situations of conflict. Along these lines, Yudron, Jones, and Raver (2014) suggest using proportions or counts to represent the number of students in a classroom with whom the teacher perceives high levels of conflict. Accordingly, we did not anticipate teacher-student relational conflict to be negatively associated with teachers' personal accomplishment, unless teachers experience high conflict with a large number of students relative to conflict perceived with other students in the same classroom.

Teacher-Student Relationship Quality and Teachers' Emotional Exhaustion

As described earlier, the transactional model of stress and coping (Lazarus, 1991) posits that only negative emotions require a second appraisal. Applied to the teaching profession, in this second appraisal teachers judge their ability to cope with the information eliciting negative emotions (i.e., a sense of control). Teachers experience stress when unable to cope with the information eliciting negative emotions (i.e., lack of a sense of control), which, when experienced over a prolonged period of time, can lead to feelings of emotional exhaustion (Chang, 2009; Jennings & Greenberg, 2009). Consequently, we expect that when teachers experience high levels of relational conflict with their students, they will report high levels of emotional exhaustion. According to the same model, relational closeness will not influence teachers' emotional exhaustion, as closeness is likely to elicit positive, not negative emotions, and thus removes the need for a second appraisal.

Although prior work has not examined the direct link between teacher-student relational conflict and teachers' emotional exhaustion, emerging evidence indicates that middle school teachers' perceptions of the quality of their relationships with students indirectly influence their emotional exhaustion through their experiences of anger (Taxer, Becker-Kurz, & Frenzel, 2019).

This echoes the strong evidence for students' behavior problems as one of the main sources of teachers' emotional exhaustion (Aloe, Shisler, Norris, Nickerson, & Rinker, 2014; American Psychological Association [APA], 2006; Hakanen, Bakker, & Schaufeli, 2006; Tsouloupas, Carson, Matthews, Grawitch, & Barber, 2010) in that such behaviors are associated with teachers' experience of anger and frustration (Chang, 2013); behavior problems often interrupt teachers' goals of following lesson plans, helping students' reach learning goals, and, overall, make their job more difficult (LaPointe, 2003). Although students' behavior problems may play a role in teachers' emotional exhaustion, there is also evidence to suggest that relational processes, particularly conflict with students as perceived by teachers, may be a more powerful predictor of teachers' emotional exhaustion than students' actual problem behaviors (Hamre et al., 2008). For example, elementary school teachers report significantly different levels of stress in relation to similar students who display behavioral problems (Abidin & Robinson 2002; Greene, Beszterczey, Katzenstein, Park, & Goring, 2002), which aligns with a transactional perspective. From this standpoint, emotional exhaustion is conceptualized as a response to teachers' appraisals of disruptive behaviors, rather than to the behaviors themselves (Roseman, & Smith, 2001; Smith, & Lazarus, 1990). Indeed, a recent study (Aldrup, Klusmann, Lüdtke, Göllner, & Trautwein, 2018) found that middle school teachers' ratings of behavioral problems contribute to their emotional exhaustion through teachers' perceptions of relational quality with their students, underscoring the key role that relational processes with students play in teachers' emotional exhaustion. As a result, we anticipate that teacher-student relational conflict will play a role in the feelings of emotional exhaustion that elementary school teachers perceive, above and beyond students' behavioral problems.

The Present Study

In the current study, we examined the hypothesized associations of closeness and conflict in teacher-student relationships with the two components of teacher burnout: personal accomplishment and emotional exhaustion. In particular, we hypothesized that (1) for personal

accomplishment, teachers who, on average, initially perceived high relational closeness with students in the classroom would report higher personal accomplishment later in the school year, when controlling for earlier personal accomplishment; and (2) for emotional exhaustion, teachers who, on average, initially perceived high relational conflict with students in the classroom would report higher emotional exhaustion later in the school year, when controlling for earlier emotional exhaustion. Finally, we moved beyond the mean levels and hypothesized that (3) teachers who initially perceived relatively high relational conflict with a larger proportion of students in their classroom would report lower personal accomplishment later in the school year, when controlling for earlier personal accomplishment.

To operationalize relational closeness and conflict in the classroom, we used the classroom-level mean of teacher-reported closeness and conflict with individual students. Several prior studies use the mean to transform student-level characteristics to the classroom-level (e.g., Friedman-Krauss et al., 2014; Thomas, Bierman, & Powers, 2011). To get an estimate of the number of students within the classroom with whom the teacher perceived high conflict, we calculated the proportion of students in the classroom with teacher-reported conflict scores two standard deviations above the classroom mean (Yudron et al., 2014). The decision to calculate the number of perceived high-conflict relationships using the classroom as opposed to the sample mean was made to align with the theoretical intra-individual process previously discussed. Specifically, using the classroom mean allows for an estimate of each teacher's perception of extreme conflict *relative* to conflict they perceived with other students in the same classroom, as opposed to relative to conflict other teachers perceived with students in other classrooms. In order to isolate the association between relational closeness and conflict and components of teacher burnout, all models controlled for variables shown to be associated with aspects of burnout, including teacher-reported student aggressive behaviors, students' English language arts test scores, teacher's years of experience, teacher certification (regular or other), classroom type (general education vs. inclusion/self-contained), and school treatment status from the larger

randomized-controlled trial from which we drew data for this analysis. In this way, we were able to examine how teacher-student relationships may play a role in teacher burnout, beyond these other relevant factors.

Methods

Data and Participants

Data for this study come from Cohort one (2015-2016) of a large-scale, multi-cohort, school-randomized controlled efficacy trial of a social-emotional learning (SEL) and literacy intervention (Reading, Writing, Respect, and Resolution; 4Rs) paired with an intensive teacher coaching model designed to improve curricular effectiveness (MyTeachingPartner; MTP). The 4Rs+MTP program represents the integration of two well-validated protocols for supporting effective teaching practices and students' social and academic learning. The 4Rs component of the program is a universal, school-based intervention in conflict resolution and intergroup understanding that integrates social-emotional development into the language arts curriculum for students in grades K-5 (Jones, Brown, & Aber, 2011). MTP is an innovative professional development approach that relies heavily on teachers having an opportunity to get feedback about their practice through shared viewing of video from their classrooms and coach-teacher interaction through high-quality written feedback and questions to prompt teacher self-reflection on practice successes and challenges (Allen, Pianta, Gregory, Mikami, & Lun, 2011). The study was conducted in a large, urban city located in the northeastern United States, with program implementation occurring over the course of one academic year.

The majority of teachers (93%) reported on their mental health, wellbeing, and demographic characteristics in the summer (August) prior to the start of the academic year. Ten teachers completed the self-report survey between August and December. Teachers reported on the consented students in their class, including their relationship with each student, in the winter (January – March), with 93% of teachers having completed reports on students by February. Summer and winter data collection are heretofore referred to as Time 1. All Time 2 data (teacher

self-reports, teacher reports on students) were collected between May and July, with most teachers (73%) having completed surveys in June.

The total analytic sample for the current study included 2,047 3rd and 4th grade students taught by 145 teachers in 27 schools (see Table 1 for counts by treatment status). The sample was evenly distributed between 3rd (46.5%) and 4th (45%) grade classrooms with comparatively fewer mixed grade classrooms (8.5%). Approximately 51% of the students were female. The average age was 9 years (*SD* = .81). Across all schools, 86% of students were eligible for free or reduced price lunch (FLR), 28% were identified as having special education (SPED) status (19 classrooms consisted of 100% students identified as having an IEP), and 15% were identified as English Language Learners (ELL). The majority of students identified as Hispanic or Latino (64%) with the remaining identifying themselves as Black (28%), White (4.5%), or Other (3.5%).

Teachers were majority (92%) female, reported an average of 11 years of experience (*SD* = 7.52), and most (93%) reported holding a master's degree. The teacher sample was racially/ethnically heterogeneous; approximately 34% of teachers identified themselves as White, 25% as Hispanic or Latino, 30% as Black or African American, 6.5% as Multiracial, 3.5% as Asian, and 1% as Other. The average class size was 22 students (*SD* = 5.51, Range = 8 - 33*)*.

Procedures

All full-time teachers in participating treatment and control schools were eligible for the study. Active parental consent was attained through permission forms that research study staff distributed to classrooms of students in September and October. Only those students with parental consent were included as participants.

Measures

Classroom-aggregated teacher-student relational closeness and conflict. Teacher-reported closeness and conflict with individual students was measured using the 15-item short-form of the Student-Teacher Relationship Scale (STRS; Pianta, 2001). Teachers responded to eight items assessing aspects of perceived closeness (e.g., "I share an affectionate warm

relationship with this child") and seven items assessing aspects of perceived conflict (e.g., "This child and I always seem to be struggling with each other"). Items were rated using a 5-point Likert scale ranging from 1-*Definitely Does Not Apply* to 5-*Definitely Applies*. The STRS has demonstrated discriminant and predictive validity (Birch & Ladd, 1998; Hamre & Pianta, 2001). In the current sample, both the closeness and conflict subscales showed acceptable internal consistency (α = .78 and α = .93, respectively) and were moderately negatively correlated (r = -.32, p < .001; see Table 2 for bivariate correlations for all study variables). Both closeness and conflict were aggregated to the classroom-level.

Emotional exhaustion and personal accomplishment. Aspects of teacher wellbeing were measured using the Emotional Exhaustion (EE) and Personal Accomplishment (PA) subscales of the Maslach Burnout Inventory-Educator Survey (MBI-ES; Maslach, Jackson, & Schwab, 1996). EE includes nine items (e.g., "I feel emotionally drained from my work") to assess the extent to which teachers report feeling emotionally frustrated, strained, and/or fatigued. PA includes eight items (e.g., "I have accomplished many worthwhile things in this job") that capture teachers' self-evaluation of their job performance, related to a sense of efficacy and capability. Teachers were asked to read each item and report if they had ever felt that way about their job using a 7-point Likert scale ranging from 0-*Never* to 6-*Every Day*. The MBI-ES has demonstrated construct (Byrne, 1991; Kokkinos, 2006), and both discriminant and predictive validity (Aloe et al., 2014; Hoglund, Klingle, & Hosan, 2015; Jeon, Buettner, Grant, & Lang, 2019). Both EE and PA showed acceptable internal consistency at Time 1 (α = .92 and α = .72, respectively) and Time 2 (α = .93 and α = .73). EE and PA were not significantly correlated at Time 1 (r = -.12, p = .17), and were significantly negatively correlated Time 2 (r = -.27, p < .001), indicating that EE and PA are capturing different aspects of teachers' burnout.

Classroom-aggregated student behavior problems. Teachers reported on aggressive behaviors that individual students exhibited using the Behavioral Assessment System for Children (BASC) – Aggression subscale (Reynolds & Kamphaus, 1998). Specifically, the BASC

includes 14 items using a 4-point Likert scale (ranging from *Never* to *Almost always*) concerning how often individual students display specific behaviors such as "complains about rules" or "blames others." The BASC-Aggression subscale showed high internal consistency (α = .95) in the current sample. This measure of aggressive behaviors was used as a proxy for students' behavior problems, and was aggregated to the classroom-level. Within a prior school-randomized controlled trial of the 4Rs program, children's exposure to intervention schools was found to impact the aggression subscale, demonstrating linear change over two years (Jones et al., 2011).

Student, Teacher, and Classroom Demographics. Data on student demographic characteristics, including race/ethnicity and gender, and academic achievement were collected via school records provided by the local Department of Education. Teacher (e.g., years of experience) and classroom (e.g., class size) demographics were provided via teacher-report on the teacher surveys administered at Time 1. All student-level demographic information was aggregated to the classroom-level.

Analytic Plan

An investigation of complete missing data, the prevalence of which ranged from 3% to 9%, showed data to not be missing completely at random (MCAR; Little, 1988). Though there is no formal test for missing at random (MAR), the data leveraged for the present study includes a rich set of covariates found to be associated with burnout in prior work, which limits the likelihood that an unobserved variable exists that would exert high levels of influence on the outcomes of interest. As such, we assume missing at random and proceed with single-level multiple imputation using Blimp v1.1. (Keller & Enders, 2017). Twenty separate imputed datasets were created.

The imputed datasets were analyzed in Mplus version 7 to estimate the association between Time 1 teacher-reported relational closeness and conflict, and Time 2 teacher-reported EE and PA, controlling for Time 1 EE and PA. Two models were estimated: one including average classroom-level teacher-reported relational closeness and conflict (Model 1), and a

second model that also included the proportion of students two standard deviations above the mean classroom-level conflict (Model 2). Models were estimated simultaneously to account for the correlation between the residual variance of the two dependent variables. Additional classroom-level covariates included teacher-reported student aggressive behaviors, students' English Language Arts (ELA) test scores, teacher's years of experience, teacher certification (regular or other), classroom type (general education vs. inclusion/self-contained), and treatment status.[2] All independent variables were allowed to freely covary, resulting in fully saturated models with perfect fit.

Prior to analysis, unconditional two-level models were evaluated for each outcome of interest, with classrooms at level-one and schools at level-two. Between school variation ranged from 1% (Time 2 PA) to 10% (Time 2 EE). As a sensitivity check, models were evaluated clustering the standard errors by school. Results were not sensitive to the school-level clustering. As such, all models presented are one-level path models that do not account for between school clustering. Standardized estimates are presented in tables and text. Additionally, due to the timing of survey completion for Time 1 and 2, there is some variability in the amount of time that passed between the pre- and post-test assessments of burnout across teachers. As a robustness check, we added two covariates to our base models: (1) time lag in days between the summer and spring teacher survey completion dates and (2) number of days into the school year that the spring teacher survey was completed (relative to 8/4/15, the date the summer survey was deployed). Results remained the same with these timing variables included in the models, so, for the sake of parsimony, we report only the base models. Cohen's f^2 was calculated to assess the local effect

[2] A sensitivity analysis was conducted in which Model 1 was evaluated separately for treatment and control teachers and classrooms. Consistent with results from the combined sample, relational closeness was significantly positively associated with PA in both the treatment and control groups. Inconsistent with results for the combined sample, relational conflict was not significantly associated with EE in either group. The small sample sizes for the treatment (N = 66) and control (N = 79) groups suggest we are underpowered to detect the small effect size ($f^2 = .04$) for conflict related to EE observed in the combined sample.

(i.e., variance explained by an independent variable of interest relative to variance explained by other independent variables in the model) of all variables significantly associated with each outcome (Cohen, 1988; Selya, Rose, Dierker, Hedeker, & Mermelstein, 2012). In line with convention, an f^2 effect size of .02, .15, and .35 is interpreted as small, medium, and large, respectively (Cohen, 1988). The present study's sample (N = 145) is able to detect with 80% power effect sizes of .11 and higher.

Results

Table 3 presents descriptive statistics for teacher-reported emotional exhaustion and personal accomplishment, classroom-level relational conflict and closeness, and the proportion of students for whom teachers reported levels of relational conflict greater than two standard deviations above the classroom mean prior to imputation (statistics did not differ markedly when averaged across the 20 imputation datasets). On average, teachers reported high levels of PA and low levels of EE. Similarly, teachers reported low levels of relational conflict and high levels of relational closeness. The average classroom was characterized by a low proportion of students (M = .05, SD = .09) for whom teachers reported experiencing relational conflict two standard deviations greater than the classroom mean.

Table 4 shows results for prediction models 1 (i.e., average classroom-level teacher-reported relational closeness and conflict) and 2 (i.e., proportion of students two standard deviations above the mean classroom-level conflict), which are described in the following sections for PA and EE, respectively. Refer to Figure 1 for a visual representation of significant results from model 1.

Associations between Relational Closeness and Conflict and Teacher Personal Accomplishment

Model 1 results indicate that classroom-level teacher-reported closeness was positively associated with Time 2 PA, controlling for Time 1 (β = .32, $p \leq .001$, f^2 = .12; see Figure 1). This indicates that a one standard deviation increase in teachers' perceptions of closeness was

associated with a .32 increase in teachers' reports of PA. Average classroom ELA achievement was negatively associated with PA ($\beta = -.18$, $p \leq .05$, $f^2 = .03$), such that teachers in classrooms with higher ELA achievement reported lower PA. Teachers who reported greater EE at Time 1 reported significantly lower PA at Time 2 ($\beta = -.27$, $p \leq .001$, $f^2 = .10$). Considering Model 2 (see Table 4), and contrary to our hypotheses, the proportion of students for whom teachers reported levels of relational conflict greater than two standard deviations above the classroom mean was not statistically significantly related to PA ($\beta = .10$, $p = .50$).

Associations between Relational Closeness and Conflict and Teacher Emotional Exhaustion

Referring to Model 1 results, only classroom-level teacher-reported conflict positively predicted Time 2 teacher-reported EE, controlling for Time 1 ($\beta = .23$, $p \leq .05$, $f^2 = .04$). This indicates that on average, teachers reporting one standard deviation greater than the mean for relational conflict with students experienced a .23 increase in Time 2 EE. Teachers who reported greater PA at Time 1 reported significantly lower EE at Time 2 ($\beta = -.16$, $p \leq .05$, $f^2 = .05$).

Discussion

The present study investigated links between teachers' perceptions of relational quality with their students and feelings of burnout. We examined this in a sample of 3rd and 4th grade teachers working in high-needs schools, who may have been at particular risk for experiencing burnout (e.g., Hoglund et al., 2015; Pas, Bradshaw, & Hershfeldt, 2012). Aligned with calls to emphasize teachers' psychological wellbeing (Jennings & Greenberg, 2009), and guided by Lazarus' transactional model of stress and coping, we specifically studied whether classroom-level measures of teachers' perceptions of relational closeness and conflict with their students was associated with two components of burnout: personal accomplishment and emotional exhaustion. Results indicated that relational closeness and conflict were a source of teachers' personal accomplishment and emotional exhaustion, respectively. Taken together, these findings are some of the first to empirically support the theoretical model outlining the importance of student-teacher relationships for teachers' wellbeing (Spilt et al., 2011). Following is a discussion

of the empirical and practical significance of these findings, where this work should next embark, and limitations to consider.

Relational Closeness is Linked to Teachers' Personal Accomplishment

Our findings provided support for the link between teacher-student relational closeness during the year and teachers' personal accomplishment at the end of the year. As hypothesized, only closeness, and not conflict, was significantly and positively linked with teachers' personal accomplishment. This result indicated that when teachers perceive warmth, connection, and openness in the relationships with their students they are more likely to report feelings of competence and achievement in their own work. Such links between closeness and personal accomplishment are consistent with Lazarus' transactional model of stress and coping; developing close relationships with students is meaningful for teachers, and thus is likely to elicit positive emotions, which in turn translate into feelings of personal accomplishment. However, it is important to note that we were unable to explicitly test this mechanism because data on teachers' specific appraisals (e.g., whether relationships with students are relevant to them and congruent with their goals) or emotional experiences (e.g., whether relationships with students elicit positive emotions in teachers) were not collected.

The fact that the local effect size of the link between relational closeness and teachers' personal accomplishment was moderate (f^2 = .12) and similar to that of their Time 1 reports of personal accomplishment (f^2 = .11) holds implications for how we can support teachers' psychological wellbeing. This is important given that most prior work has either reverse coded personal accomplishment, or considered low scores as symptomatic of burnout (e.g., Brouwers & Tomic, 2000; Egyed & Short, 2006; Goddard, O'Brien, & Goddard, 2006; Grayson & Alvarez, 2008; Shin, Noh, Jang, Park, & Lee., 2013; Skaalvik & Skaalvik, 2007; Steinhardt, Jaggars, Faulk, & Gloria, 2011), thus limiting our understanding of how to enhance teachers' personal accomplishment. Based on findings from the present study, resources may be well invested in helping teachers to develop close relationships with their students in support of the occupational

efficacy of teachers. However, most prior studies that target the development of warm and supportive teacher-student relationships have focused *only* on student outcomes, further limiting our understanding of how teacher-student relationship interventions may also support teachers. For instance, a short-term intervention that focused teachers' attention on what they have in common with specific students (Gehlbach et al., 2016) demonstrated gains in teachers' perceptions of relational quality with their students, and in students' academic achievement. Similarly, an intervention that instructs elementary school teachers to intentionally develop positive relationships with students (Cook et al., 2018) showed improvements in teacher reports of relational quality, and students' observed behaviors. Results from our study raise the question about whether such efforts to improve teacher-student relationships may also show impacts on teachers' psychological wellbeing, particularly their personal accomplishment. Further school-based intervention work to improve teacher-student relationships should consider including teacher burnout measures in order to provide experimental evidence on how closer relationships with students impact teachers.

Before seriously contemplating its application to intervention, this finding must be contextualized by the high levels of personal accomplishment reported in this sample. The mean level of personal accomplishment at both Time 1 and Time 2 exceeded five on a 7-point scale (0-*Never* to 6-*Every Day*), where 5 indicates "A Few Times a Week." The standard deviation indicated that most teachers reported at or above a three (i.e., "A Few Times a Month"), indicating moderate to high levels across a substantial proportion of teachers in this sample. Given that the average teacher reported such high levels of competence and achievement related to their work, the field would be well-advised to consider the value-added of increasing the experience of a positive psychological construct already highly endorsed. That said, personal accomplishment (M = 5.25, SD = 0.65) in this sample was more negatively skewed than in other samples where mean levels were more moderate, ranging from 3.47 (SD = 0.41; Hoglund et al., 2015) to 4.37 (SD = .83; Taris, Le Blanc, Schaufeli, & Schreurs, 2005). There could be

something unique about this sample of teachers (e.g., most held a Master's degree or higher) related to their reports of higher mean levels of personal accomplishment. Given the skewed data and uniqueness of the sample, it will be important to replicate this work in other samples of teachers.

Relational Conflict is Not Linked to Teachers' Personal Accomplishment

Counter to our hypothesis, the proportion of students in the classroom for whom teachers perceived extreme levels of conflict was not linked to teachers' personal accomplishment. This finding was especially surprising given that we defined extreme cases relative to mean conflict within classrooms. We opted for this approach to look at individual teacher perceptions of conflict, irrespective of how high or low they may have rated conflict with students compared to other teachers. It is possible that such extreme cases are more salient when teachers attribute their conflictual relationship with a student to internal factors (e.g., their training, skills, etc.), than when they attribute them to external factors such as students' personality or chronic family stress (Chang, 2013; Mavropoulou & Padeliadu, 2002). This raises questions about whether the proportion of extreme cases of conflict is differentially salient related to teachers' personal accomplishment depending on their beliefs and attributions or other school factors (e.g., supports available to teachers). Future research should explore this hypothesis.

Relational Conflict is Linked to Teachers' Emotional Exhaustion

As hypothesized, relational conflict emerged as linked to increases in teachers' emotional exhaustion, whereas relational closeness was unrelated. This finding suggests that when teachers perceive negativity or lack of rapport in the relationships with their students, they are more likely to report feelings of emotional frustration, fatigue, and strain. This result is also consistent with Lazarus' transactional model of stress and coping in that conflict with students will likely elicit negative emotions in teachers, which over time can lead to feelings of emotional exhaustion. Considering that emotional exhaustion is the component of burnout most associated with teachers' depression (Steinhardt et al., 2011) and motivation to leave the profession (Skaalvik &

Skaalvik, 2011), this finding speaks to the need for supporting teachers to manage the relational conflict they experience with students. This result is especially compelling given that we accounted for teacher ratings of students' aggressive behaviors, and thus set a higher bar for finding a link between relational conflict and teachers' emotional exhaustion. In other words, relational conflict with students matters for teachers' emotional exhaustion beyond teachers' perceptions of students' aggressive behaviors, thus underscoring the importance of adopting a relational perspective (and not only a reduction in behavior problems) to target teachers' emotional exhaustion.

Different from the moderate local effect size observed for closeness, the local effect size of conflict related to teachers' emotional exhaustion was small (f^2 = .04). This finding suggests that interventions intended to support teachers' psychological wellbeing should focus on helping teachers to build close relationships with students, rather than reducing conflict. Yet, future experimental work is needed to provide stronger evidence for this claim. Despite the small local effect size, the relationship between conflict and teachers' emotional exhaustion should not be dismissed. Given the high stability of teachers' emotional exhaustion from Time 1 to Time 2 (r = .69***) and the high local effect size of Time 1 related to Time 2 emotional exhaustion (f^2 = .82), it is of substantive interest that conflict emerged as significantly linked to emotional exhaustion, even after controlling for teachers' perceptions of students' aggressive behaviors. Because small effect sizes often do not replicate across different samples (Loannidis, 2005), future work should investigate the replicability of this finding.

Limitations and Future Directions

Due to the paucity of empirical work investigating this intraindividual psychological process applied to teacher burnout, this study's reliance on teacher-reported measures was intentional. Given the dynamic nature of relationships, however, future work would benefit from bringing in different perspectives, such as student-reports or observational data about student-teacher relationship qualities. It is common to find low agreement between multiple reporters (Johnson &

Hannon, 2014; Kunter & Baumert, 2006), so it might be that what is supported here is solely an intraindividual psychological process that would need to be revisited and modified to accommodate the dynamics of multiple perspectives. Further, relationships with students are not the only ones relevant to teachers; colleagues (Travers & Cooper, 1996) and parents (Prakke, van Peet, & van der Wolf, 2007) are also important sources of stress for teachers. In addition to relationships, teachers also report characteristics of the school environment (e.g., organization, climate) as sources of stress (Shernoff, Mehta, Atkins, Torf, & Spencer, 2011). The field would benefit from looking more comprehensively at all of the environmental features that could contribute to personal accomplishment and emotional exhaustion, as a means of identifying the most active mechanisms.

Additionally, there is a case to be made for the importance of preventing emotional exhaustion in support of teachers' sense of personal accomplishment. Emotional exhaustion significantly predicted personal accomplishment with an effect size (f^2 = .10) in line with both Time 1 personal accomplishment (f^2 = .11) and relational closeness (f^2 = .12). Though only conflict emerged as a modest predictor of emotional exhaustion, more work needs to be done to understand how we might prevent teachers' increased feelings of emotional fatigue throughout the year. In this vein, more work is needed to better understand how emotional exhaustion and personal accomplishment influence one another. Though emotional exhaustion was a stronger predictor of personal accomplishment, personal accomplishment also significantly negatively predicted emotional exhaustion. The present study provides evidence that different constructs are significantly associated with these two aspects of burnout; future work is warranted to understand how influencing one aspect, either directly or indirectly, holds implications for the other.

Though not central to the aims of this study, it is notable that classroom aggregated teacher reports of student aggressive behavior were not significantly associated with teacher-reported emotional exhaustion. This finding runs counter to a recent meta-analysis that found student misbehavior to be most strongly related to emotional exhaustion of all burnout

components (Aloe et al., 2014). It could be, as Spilt et al. (2011) theorize, that relational quality both moderates and mediates the association between student behavior and teacher wellbeing. Future work is needed to better understand how relational quality and student behavior jointly influence teacher wellbeing.

Data used for the present study come from a randomized-controlled trial (RCT) of an intervention intended to support implementation of an intervention that targeted students' social-emotional skills. Despite teacher burnout and teacher-student relational quality not being direct targets of the intervention, it is possible that the intervention influenced both (e.g., access to coaches might have made teachers feel more supported in positively interacting with students). Though we controlled for intervention status, which was not significantly associated with either outcome of interest, it will be important to replicate these findings using samples of teachers engaged solely in business-as-usual.

Future work would also benefit from investigations in which teachers report on relational quality at many or different points throughout the academic year. In the current study, teachers reported on relational quality mid- (January-March) and end-of-year (May-June). Though extant research provides evidence of the relative stability of closeness and conflict within an academic year (Doumen et al., 2008; Hartz, Williford, & Koomen, 2017; Mejia & Hoglund, 2016; Portilla, Ballard, Adlet, Boyce, & Obradović, 2014), there is still significant variation in teacher-reported relational quality, especially for closeness. It could be that teachers who start the year experiencing different levels of emotional exhaustion and personal accomplishment perceive and proceed to develop relationships with students differently. Whether or not all significant paths supported by the present study replicate when teachers report on relational quality at different time points is a remaining question.

Finally, and related to the previous point, though the present study provides rigorous evidence that student-teacher relationships are associated with components of teacher burnout, there is existing literature that also provides evidence in support of the reverse pathway. For

instance, a recent experimental trial of the CARE for teachers program (Jennings et al., 2017) indicated that promotion of teachers' wellbeing leads to improvements in the quality of teacher-student interactions, thus underscoring the potential bidirectional nature of these processes. The reciprocal interactions between teacher-student relationships and teachers' burnout beg the question of whether or not all of the paths for which there is empirical evidence emerge longitudinally. It would be important to know if relational quality drives changes in burnout, if burnout drives changes in relational quality, or if they contribute to changes in each other over time. Given that burnout is a teacher characteristic and relational quality is constructed and shared with the student, the point of intervention that the field may converge on will be different dependent on these longitudinal associations. For these reasons, we see investigations of bidirectional associations as a critical next step for the field.

Conclusion

Teaching is a uniquely stressful profession. Approximately half of K-12 teachers report experiencing high levels of daily job-related stress – a proportion matched only by the nursing profession (Gallup, 2014). This stress has been linked to increased levels of teacher burnout (Steinhardtet al, 2011), which is concerning for teachers' own mental health (e.g., Steinhardt et al., 2011; Shin et al., 2013), for student outcomes (e.g., Oberle, & Schonert-Reichl, 2016), and for schools' functioning (e.g., Skaalvik & Skaalvik, 2011; Ronfeldt et al., 2013). The present study highlights how the proximal resource of relationships with students are related to teachers' experience of burnout over the school year.

Acknowledgements

This study was supported by the Institute of Education Sciences U.S. Department of Education, through Grant R305A140559, awarded to Joshua Brown, and through Grant #R305B140026 to the Rectors and Visitors of the University of Virginia, and by a scholarship awarded to Pilar Alamos by the National Commission of Scientific and Technological Research (CONICYT), Chile. The opinions expressed are those of the authors and do not represent views of the Institute or the U.S. Department of Education.

References

Abidin, R. R., & Robinson, L. L. (2002). Stress, biases or professionalism: What drives teachers' referral judgments of students with challenging behaviors? *Journal of Emotional and Behavioral Disorders, 10,* 204-212. doi: 10.1177/10634266020100040201

Aldrup, K., Klusmann, U., Lüdtke, O., Göllner, R., & Trautwein, U. (2018). Student misbehavior and teacher well-being: Testing the mediating role of the teacher-student relationship. *Learning and Instruction, 58,* 126-136. doi: 10.1016/j.learninstruc.2018.05.006

Aloe, A. M., Shisler, S. M., Norris, B. D., Nickerson, A. B., & Rinker, T. W. (2014). A multivariate meta-analysis of student misbehavior and teacher burnout. *Educational Research Review, 12,* 30-44. doi: 10.1016/j.edurev.2014.05.003

Allen, J. P., Pianta, R. C., Gregory, A., Mikami, A. Y., & Lun, J. (2011). An interaction-based approach to enhancing secondary school instruction and student achievement. *Science, 333,* 1034-1037. doi: 10.1126/science.1207998

American Psychological Association, Coalition for Psychology in Schools and Education. (2006). *Report on the teacher needs survey*. Washington, DC: American Psychological Association.

Belcastro, P. A., & Gold, R. S. (1983). Teacher stress and burnout: Implications for school health personnel. *Journal of School Health, 53*, 404-407. https://doi.org/10.1111/j.1746-1561.1983.tb03148.x

Bibou-Nakou, I., Stogiannidou, A., & Kioseogglou, G. (1999). The relation between teacher burnout and teachers' attributions and practices regarding school behaviour problems. *School Psychology International, 20,* 209-217. doi: 10.1177/0143034399020002004

Birch, S. H., & Ladd, G. W. (1998). Children's interpersonal behaviours and the teacher–child relationship. *Developmental Psychology, 34,* 934–946. doi: 10.1037/0012-1649.34.5.934

Brouwers, A., & Tomic, W. (2000). A longitudinal study of teacher burnout and perceived self-efficacy in classroom management. *Teaching and Teacher Education, 16*, 239-253. doi: 10.1016/S0742-051X(99)00057-8

Bryne, B. M. (1991). The Maslach Burnout Inventory: Validating factorial structure and invariance across intermediate, secondary, and university educators. *Multivariate Behavioral Research, 26*(4), 583-605.

Chang, M. L. (2009). An appraisal perspective of teacher burnout: Examining the emotional work of teachers. *Educational Psychology Review, 21*, 193–218. doi: 10.1007/s10648-009-9106-y

Chang, M. L. (2013). Toward a theoretical model to understand teacher emotions and teacher burnout in the context of student misbehavior: Appraisal, regulation and coping. *Motivation and Emotion, 37,* 799-817. doi: 10.1007/s11031-012-9335-0

Clunies-Ross, P., Little, E., & Kienhuis, M. (2008). Self-reported and actual use of proactive and reactive classroom management strategies and their relationship with teacher stress and student behavior. *Educational Psychology, 28*, 693-710. doi: 10.1080/01443410802206700

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Lawrence Earlbaum Associates.

Cook, C. R., Coco, S., Zhang, Y., Fiat, A. E., Duong, M. T., Renshaw, T. L., … & Frank, S. (2018). Cultivating positive teacher-student relationships: Preliminary evidence of the Establish-Maintain-Restore (EMR) method. *School Psychology Review, 47,* 226-243. doi: 10.17105/SPR-2017-0025.V47-3.

Curbow, B., Spratt, K., Ungaretti, A., McDonnell, K., & Breckler, S. (2000). Development of the child care worker job stress inventory. *Early Childhood Research Quarterly, 15*, 515-536. doi: 10.1016/S0885-2006(01)00068-0

Day, C., & Leitch, R. (2001). Teachers' and teacher educators' lives: the role of emotion. *Teaching and Teacher Education, 17*, 403-415. doi: 10.1016/S0742-051X(01)00003-8

Doumen, S., Verschueren, K., Buyse, E., Germeijs, V., Luyckx, K., & Soenens, B. (2008). Reciprocal relations between teacher-child conflict and aggressive behavior in kindergarten: A three-wave longitudinal study. *Journal of Clinical Child & Adolescent Psychology, 37*, 588-599. doi: 10.1080/15374410802148079

Downer, J. T., Jamil, F., & Maier, M. (2012). Implications of information processing theory for professional development of early educators. In C. Howes, B. Hamre, & R. Pianta (Eds.), *Effective early childhood professional development: Improving teacher practice and child outcomes* (pp. 131–155). Baltimore, MD: Brookes.

Egyed, C.J. & Short, R.J. (2006) Teacher self-efficacy, burnout, experience and decision to refer a disruptive student. *School Psychology International, 27*, 462-474. doi: 10.1177/0143034306070432

Friedman-Krauss, A. H., Raver, C. C., Morris, P. A., & Jones, S. M. (2014). The role of classroom-level child behavior problems in predicting preschool teacher stress and classroom emotional climate. *Early Education and Development*, 25, 530-552. doi: 10.1080/10409289.2013.817030

Friedman, I. A. (2006). Classroom management and teacher stress and burnout. In C. M. Evertson & C. S.Weinstein (Eds.), *Handbook of classroom management: Research, practice, and contemporary issues* (pp. 925–944). Mahwah, NJ: Erlbaum.

Gallup. (2014). State of American schools: The path to winning again in education. Retrieved from https://www.gallup.com/services/178769/state-america-schools-report.aspx.

Gehlbach, H., Brinkworth, M. E., Hsu, L., King, A., McIntyre, J., & Rogers, T. (2016). Creating birds of similar feathers: Leveraging similarity to improve teacher-student relationships

and academic achievement. *Journal of Educational Psychology*. *108*, 342-352. doi: 10.1037/edu0000042

Goddard, R., O'Brien, P., & Goddard, M. (2006). Work environment predictors of beginning teacher burnout. *British Educational Research Journal, 32,* 857-874. doi: 10.1080/01411920600989511

Grayson, J. L., & Alvarez, H. K. (2008). School climate factors relating to teacher burnout: A mediator model. *Teaching and Teacher Education, 24*, 1349-1363. doi: 10.1016/j.tate.2007.06.005

Greenberg, M. T., Brown J. L., & Abenavoli, R.M. (2016). *Teacher stress and health effects on teachers, students, and schools*. Edna Bennett Pierce Prevention Research Center, Pennsylvania State University.

Greene, R. W., Beszterczey, S. K., Katzenstein, T., Park, K., & Goring, J. (2002). Are students with ADHD more stressful to teach?: Patterns of teacher stress in an elementary school sample. *Journal of Emotional and Behavioral Disorders, 10*, 79–89. doi: 10.1177/10634266020100020201

Hakanen, J. J., Bakker, A. B., & Schaufeli, W. B. (2006). Burnout and work engagement among teachers. *Journal of School Psychology, 43*, 495–513. doi:10.1016/j.jsp.2005.11.001

Hamre, B. K., & Pianta, R. C. (2001). Early teacher–child relationships and the trajectory of children's school outcomes through eighth grade. *Child Development, 72,* 625-638. doi: 10.1111/1467-8624.00301

Hamre, B. K., Pianta, R. C., Downer, J. T., & Mashburn, A. J. (2008). Teachers' perceptions of conflict with young students: Looking beyond problem behaviors. *Social Development, 17,* 115–136. doi: 10.1111/j.1467-9507.2007.00418.x

Hargreaves, A. (2000). Mixed emotions: Teachers' perceptions of their interactions with students. *Teaching and Teacher Education, 16*, 811–826. doi: 10.1016/S0742-051X(00)00028-7

Hartz, K., Williford, A. P., & Koomen, H. M. Y. (2017). Teachers' perceptions of teacher-child

relationships: Links with children's observed interactions. *Early Education and Development, 28,* 441-456. doi: 10.1080/10409289.2016.1246288

Herman, K. C., Hickmon-Rosa, J., & Reinke, W. M. (2018). Empirically derived profiles of teacher stress, burnout, self-efficacy, and coping and associated student outcomes. *Journal of Positive Behavior Interventions, 20,* 90–100. doi: 10.1177/1098300717732066

Hoglund, W. L. G., Klingle, K. E., & Hosan, N. E. (2015). Classroom risks and resources: Teacher burnout, classroom quality and children's adjustment in high needs elementary schools. *Journal of School Psychology, 53,* 337–357. doi: 10.1016/j.jsp.2015.06.002

Jennings, P. A., & Greenberg, M. T. (2009). The prosocial classroom: Teacher social and emotional competence in relation to student and classroom outcomes. *Review of Educational Research, 79,* 491–525. doi: 10.3102/0034654308325693

Jennings, P. A., Brown, J. L., Frank, J. L., Doyle, S., Oh, Y., Davis, R., ... Greenberg, M. T. (2017). Impacts of the CARE for teachers program on teachers' social and emotional competence and classroom interactions. *Journal of Educational Psychology*, *109*, 1010-1028. doi: 10.1037/edu0000187

Jeon, L., Buettner, C. K., Grant, A. A., & Lang, S. N. (2019). Early childhood teachers' stress and childrens' social, emotional, and behavioral functioning. *Journal of Applied Developmental Psychology, 61,* 21-32. https://doi.org/10.1016/j.appdev.2018.02.002

Johnson, K., & Hannon, M. (2014). Measuring the relationship between parent, teacher, and student problem behavior reports and academic achievement: Implications for school counselors. *Professional School Counseling, 18,* 38-48. doi: 10.1177/2156759X0001800109

Jones, S. M., Brown, J. L., & Aber, L. J. (2011). Two-year impacts of a universal school-based social-emotional and literacy intervention: An experiment in translational development research. *Child Development, 82*, 533-554. doi: 10.1111/j.1467-8624.2010.01560.x

Keller, B. T., & Enders, C. K. (2017). *Blimp User's Manual (Version 1.0).* Los Angeles, CA.

Klassen, R. M., Perry, N. E., & Frenzel, A. C. (2012). Teachers' relatedness with students: An underemphasized component of teachers' basic psychological needs. *Journal of Educational Psychology, 104*, 150-165. doi: 10.1037/a0026253

Kokkinos, C. M. (2006). Factor structure and psychometric properties of the Maslach Burnout Inventory – Educators Survey among elementary and secondary school teachers in Cyprus. *Stress and Health, 22,* 25-33. doi: 10.1002/smi.1079

Kunter, M., & Baumert, J. (2006). Who is the expert? Construct and criterion validity of student and teacher ratings of instruction. *Learning Environments Research, 9*(3), 231-251.

LaPointe, J. M. (2003). Teacher–student conflict and misbehavior: Toward a model of the extended symmetrical escalation. *Journal of Classroom Interaction, 38*(2), 11–19.

Lazarus, R. S. (1991). Progress on a cognitive–motivational–relational theory of emotion. *American Psychologist*, *46*, 819–834. doi: 10.1037/0003-066X.46.8.819

Little, R. J. A. (1988). A test of missing completely at random for multivariate data with missing values. *Journal of the American Statistical Association, 83*(404), 1198-1202.

Liu, S., & Onwuegbuzie, A. J. (2012). Chinese teachers' work stress and their turnover intention. *International Journal of Educational Research*, *53*, 160-170. doi: 10.1016/j.ijer.2012.03.006

Loannidis, J. P. (2005). Why most published research findings are false. *PLoS medicine, 2*, e124.

Markow, D., Macia, L., & Lee, H. (2013). *The MetLife survey of the American teacher: Challenges for school leadership*. New York, NY: Metropolitan Life Insurance Company.

Maslach, C. (1993). Burnout: A multidimensional perspective. In W. B. Schaufeli, C. Maslach, & T. Marek (Eds.), *Series in applied psychology: Social issues and questions. Professional burnout: Recent developments in theory and research* (pp. 19-32). Philadelphia, PA, US: Taylor & Francis.

Maslach, C., Jackson, S. E., & Schwab, R. L. (1996). Maslach Burnout Inventory –Educators Survey (MBI-ES). In C. Maslach, S. E. Jackson, & M. P. Leiter (Eds.), *MBI Manual* (3rd ed.). Palo Alto, CA: Consulting Psychologists Press.

Mavropoulou, S., & Padeliadu, S. (2002). Teachers' causal attributions for behavior problems in relation to perceptions of control. *Educational Psychology, 22,* 191-202. doi: 10.1080/01443410120115256

McCarthy, C. J., Lambert, R. G., O'Donnell, M., & Melendres, L. T. (2009). The relation of elementary teachers' experience, stress, and coping resources to burnout symptoms. *The Elementary School Journal, 109,* 282-300. doi: 10.1086/592308

Mejia, T. M., & Hoglund, W. L .G. (2016). Do children's adjustment problems contribute to teacher-child relationship quality? Support for a child-driven model. *Early Childhood Research Quarterly, 34,* 13-26. doi: 10/1016/j.ecresq.2015.08.003

Milatz, A., Lüftenegger, M., & Schober, B. (2015). Teachers' relationship closeness with students as a resource for teacher wellbeing: A response surface analytical approach. *Frontiers in Psychology, 6,* doi: 10.3389/fpsyg.2015.01949

Oberle, E., & Schonert-Reichl, K. A. (2016). Stress contagion in the classroom? The link between classroom teacher burnout and morning cortisol in elementary school students. *Social Science & Medicine, 159,* 30-37. doi: 10.1016/j.socscimed.2016.04.031

O'Connor, K. E. (2008). "You choose to care": Teachers, emotions and professional identity. *Teaching and Teacher Education, 24,* 117–126. doi: 10.1016/j.tate.2006.11.008

Pas, E. T., Bradshaw, C. P., & Hershfeldt, P. A. (2012). Teacher- and school-level predictors of teacher efficacy and burnout: identifying potential areas for support. *Journal of School Psychology, 50,* 129-145. doi: 10.1016/j.jsp.2011.07.003.

Pianta, R. C. (2001). *Student–teacher relationship scale: professional manual*. Lutz: Psychological Assessment Resources.

Portilla, X. A., Ballard, P. J., Adler, N. E., Boyce, W. T., Obradović, J. (2014). An integrative view of school functioning: Transactions between self-regulation, school engagement, and teacher-child relationship quality. *Child Development, 85*, 1915-1931. doi: 10.1111/cdev.12259

Prakke, B., van Peet, A., & van der Wolf, K. (2007). Challenging parents, teacher occupational stress and health in Dutch primary schools. *International Journal about Parents in Education, 1*, 36-44.

Quan-McGimpsey, S., Kuczynski, L., & Brophy, K. (2013). Tensions between the personal and the professional in close teacher-child relationships. *Journal of Research in Childhood Education, 27*, 111-126. doi: 10.1080/02568543.2012.738287

Reynolds, C.R., & Kamphaus, R.W. (1998). *Behavioral Assessment System for Children*. Circle Pines, MN: American Guidance Service Inc.

Roeser, R. W., Skinner, E., Beers, J., & Jennings, P. A. (2012). Mindfulness training and teachers' professional development: An emerging area of research and practice. *Child Development Perspectives, 6*, 167–173. doi: 10.1111/j.1750-8606.2012.00238.x

Ronfeldt, M., Loeb, S., & Wyckoff, J. (2013). How teacher turnover harms student achievement. *American Educational Research Journal, 50*, 4-36. doi: 10.3102/0002831212463813

Roseman, I. J., & Smith, C. A. (2001). Appraisal theory: Overview, assumptions, varieties, controversies. In K. R. Scherer, A. Schorr, & T. Johnstone (Eds.), *Series in affective science. Appraisal processes in emotion: Theory, methods, research* (pp. 3-19). New York, NY, US: Oxford University Press.

Sabol, T. J., & Pianta, R. C. (2012). Recent trends in research on teacher-child relationships. *Attachment and Human Development, 14*, 213-231. doi: 10.1080/14616734.2012.672262

Schaufeli, WB., Bakker, A. B., Hoogduin, K., Schaap, C., & Kladler, A. (2001). On the clinical validity of the Maslach Burnout Inventory and the Burnout Measure. *Psychology & Health, 16,* 565-582. doi: 10.1080/08870440108405527

Schonert-Reichl, K. A., Kitil, M. J., & Hanson-Peterson, J. (2017). *To reach the students, teach the teachers: A national scan of teacher preparation and social and emotional learning.* A report prepared for the Collaborative for Academic, Social, and Emotional Learning (CASEL). Vancouver, B.C.: University of British Columbia.

Selya, A. S., Rose, J. S., Dierker, L. C., Hedeker, D., & Mermelstein, R. J. (2012). A Practical Guide to Calculating Cohen's *f*2, a Measure of Local Effect Size, from PROC MIXED. *Frontiers in Psychology, 3,* doi: 10.3389/fpsyg.2012.00111

Shernoff, E. S., Mehta, T. G., Atkins, M. S., Torf, R., & Spencer, J. (2011). A qualitative study of the sources and impact of stress among urban teachers. *School Mental Health, 3*(2), 59-69. doi: 10.1007/s12310-011-9051-z

Shin, H., Noh, H., Jang, Y., Park, Y., & Lee, S. (2013). A longitudinal examination of the relationship between teacher burnout and depression. *Journal of Employment Counseling, 50,* 124-137. doi: 10.1002/j.2161-1920.2013.00031.x

Skaalvik, E. M., & Skaalvik, S. (2007). Dimensions of teacher self-efficacy and relations with strain factors, perceived collective teacher efficacy, and teacher burnout. *Journal of Educational Psychology, 99,* 611-625. doi: 10.1037/0022-0663.99.3.611

Skaalvik, E. M., & Skaalvik, S. (2011). Teacher job satisfaction and motivation to leave the teaching profession: relations with school context, feeling of belonging, and emotional exhaustion. *Teaching and Teacher Education, 27,* 1029- 1038. doi: 10.1016/j.tate.2011.04.001

Smith, C. A., & Lazarus, R. S. (1990). Emotion and adaptation. In L. A. Pervin (Ed.), *Handbook of personality: Theory and research* (pp. 609-637). New York, NY, US: Guilford Press.

Spilt, J. L., Koomen, H. M. Y., & Thijs, J. T. (2011). Teacher wellbeing: The importance of

teacher-student relationships. *Educational Psychology Review, 23,* 457–477. doi:10.1007/s10648-011-9170-y

Steinhardt, M. A., Smith Jaggars, S. E., Faulk, K. E., & Gloria, C. T. (2011). Chronic work stress and depressive symptoms: Assessing the mediating role of teacher burnout. *Stress and Health: Journal of the International Society for the Investigation of Stress, 27,* 420-429. doi: 10.1002/smi.1394

Taris, T. W., Le Blanc, P. M., Schaufeli, W. B., & Schreurs, P. J. G. (2005). Are there causal relationships between the dimensions of the Maslach Burnout Inventory? A review and two longitudinal tests. *Work & Stress, 19*(3), 238-255. https://doi.org/10.1080/02678370500270453

Taxer, J. L., Becker-Kurz, B., & Frenzel, A. C. (2019). Do quality teacher-student relationships protect teachers from emotional exhaustion? The mediating Role of enjoyment and anger. *Social Psychology of Education: An International Journal, 22,* 209-226. doi: 10.1007/s11218-018-9468-4

Thomas, D. E., Bierman, K. L., & Powers, C. J. (2011). The influence of classroom aggression and classroom climate on aggressive-disruptive behavior. *Child Development, 82*, 751-757. doi: 10.1111/j.1467-8624.2011.01586.x

Travers, C. J., & Cooper, C. L. (1996). *Teachers under pressure: Stress in the teaching profession.* Routledge.

Tsouloupas, C. N., Carson, R. L., Matthews, R., Grawitch, M. J., & Barber, L. K. (2010). Exploring the association between teachers' perceived student misbehaviour and emotional exhaustion: The importance of teacher efficacy beliefs and emotion regulation. *Educational Psychology, 30*, 173–189. doi: 10.1080/01443410903494460

Virtanen, T., Vaaland, G. S., & Ertesvåg, S. K. (2019). Associations between observed patterns of classroom interactions and teacher wellbeing in lower secondary school. *Teaching and Teacher Education, 77*, 240-252. doi:10.1016/j.tate.2018.10.013

Yoon, J. S. (2002). Teacher characteristics as predictors of teacher–student relationships: Stress, negative affect, and self-efficacy. *Social Behavior & Personality: An International Journal*, *30*, 485–494. doi: 10.2224/sbp.2002.30.5.485

Yudron, M., Jones, S. M., & Raver, C. C. (2014). Implications of different methods for specifying classroom composition of externalizing behavior and its relationship to social–emotional outcomes. *Early Childhood Research Quarterly, 29*, 682-691. doi: 10.1016/j.ecresq.2014.07.00

Table 1.
Analytic sample counts by treatment status.

	Treatment	Control	Total Sample
Students	861	1,186	2,047
Teachers	66	79	145
Schools	14	13	27

Table 2.
Bivariate correlations for all study variables.

	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Time 2 EE	1												
2. Time 2 PA	-.27***	1											
3. Time 1 EE	.69***	-.28***	1										
4. Time 1 PA	-.17*	.36***	-.12	1									
5. Conflict	.21*	-.06	.03	.15†	1								
6. Closeness	.03	.27***	.18*	.03	-.32***	1							
7. Prop. of Students 2 SD Above the Classroom Conflict Mean	-.08	.07	-.11	-.34***	-.31***	.01	1						
8. Aggressive Behaviors	.09	.07	-.07	.18*	.77***	-.27***	-.31***	1					
9. ELA Test Score	.01	-.16†	.13	-.01	-.32***	.12	.00	-.39***	1				
10. Treatment Status	.05	.09	-.05	-.05	.11	.07	.00	.20*	-.19*	1			
11. General Ed. Classroom	-.04	-.06	.10	.11	-.21**	-.01	.09	-.36***	.47***	.01	1		
12. Teacher's Years of Exp.	-.01	-.13	.13	-.25***	.08	-.04	-.04	-.02	.12	.18*	.19*	1	
13. Regular Certification	.01	-.02	.09	-.13	-.06	.06	.05	.03	.16†	.14†	.07	.38***	1

Note. $N_{classrooms} = 145$. Correlations reported were calculated using data prior to multiple imputation. EE = emotional exhaustion; PA = personal accomplishment; Prop. of Students 2 SD Above the Classroom Conflict Mean = Proportion of students 2 standard deviations above classroom conflict mean; ELA = English language arts; Teacher's Years of Exp. = Teacher's years of experience; General Ed. Classroom = General Education classroom.
*** $p \leq .001$. ** $p \leq .01$. * $p \leq .05$. † $p \leq .10$.

Table 3.
Descriptive statistics for study variables.

	Time 1		Time 2	
	Mean (SD)	Range	Mean (SD)	Range
Personal Accomplishment	5.25 (0.65)	2.29 – 6.00	5.19 (0.68)	3.00 – 6.00
Emotional Exhaustion	2.18 (1.41)	0.00 – 5.75	2.44 (1.53)	0.11 – 5.83
Classroom-level Relational Conflict	1.83 (0.50)	1.07 – 3.83	1.81 (0.53)	1.06 – 3.39
Classroom-level Relational Closeness	4.10 (0.45)	2.48 – 4.98	4.19 (0.48)	2.42 – 4.98
Prop. of Students 2 SD Above the Classroom Conflict Mean	0.05 (0.09)	0.00 – 0.17	0.05 (0.05)	0.00 – 0.20

Note. Statistics reported were calculated using data prior to multiple imputation. Response scale anchors are as follows: Personal Accomplishment and Emotional Exhaustion (0-*Never* to 6-*Every Day*); Relational Conflict and Closeness (1-*Definitely does not apply* to 5-*Definitely applies*).

Table 4.
Results for regression analyses evaluating the associations between classroom mean-level relational closeness and conflict, and time two teacher-reported emotional exhaustion and personal accomplishment.

	Model 1						Model 2			
	EE			PA			EE		PA	
	Estimate	(S.E.)	f^2	Estimate	(S.E.)	f^2	Estimate	(S.E.)	Estimate	(S.E.)
Closeness	.03	(.07)		.32***	(.08)	.12	.02	(.07)	.33***	(.07)
Conflict	.23*	(.10)	.04	-.18	(.12)		.26**	(.10)	-.16	(.12)
2SD	-	-		-	-		.18	(.12)	.10	(.15)
Time 1 EE	.66***	(.06)	.83	-.27***	(.08)	.10	.69***	(.06)	-.26***	(.08)
Time 1 PA	-.16*	(.07)	.05	.29**	(.10)	.11	-.12†	(.07)	.32***	(.08)
Agg. Beh.	-.05	(.11)		.16	(.13)		-.02	(.11)	.18	(.13)
ELA	.02	(.08)		-.18*	(.09)	.03	.03	(.08)	-.18†	(.09)
Teacher's Years of Exp.	-.09	(.09)		-.02	(.09)		-.11	(.08)	-.03	(.09)
Regular Certification	-.02	(.07)		.04	(.08)		-.03	(.07)	.04	(.08)
General Ed. Classroom	-.02	(.07)		.08	(.09)		-.06	(.07)	.09	(.09)
Treatment	.00	(.07)		.06	(.08)		.00	(.07)	.06	(.08)
R^2	.52			.33			.55		.35	

Note. $N_{classrooms} = 145$. Standard errors are in parentheses. All estimates are standardized. Local effect sizes (f^2) are reported for significant relationships yielded from Model 1. Models were estimated across 20 imputation datasets. EE = emotional exhaustion; PA = personal accomplishment; S.E. = standard error; Agg. Beh. = classroom mean aggressive behaviors; ELA = classroom mean English Language Arts test score; Teacher's Years of Exp. = Teacher's years of experience; General Ed. Classroom = General Education classroom.
*** $p \leq .001$. ** $p \leq .01$. * $p \leq .05$. † $p \leq .10$.

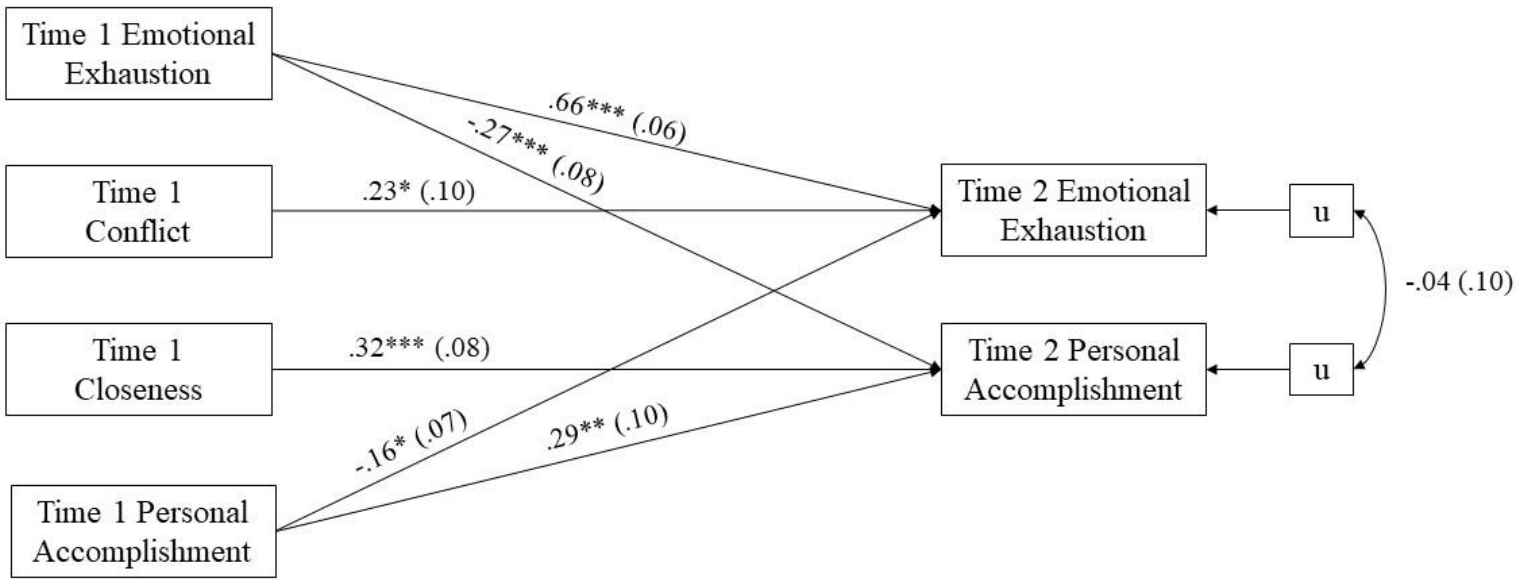

Figure 1. Results for Model 1 regression analyses evaluating the associations between Time 1 classroom mean level relational closeness and conflict, and Time 2 teacher-reported emotional exhaustion and personal accomplishment. Standardized estimates are presented with standard errors in parentheses. Single-headed arrows represent predictive paths. Double-headed arrows represent correlations between variables. u = residual variance.
* $p \leq .05$. ** $p \leq .01$. *** $p \leq .001$.

Bidirectional Associations among Components of Teachers' Psychological Adjustment in Urban Elementary Schools

Catherine M. Corbin[1], Jason T. Downer[1], Joshua L. Brown[2]

[1]The University of Virginia, [2]Fordham University

(Manuscript in Preparation)

Abstract

Teachers' psychological adjustment is integral to the healthy functioning and development of students and teachers. Diversity in how teachers' psychological adjustment is defined and operationalized, however, has constrained our understanding of its development over time, which ultimately limits the effectiveness of interventions supporting teachers and students. With this in mind, the present study leveraged a racially/ethnically diverse sample of teachers serving students in an under-resourced, urban area to examine the bidirectional associations among three of the most widely studied components of teachers' psychological adjustment (psychological distress, emotional exhaustion, and personal accomplishment) across two time points within an academic year. Findings supported bidirectional positive associations between emotional exhaustion and psychological distress. Further, emotional exhaustion and psychological distress were both negatively associated with personal accomplishment, whereas personal accomplishment was not found to be significantly associated with either emotional exhaustion or psychological distress. The present study contributes a more robust understanding of the multifaceted nature of teachers' psychological adjustment – an important step toward developing targeted interventions to most effectively support teachers in the service of students.

Keywords: Psychological Distress, Burnout, Teachers, Elementary, Bidirectional

Bidirectional Associations among Components of Teachers' Psychological Adjustment in Urban Elementary Schools

Teachers' healthy psychological adjustment[1] is integral to effectively supporting students' social-emotional and academic development. Students of teachers experiencing more negative psychological adjustment (e.g., increased stress or depression) receive less organized instruction (McLean, Abry, Taylor, & O'Connor, 2018), have lower math achievement (McLean & O'Connor, 2015), and teachers report them to exhibit fewer prosocial skills (Hindman & Bustamante, 2019) and more aggressive behaviors (Jeon, Buettner, Grant, & Lang, 2019). Diminished psychological adjustment is also associated with a host of negative outcomes for teachers including increased biological markers of stress (Katz, Greenberg, Jennings, & Klein, 2016) and poor sleep quality (de Souza, de Souza, Belísio, & Macedo de Azevedo, 2012), both of which are risk factors for a variety of other physical and psychological health issues (Dimsdale, 2008; Strine & Chapman, 2005).

Despite the importance for both teachers and students, there exists considerable diversity in how studies define and operationalize teachers' psychological adjustment. Some define it as negative psychological constructs that theoretically *permeate* multiple contexts of one's life (e.g., intimate relationships, professional context); the most commonly studied among these include depression (Hindman & Bustamante, 2019), anxiety (Frenzel et al., 2012), and stress (Lambert, Boyle, Fitchett, & McCarthy, 2019).

[1] We utilize the term "adjustment" in place of the more commonly used term "wellbeing" throughout the present study for two reasons. First, adjustment is suggestive of a change process, which the present study seeks to examine. Second, the present study leverages several negative psychological constructs (emotional exhaustion, depression, and anxiety) and only one positive psychological construct (personal accomplishment). We assert that the absence of negative psychological states or traits is not synonymous with wellbeing. As such, we opt for a term describing the process we hope to illuminate.

Others define it as burnout – a combination of positive and negative psychological constructs (e.g., emotional exhaustion, personal accomplishment) theoretically *confined* to the professional context (Maslach, Schaufeli, & Leiter, 2001). Whether or not teachers' psychological adjustment influences or is influenced by multiple life domains holds important implications for how and where to provide supports for teachers and their students to thrive.

This lack of clarity is due, in part, to gaps in our understanding of how different components of teachers' psychological adjustment are interrelated. While it is common to empirically investigate one component of teachers' psychological adjustment (Hindman & Bustamante, 2019; Jeon et al., 2019; Klusman, Richter, & Lüdtke, 2016; McClean & O'Connor, 2015; Mclean et al., 2018; Roberts, Gallagher, Daro, Iruka, & Sarver, 2018; Roberts, LoCasale-Crouch, Hamre, & DeCoster, 2016), comparatively few studies probe how each component influences or is influenced by the others (Leiter & Maslach, 2016; Plieger, Melchers, Mongtag, Meermann, & Reuter, 2015; Schonfeld & Bianchi, 2015). Developing a more detailed understanding of the distinct components of teachers' psychological adjustment over time will help to clarify the range of targets for interventions aimed at supporting teachers and their students. With this in mind, the present study utilized two time points within an academic year in a sample of upper elementary school teachers serving low-resourced, urban communities to investigate the bidirectional associations between three of the most commonly studied components of teachers' psychological adjustment (depression, anxiety, and stress), emotional exhaustion, and personal accomplishment.

Theoretical Perspectives on Teachers' Psychological Adjustment

At a high level, teachers' psychological adjustment can be understood via ecological systems theory and its applications. Ecological systems theory posits that individuals develop in more (e.g., interpersonal relationships) and less (e.g., societal laws) proximal systems, and that these systems and the individual influence one another bidirectionally leading to changes in both over time (Bronfenbrenner, 2007; Lerner, 1998). The prosocial classroom (Jennings & Greenberg, 2009) is an application of systems theory to the primary educational setting (i.e., classroom), and implicates teachers' psychological adjustment – labeled by the authors as wellbeing – as a relevant, dynamic construct. According to the prosocial classroom framework, the association between teachers' psychological adjustment and student development is mediated through various systems including, among others, teacher-student relationships, classroom climate, and community factors. Importantly, teachers' psychological adjustment is not hypothesized to operate unidirectionally to influence any mediator or students' development. Rather, teachers' psychological adjustment, the mediators, and students' development influence one another bidirectionally.

Ecological systems theory, and the prosocial classroom framework more specifically, help to situate teachers' psychological adjustment within the various contexts in which it develops or changes over time. However, more targeted theories are required to understand why teachers might vary with regard to any component of their psychological adjustment. The diathesis-stress model holds that vulnerabilities specific to individuals (e.g., causal attributions of negative life events; Metalsky & Joiner, 1992) interact with their response to stressors, resulting in differential likelihood of mental health conditions, such as depression (Ingram & Luxton, 2005). Another theory

suggestive of individual differences in psychological adjustment is Lazarus' transactional model of stress and coping (1991), which postulates that individuals (e.g., teachers) receive information from interactions with their environment (e.g., student behavior) that is processed through appraisals resulting in either positive emotions or feelings of distress (Spilt, Koomen, & Thijs, 2011).

Taken together, the diathesis-stress model (Ingram & Luxton, 2005) and Lazarus' transactional model of stress and coping (1991) suggest that there will be individual differences in teachers' cognitive processing (e.g., attributions, appraisals) of environmental stimuli, which will influence the experience of stress over time leading to variable rates of psychological adjustment. In this paper, we investigate the within year bidirectional associations between three commonly studied teacher psychological adjustment constructs: psychological distress (depression, anxiety, and stress), emotional exhaustion, and personal accomplishment. The following sections summarize research related to teacher psychological adjustment defined as either burnout or psychological distress, as well as the value gleaned from better understanding the relation between the two over time.

Multiple Components of Psychological Adjustment

Teachers' psychological adjustment is defined in a variety of ways that rely on both positive and negative psychological constructs (Beltman, Mansfield, & Price, 2011; Jennings et al., 2017). Two of the most common, however, are job-embedded burnout (Maslach, 1998) and general psychological distress (Franco, Mañas, Canagas, Moreno, & Gallego, 2010), which are discussed in detail in the following sections.

Burnout. Burnout – the result of long-term exposure to interpersonal stress in a professional context (Maslach et al., 2001) – is one common way of defining teachers' psychological adjustment. In its most common conceptualization, three dimensions comprise burnout: emotional exhaustion refers to an individual's experience of emotional fatigue or strain (e.g., a teacher is in continuous conflict with a student and unable to leave the classroom to take a break); personal accomplishment refers to feelings related to one's own professional competence (e.g., a teacher successfully manages student behavior and delivers a high quality lesson); and depersonalization, which refers to detached or cynical responses to people or the work itself (e.g., a teacher is disengaged or responds in negative and pessimistic ways when interacting with students; Maslach, 1998). Extant research suggests that burnout, or its component parts, are important for students' development. Particularly, burnout has been associated with decreased student achievement (Klusman et al., 2016), motivation (Shen et al., 2015), and students' perceptions of school satisfaction (Arens & Morin, 2016). Teacher burnout has also been shown to have contagion effects, influencing students' stress as measured by their morning cortisol (Oberle & Schonert-Reichl, 2016), as well as their intimate partners' psychological adjustment via an indirect association (Bakker, 2009). The importance of teachers' burnout for school, teacher, and student functioning highlights the need to understand how burnout changes over time.

While burnout has been shown to be relatively stable over time (Hakanen, Schaufeli, & Ahola, 2008), theory posits associations between individual components of burnout suggestive of temporal variability. Specifically, emotional exhaustion is

theorized to operate through depersonalization[2] to influence teachers' personal accomplishment (Lieter & Maslach, 1988; Lieter, 1989). While some evidence supports emotional exhaustion leading to personal accomplishment (Taris, Le Blanc, Schaufeli, & Schreurs, 2005; Brouwers & Tomic, 2014), evidence for alternative models have also been found, including bidirectional associations between emotional exhaustion and personal accomplishment (Corbin, Alamos, Lowenstein, Downer, & Brown, 2019). These mixed findings underscore the need for more investigations of individual components of teachers' burnout over time.

Psychological distress. Psychological distress, as it pertains to teachers' psychological adjustment, is most commonly conceptualized as depression (e.g., hopelessness, fatigue), anxiety (e.g., nervousness, tension; American Psychological Association, 2013), and stress (negative emotions, physiological arousal; Kyriacou, 2001). Students of teachers reporting increased depressive symptoms tend to have more conflictual relationships as reported by their teachers (Hamre, Pianta, Downer, & Mashburn, 2007), receive less organized instruction (McLean et al., 2018), and experience lower academic achievement (McClean & O'Connor, 2015). Similarly detrimental, teachers experiencing higher levels of stress report their students to exhibit more aggression (Jeon et al., 2019), request more expulsions for students (Zinsser, Zulauf, Das, & Silver, 2019), and have students self-reporting significantly higher levels of depression compared to their peers with less stressed teachers (Herman, Prewett, Eddy,

[2] The depersonalization subscale has exhibited lower internal consistency than the other two subscales of the Maslach Burnout Inventory (MBI), emotional exhaustion and personal accomplishment (Shaufeli, Bakker, Hoogduin, Schaap, & Kladler, 2001). As such, the randomized controlled trial from which these data originate did not include the depersonalization subscale in data collection efforts. Thus depersonalization is not considered in the present study.

Savala, & Reinke, 2020). Though there are fewer empirical investigations of teachers' anxiety, available evidence suggests similarly undesirable associations with student outcomes as with depression and stress. For example, female students experienced lower math achievement compared to males when paired with a female teacher exhibiting math anxiety (Beilock, Gunderson, Ramirez, & Levine, 2010). Further, students perceived less organized instruction and reported being more anxious themselves when their teachers reported increased levels of anxiety (Sinclair & Ryan, 1987).

In the absence of intervention, teachers' anxiety and depression, on average, decrease slightly over the academic year (Hindman & Bustamante, 2019; Roeser, et al., 2013). However, Hindman and Bustamante (2019) found a low correlation ($r = 0.27$) between average fall and spring teacher depression indicating that though average levels of depression remained fairly stable, some teachers became more or less depressed as the year progressed. Further, the authors found that teachers' depression was, on average, significantly influenced by individual and contextual factors, including teachers' race/ethnicity and the number of dual English language learners in the classroom. These findings highlight the value of investigating teachers' psychological distress over time – a currently underutilized approach (Beer & Beer, 1992; Chan, 1998; Roberts et al., 2016).

Additionally, though there exists an abundance of research investigating the relation between anxiety and depression in other populations (Jacobson & Newman, 2017), there is a paucity of such work with teachers. Indeed, studies that do examine aspects of psychological distress among teachers tend to do so by studying depression, anxiety, and stress independent of one another (Franco et al., 2010; Roeser et al., 2013, Lambert et al., 2019). One reason for this may be difficulty in consistently distinguishing

between these constructs. While initial work investigating the underlying structure of the measure utilized in the present study (Depression, Anxiety, and Stress (DASS-21) – Short Form) found a low correlation (r = .28) between the latent factors of depression and anxiety (Antony, Bieling, Cox, Enns, & Swinson, 1998), more recent work has revealed more moderate (r = .55; Osman et al., 2012) and high (r = .88; Sinclair et al., 2012) correlations. Further, recent work has shown latent depression (r = .85) and anxiety (r = .86) to correlate highly with latent stress (Sinclair et al., 2012). Taken together, this evidence suggests that DASS-21 items may not measure each of these constructs uniquely. Other work has provided evidence of a general psychological distress construct in addition to depression, anxiety, and stress subfactors (Henry & Crawford, 2005; Osman et al., 2012), though interpretation of depression, anxiety, and stress net any variance shared among them remains elusive. Regardless of whether teachers are distinctly reporting on depression, anxiety, and stress, or a state of more general psychological distress, the evidence remains clear – negative psychological adjustment as defined by symptoms of depression, anxiety, and stress have deleterious effects for teachers and students (Beilock et al., 2010; Katz et al., 2016; McLean et al., 2018; McLean & O'Connor, 2015; Sinclair & Ryan, 1987; Tolan, Molloy Elreda, Bradshaw, Downer, & Ialongo, 2020; Zinsser et al., 2019). As such, the present study investigated change in teachers' psychological distress (depression, anxiety, and stress) across an academic year.

Dynamic Nature of Psychological Adjustment

Evidence has begun to amass providing insight into the development of teachers' burnout (Hakanen et al., 2008; Taris et al., 2005) and psychological distress (Hindman &

Bustamante, 2019). While some work has investigated the interrelations between depression and emotional exhaustion (Shin, Noh, Jang, Park, & Lee, 2013), very little is known about how other components of burnout (e.g., personal accomplishment) and psychological distress (e.g., anxiety) are interrelated. Theoretically, burnout is a psychological phenomenon *confined* to the professional context (Maslach et al., 2001), whereas psychological distress (e.g., depression, anxiety, and stress) *permeates* multiple contexts of one's life (e.g., work, home). Some question the validity of this distinction, suggesting that when considered longitudinally, burnout acts as an antecedent to depression, which often presents as domain specific (e.g., work) in its nascent stages (Bianchi, Schonfeld, & Laurent, 2015a). Bakker et al. (2000) found that reciprocity in relationships with students (e.g., work) and an individual's partner (e.g., home) were associated with burnout and depression, respectively. This finding indicates that work factors (e.g., relationships with students) were only associated with the psychological phenomenon theoretically confined to the work space, and vice versa, thus providing empirical support for the conceptual distinction between burnout and depression. More recent work, however, has shown burnout leading to depression (Shin et al., 2013) or the two developing in tandem (Bianchi, Schonfeld, & Laurent, 2015b).

Alternative associations between aspects of psychological distress and burnout are suggested by personality research. Evidence shows that individuals high in neuroticism – an aspect of the Big Five personality traits characterized by, among other things, trait anxiety and depression (Clark, Watson, & Mineka, 1994) – are more likely to experience burnout (Bakker, Van Der Zee, Lewig, & Dollard, 2006; Goddard, Patton, & Creed, 2004; Kokkinos, 2011; Langelaan, Bakker, van Doornen, & Schaufeli, 2006). Because

traits are more fixed than states, these findings suggest that, counter to Bianchi et al. (2015a), depression and anxiety would drive burnout. Indeed, Schonfeld & Bianchi (2015) found that teachers reporting high levels of burnout were twice as likely to report a history of anxiety and three times as likely to be taking antianxiety medication as those reporting low levels of burnout.

These mixed findings coupled with the dearth of research investigating the interrelations of constructs other than depression and burnout create uncertainty regarding how best to approach supporting teachers and students to thrive. To address this, the present study proposes to leverage two time points within an academic year to examine the bidirectional associations between teacher-reported psychological distress (inclusive of depression, anxiety, and stress), and two components of burnout (emotional exhaustion and personal accomplishment).

Present Study

Leveraging a racially/ethnically diverse sample of 3rd and 4th grade teachers serving an under-resourced, urban community of students, the current study proposes to investigate the bidirectional associations among three components of psychological adjustment – teacher-reported psychological distress, emotional exhaustion, and personal accomplishment. In order to isolate the associations among these components of teachers' psychological adjustment, covariates exogenous to the outcomes of interest were considered for inclusion in analytic models (see Analytic Plan for more details). Based on prior research, these include years of teaching experience, teacher gender, teacher race/ethnicity, class size, proportion of English Language Learners (ELL), and proportion of students identified as special education (SPED; Bottiani, Duran, Pas, & Bradshaw,

2019; Cano-García, Padilla-Muñoz, & Carrasco-Ortiz, 2005; Hindman & Bustamante, 2019; Steinhardt, Smith Jaggars, Faulk, & Gloria, 2011).

Based on prior research, we hypothesize the following: (1) the model including bidirectional associations between all psychological adjustment constructs (Model 2) will fit the data significantly better than a model only including bidirectional associations between components of burnout (Model 1; see Analytic Plan for a more detailed explanation of Models 1 and 2), (2) significant cross-lagged associations will emerge between components of teachers' burnout (i.e., emotional exhaustion, personal accomplishment) and (3) Time 1 emotional exhaustion will be significantly associated with Time 2 psychological distress, and vice versa. Due to the lack of empirical work examining psychological distress and personal accomplishment, we view investigation of these paths as exploratory and make no specific hypotheses.

Method

Sample

Data for the present study come from cohorts 1 (2015-2016) and 2 (2016-2017) of a large-scale randomized controlled trial of a social-emotional (SEL) and literacy intervention (Reading, Writing, Respect, and Resolution; 4Rs) paired with an intensive teacher coaching model designed to improve curricular effectiveness (MyTeachingPartner™; MTP). These two well-validated programs have been integrated to create 4Rs+MTP – an intervention designed to support teachers' implementation of effective classroom interactions in support of students' social-emotional learning. 4Rs is a universal, school-based program focusing on conflict resolution and intergroup relations, while integrating social-emotional language into language arts curriculum for

students in grades K-5 (Jones, Brown, & Aber, 2011). MTP is a dynamic approach to professional development in which teachers reflect and receive feedback on their classroom practices in two ways: (1) via shared viewing of recorded classroom practices with their coach and (2) through written feedback and questions from their coach meant to encourage teachers' self-reflection on successes and challenges related to their practice (Allen, Pianta, Gregory, Mikami, & Lun, 2011). The study was conducted in 3rd and 4th grade classrooms in a large, urban city located in the northeastern United States. Program implementation occurred over the course of one academic year, though due to the staged two cohort design, there is a one year lag in implementation year between cohorts.

Analytic sample. The total analytic sample for the proposed study included 326 teachers serving 60 schools (see Table 1 for counts by cohort and treatment status). Teachers were fairly evenly distributed between grades three (45%) and four (44%), with a smaller percentage (10.5%) serving mixed grade (e.g., 3rd and 4th) classrooms (see Table 2). The majority of teachers across both cohorts were female (91%) and reported an average of 11 years of teaching experience (*SD* = 7.51). Both cohorts of teachers were highly qualified with 92% holding a Master's degree. Teachers were racially/ethnically diverse with 39% of teacher identifying themselves as White, 28% as Hispanic or Latino, 22% as Black or African American, 7% as Multiracial, 3% as Asian, and 1% as Other. The average class size was 22 students.

Procedure

All full-time teachers in participating treatment and control schools were eligible for participation in the study. Once active consent was attained, teachers reported on demographic information, classroom characteristics, and their psychological adjustment

in August prior to the start of the academic year, which we refer to as Time 1 (2015 for cohort 1, 2016 for cohort 2). Teachers reported on their psychological adjustment again at the close of the academic year, which we refer to as Time 2 (2016 for cohort 1, 2017 for cohort 2).

The majority of teachers in cohort 1 (93%) completed the time 1 survey in August prior to the start of the academic year with a small number of teachers (N = 10) completing the surveys between August and December. While still a majority, a smaller proportion of cohort 2 teachers (64%) completed the survey in August, with a larger number than in cohort 1 (N = 56) completing the survey between August and December. There was a small number of cohort 2 (N = 3) teachers that completed the Time 1 survey in January. Because of evidence suggesting that a multitude of factors may have influenced teachers' psychological adjustment at different points throughout the school year (Corbin et al., 2019; Hindman & Bustamante, 2019; Roberts et al., 2019), a variable will be included controlling for the numbers of days between Time 1 and Time 2 teacher survey completion dates. Specific plans related to use of this covariate are described in the analytic plan.

Measures

Emotional exhaustion and personal accomplishment. Teachers' emotional exhaustion (EE) and personal accomplishment (PA) were measured via the Maslach Burnout Inventory-Educator Survey (MBI-ES; Maslach, Jackson, & Schwab, 1996). The EE subscale included nine items that reflected the emotional fatigue and frustration experienced by teachers (e.g., "I feel fatigued when I get up in the morning and have to face another day on the job"). The PA subscale included eight items that assessed

teachers' sense of competence related to their work (e.g., "I have accomplished many worthwhile things in this job"). Teachers were prompted to read each item and consider if they had ever felt that way, and then indicate the frequency with which they had via a 7-point Likert scale ranging from 0-*Never* to 6-*Every day*. The MBI-ES has demonstrated construct (Byrne, 1991), as well as discriminant and predictive validity (Aloe, Shisler, Norris, Nickerson, & Rinker, 2014; Hoglund, Klingle, & Hosan, 2015; Jeon et al., 2019). Both EE and PA showed acceptable internal consistency at Time 1 ($\alpha_{EE} = .92;\ \alpha_{PA} = .76$) and Time 2 ($\alpha_{EE} = .93;\ \alpha_{PA} = .79$). See Table 3 for univariate statistics and Table 4 for bivariate correlations for all key study variables.

Depression, anxiety, and stress. Teachers reported on aspects of psychological distress via the Depression, Anxiety, and Stress Scale (DASS-21) Short Form (Lovibond & Lovibond, 1995). Each subscale included seven items that reflected symptoms associated with depression (e.g., "I felt I wasn't worth that much as a person"), anxiety (e.g., "I felt scared without any good reason"), and stress (e.g., I found myself getting agitated"). Teachers reported on how often each item applied to them over the previous week using a 4-point Likert scale ranging from 0-*Did not apply to me at all* to 3-*Applied to me very much, or most of the time.* The DASS-21 has demonstrated construct (Henry & Crawford, 2005) and predictive validity (DeMauro & Jennings, 2016; Hirai, Frazier, & Syed, 2015) in non-clinical samples.

Though the DASS-21 is intended to uniquely measure depression, anxiety, and stress, recent measurement work investigating the underlying factor structure has shown evidence suggestive of one latent construct as opposed to three (Osman et al., 2012; Sinclair et al., 2012). In the current sample, confirmatory factor analysis (CFA) showed

similar and acceptable fit between the three-factor correlated and one-factor solution at both Time 1 and Time 2 (see Table 5 for fit statistics). Because the correlations between latent depression, anxiety, and stress in the three-factor solution were high (> .75; see Table 5 for inter-factor correlations), indicating a lack of differentiation, we proceeded with the one-factor solution. All items appreciably loaded (λ >= .40) onto the single factor, and were statistically significant at the $p \leq .001$ level. Further, the one-factor solution showed metric ($\chi^2_{diff}\ (20) = 30.62, p = .06$) and partial scalar[3] ($\chi^2_{diff}\ (57) = 74.42, p = .06$) invariance between Time 1 and Time 2. In order to capitalize on strong evidence that the same construct was being measured at Time 1 and Time 2, and to limit measurement error, factor scores were exported from the partial scalar invariance model and used in all predictive analyses. We interpret this construct as teachers' psychological distress, characterized by negative affect (e.g., hopelessness, irritation) and physiological arousal (e.g., rapid breathing, trembling).

Teacher demographics and classroom characteristics. Teachers reported on demographic information (e.g., gender, years of teaching experience) and characteristics of the classroom (e.g., class size) at Time 1. Additionally, student-level data including free or reduced price lunch (FRPL) and English learner status were provided via the local Department of Education. These student-level variables were aggregated to the classroom-level for consideration as independent variables in all predictive models.

Analytic Plan

[3] Residual variances between two sets of two DASS-21 items were allowed to correlate in the partial scalar invariance model. All thresholds respondents used at Time 1 and Time 2 were specified to be equal across time.

Clustering. These data represent teachers (*N* = 326*)* nested within schools (*N* = 60). The intraclass correlation (ICC) was examined for each dependent variable to determine the amount of variance attributable to schools and thus whether data dependency needed to be accounted for in analyses. Results from three unconditional two-level models (one for each outcome of interest) indicated there to be no practically significant between school variation for Time 2 psychological distress (ICC = .00) and personal accomplishment (ICC = .01). The ICC for Time 2 emotional exhaustion, however, indicated that 11% of the variance was due to between school factors. As such, all models cluster standard errors by school to correct for underestimation of standard errors and overestimation of p-values due to dependency in the data (Cameron & Miller, 2015).

Missing Data. Missing data ranged from 1% to 9%. To implement methods to recover missing data, assumptions regarding the mechanism of missingness must be met (Little & Rubin, 2019). Specifically, missing data must either (a) not be related to any independent study variables or an unobserved variable related to the outcome (missing completely at random; MCAR), or (b) can be related to independent study variables, but not an unobserved variable related to the outcome (missing at random; MAR; Little, 1988). MCAR was not supported in the present study. Unfortunately, because MAR implicates unobserved characteristics, there is no available test for the assumption. However, available data in the present study include a variety of constructs shown to be associated with the outcomes of interest (Brunsting, Sreckovic, & Lane, 2014; Hindman & Bustamante, 2019; Schonfeld & Bianchi, 2015), which means the likelihood that some unobserved characteristic exists that would exert disproportionately high levels of

influence on any of the outcomes is small. As such, we assumed MAR and used full information maximum likelihood (FIML) to retain all available cases (Enders, 2001).

Primary analyses. In order to investigate the bidirectional associations between teacher-reported psychological distress, emotional exhaustion, and personal accomplishment, two path models were investigated and compared (see Figure 1 for visual representation of Models 1 and 2). Model 1 specified all autoregressive pathways (e.g., Time 1 emotional exhaustion to Time 2 emotional exhaustion), as well as cross-lagged paths between components of burnout (e.g., Time 1 emotional exhaustion to Time 2 personal accomplishment). Model 2 added to Model 1 by specifying all cross-lagged pathways between components of psychological distress and burnout (e.g., Time 1 psychological distress to Time 2 emotional exhaustion; Time 1 personal accomplishment to Time 2 psychological distress). Because empirical evidence has supported bidirectional pathways between components of teachers' burnout (Corbin et al., 2019), Model 1 serves as the baseline model to which we compare Model 2. In order to account for common method variance, residual variances for components of burnout and psychological distress were correlated within Time 1 and Time 2 (Lindell & Whitney, 2001). Based on prior research indicating significant associations with various components of teachers' psychological adjustment, the following covariates were examined for potential inclusion in all models (see Table 2 for descriptive statistics): teachers' gender, teachers' race/ethnicity, teachers' years of experience, grade taught, class size, classroom-level proportion English Language Learners (ELL), classroom-level proportion Special Education (SPED; Bottiani et al., 2019; Cano-García et al., 2005; Hindman & Bustamante, 2019; Steinhardt et al., 2011). Of these variables, only those

correlated with a dependent variable at a level of $p \leq .10$ or lower were included in predictive models. Based on this decision rule, teachers' race/ethnicity was controlled for related to Time 2 EE, teachers' years of experience was controlled for related to Time 2 PA, and teachers' race/ethnicity and grade-level were controlled for related to Time 2 psychological distress. Cohort and treatment status were included as independent variables for all outcome variables. Additionally, because some teachers reported on components of their psychological adjustment further into the academic year than others, we controlled for the time lag in days between Time 1 and Time 2 teacher survey completion dates.

Several statistics were used to assess model fit. The Tucker-Lewis Index (TLI) and Comparative Fit Index (CFI) represent fit relative to the null model, with values greater than .95 indicating acceptable model fit (Hu & Bentler, 1999). Additionally, RMSEA and SRMR – measures of absolute fit – were considered with values less than .06 and .08, respectively, indicative of models well fit to the data. In addition, several statistics were leveraged to compare Models 1 and 2. First, the Akaike Information Criterion (AIC) and Bayesian Information (BIC) were examined, with smaller values providing evidence of better fit. Finally, because Model 1 is nested in Model 2, the Satorra-Bentler chi-square test[4] (χ^2) was used to formally test model equivalency. Specifically, significant χ^2 values indicate that the more complex model provides a better fit to the data (Vuong, 1989). All analyses were run in Mplus version 7 using type=complex to cluster standard errors by school (Muthén & Muthén, 2015).

[4] We used the maximum likelihood robust (MLR) estimator in Mplus, which is robust to issues of non-normality. The Satorra-Bentler chi-square difference test implements a scaling correction to produce a statistic more appropriate under conditions of non-normality (Satorra & Bentler, 2001).

Standardized estimates are presented. In addition, Cohen's f^2 was calculated as a measure of local effect size for statistically significant independent variables (Cohen, 1988; Selya, Rose, Dierker, Hedeker, & Mermelstein, 2012), where values of .02, .15, and .25 indicate a small, medium, and large effect.

Though no specific guidelines exist pertaining to appropriate sample sizes for path models, Klein (2016) suggests a ratio between the number of observations and the number of free parameters to be estimated equal to 20:1, with decreasing ratios increasing the instability of results and a ratio of 5:1 being ill-advised. The available sample adheres to a 15:1 ratio for Model 2 (i.e., all cross-lagged paths specified) with no covariates. The ratio decreases with the addition of covariates.

Results

Table 3 presents descriptive statistics for EE, PA, and psychological distress factor scores at Time 1 and Time 2. On average, both mean EE ($M_{T1} = 2.25, SD_{T1} = 1.38;\ M_{T2} = 2.53, SD_{T2} = 1.49$) and psychological distress factor scores ($M_{T1} = 0.05, SD_{T1} = .88;\ M_{T2} = 0.18, SD_{T2} = 1.04$) increased slightly from Time 1 to Time 2, whereas PA decreased slightly ($M_{T1} = 5.20, SD_{T1} = .71;\ M_{T2} = 5.13, SD_{T2} = .72$).

Prior to interpreting predictive results, we first had to determine which proposed model (Model 1 or Model 2) best fit the data. Model 1 showed inconsistent fit with the data (CFI = .94, TLI = .81, RMSEA = .10, SRMR = .04). Model 2 showed excellent fit with the data (CFI = 1.00, TLI = 1.02, RMSEA = .00, SRMR = .01), and superior fit compared to Model 1 as evidenced by the Satorra-Bentler chi-square test ($\chi^2(4) = 52.97, p \leq .001$) and lower AIC (Model 1 = 12,027.16; Model 2 = 11,987.30) and BIC

(Model 1 = 12,489.16; Model 2 = 12,464.45) values. As such, we proceed interpreting results from Model 2.

Within Year Cross-lagged Associations between Psychological Distress and Components of Burnout

Results from Model 2 revealed all autoregressive pathways to be positive and statistically significant (see Table 6 for all Model 2 results). For example, teachers who reported more psychological distress at Time 1 also reported higher psychological distress at Time 2. In addition, several statistically significant cross-lagged paths emerged. Following is a summary of results for each outcome beginning with Time 2 emotional exhaustion (see Figure 2 for a visual representation of all significant cross-lagged paths).

Emotional Exhaustion. Time 1 psychological distress was significantly positively associated with Time 2 EE ($\beta = .20$, $p \leq .001$, $f^2 = .06$). This means that a one standard deviation increase in Time 1 psychological distress was associated with a .20 standard deviation increase in Time 2 EE, controlling for Time 1 EE. No significant association was observed between Time 1 PA to Time 2 EE ($\beta = -.09$, $p = .07$). Further, Black teachers had .10 standard deviations lower EE than White teachers, adjusting for their Time 1 EE ($\beta = -.10$, $p \leq .05$, $f^2 = .01$). In other words, for Black and White teachers reporting the same Time 1 EE, Black teachers had .10 standard deviations lower Time 2 EE.

Personal Accomplishment. Both Time 1 EE ($\beta = -.15$, $p \leq .01$, $f^2 = .02$) and Time 1 psychological distress ($\beta = -.11$, $p \leq .05$, $f^2 = .01$) were significantly negatively associated with Time 2 PA. Specifically, a one standard deviation increase in Time 1 EE

was associated with a .15 standard deviation decrease in Time 2 PA, and a one standard deviation increase in Time 1 psychological distress was associated with a .11 standard deviation decrease in Time 2 PA. No other significant associations were observed.

Psychological Distress. Time 1 EE emerged as significantly positively associated with Time 2 psychological distress ($\beta = .16$, $p \leq .001$, $f^2 = .05$), such that a one standard deviation increase in Time 1 EE was associated with a .16 standard deviation increase in Time 2 psychological distress. Time 1 PA was not significantly associated with Time 2 psychological distress ($\beta = -.05$, $p = .19$). Compared to White teachers and controlling for residualized change in EE and PA, Black teachers reported significantly less psychological distress over the school year ($\beta = -.08$, $p \leq .05$, $f^2 = .01$). Finally, compared to 4th grade teachers and controlling for residualized change in EE and PA, 3rd grade teachers reported more psychological distress over the school year ($\beta = .06$, $p \leq .05$, $f^2 = .01$).

Discussion

The present study examined the extent to which three commonly studied components of teachers' psychological adjustment (psychological distress, emotional exhaustion, personal accomplishment) were related to one another over the course of one academic year. We investigated this in a sample of 3rd and 4th grade teachers in a low-resourced, urban area – a population of teachers at elevated risk of experiencing maladaptive psychological adjustment (Collie, Shapka, & Perry, 2012; Pas, Bradshaw, & Hershfeldt, 2012). Results revealed EE and psychological distress to be significantly positively associated with one another from Time 1 to Time 2. Further, both Time 1 EE and psychological distress were significantly negatively associated with Time 2 PA,

controlling for Time 1 PA. Time 1 PA, however, was not observed to be significantly associated with either Time 2 EE or psychological distress. These represent among the first efforts to empirically investigate the interrelations among multiple components of teachers' psychological adjustment, thus illuminating how these job-embedded (i.e., burnout) and context independent (i.e., psychological distress) psychological characteristics are associated with one another over time. The following sections present a discussion of the practical significance of these findings, what we see as next steps for this and related future work, as well as key limitations to consider.

Bidirectional Associations between Emotional Exhaustion and Psychological Distress

Findings from the present study provide support for the bidirectional association between EE and psychological distress. As hypothesized, teachers who reported increased psychological distress at the outset of the academic year experienced significant increases in emotional exhaustion from Time 1 to Time 2. Because psychological distress is conceptualized to *permeate* multiple contexts of one's life (e.g., professional context, intimate relationships), we would expect it to influence teachers' experiences at school or in the classroom. Conversely, emotional exhaustion – a component of burnout – is conceptualized to be *confined* to the professional context. The present study found, however, that the job-embedded emotional fatigue and strain experienced by teachers at the start of the school year contributed to their increased feelings of psychological distress over time, indicating that while some aspect of EE may be specific to the professional context, EE may also operate as an antecedent to more general psychological distress (Bianchi et al., 2015a).

To extend our developing understanding of the change process between teachers' emotional exhaustion and psychological distress over time, future work should focus efforts on examining each across several points in time. While the present study speaks to how EE and psychological distress are associated with one another *controlling* for residualized change in both over two time points, it does not speak to whether, for example, residualized change in EE itself was associated with residualized change in psychological distress. This distinction is important because the effect sizes for Time 1 psychological distress to Time 2 EE ($f^2 = .06$) and Time 1 EE to Time 2 psychological ($f^2 = .05$) were small, indicating that reductions in EE would likely only be associated with small reductions in psychological distress, and vice versa. The effect sizes for the autoregressive pathways for EE ($f^2 = .47$) and psychological distress ($f^2 = .94$), however, were large. If future empirical work shows change in one of these constructs *driving* change in the other, intervention developers can target resources on reducing just one with a reasonable expectation that doing so will result in substantive reductions in the both.

Notably, prior studies have investigated bidirectional associations using only depression (Bakker et al., 2000; Bianchi et al., 2015a; Shin et al., 2013), as opposed to the more broadly conceived psychological distress construct – defined by negative affect (e.g., hopelessness, irritation) and physiological arousal (e.g., rapid breathing, trembling), which underlie depression, anxiety, and stress – leveraged in the present study. That psychological distress in the present study showed a similar association with EE over time as has been shown for depression (Bianchi et al., 2015b) holds important implications for intervention developers. Because depression is symptomatically distinct

from anxiety and stress (American Psychological Association, 2013), interventions aiming to support teachers' healthy psychological adjustment may be well-advised to develop services and supports that target negative affect and physiological arousal more generally, as opposed to symptoms of depression specifically. In fact, evidence from a recent randomized-controlled trial found that teachers' participation in a mindfulness intervention – intended to support self-awareness and emotion regulation broadly – significantly reduced teachers' psychological distress compared to control participants (Jennings et al., 2019). Worth noting is that this mindfulness intervention might have been successful because it tailored services for teachers in the professional context. Stigma around mental health (Parcesepe & Cabassa, 2013) and mental health services (Clement et al., 2015) – which can be magnified among historically marginalized racial/ethnic communities (Abdullah & Brown, 2011) – may constrain how responsive teachers would be to efforts targeting depression, anxiety, or stress apart from job-embedded burnout, particularly if those efforts relied on connecting teachers to more traditional mental health services like counseling.

To further illuminate changes in components of teachers' psychological adjustment over time, we see a focus on mechanisms as another fruitful direction for future work. For example, a recent meta-analysis showed student misbehavior in the classroom to negatively impact teachers' psychological adjustment (Aloe et al., 2014), and emerging evidence suggests that relationships with students are implicated in changes to components of teachers' burnout over time (Corbin et al., 2019). Mechanisms outside of the classroom are also worth investigating. Teachers who feel pressed for time (e.g., little or no scheduled planning time) and lack support from school leadership tend

to experience higher rates of burnout (Skaalvik & Skaalvik, 2009; Skaalvik & Skaalvik, 2011). Further, because psychological distress is context independent, an investigation of mechanisms should also include those outside of the school entirely. Life stressors like divorce (Barrett, 2000), financial hardship (Heflin & Iceland, 2009), and perceived racism (Pieterse, Todd, Neville, & Carter, 2012) have all been linked to components of psychological distress. With evidence amassing in support of the interrelations between components of teachers' psychological adjustment, a shift toward understanding conditions that contribute to these interrelations will be key.

While not of primary interest to the present study, compared to White teachers, Black teachers reported significant decreases in EE and psychological distress from Time 1 to Time 2, though the effect sizes for both were small. This contrasts with extant research showing either no between racial/ethnic group differences regarding components of psychological distress (Roberts et al., 2019) and burnout (Steinhardt et al., 2011), or an increase in depression among only teachers of Hispanic/Latino backgrounds (Hindman & Bustamante, 2019). One explanation may be that Black teachers possess more relevant cultural capital to meet the needs of such racially/ethnically diverse students compared to White teachers (Yarnell & Bohrnstedt, 2017). Another possibility is that the psychological distress factor is not invariant across racial/ethnic groups. One study found factor loadings, but not scale covariances, for the DASS-21 items to be invariant across racial/ethnic groups (Norton, 2007). This study examined invariance for a three-factor solution, which, like other studies, showed high inter-factor correlations irrespective of racial/ethnic group. Before interpreting the present study's finding for Black teachers

related to potential intervention implications, more measurement work needs to be done to assess invariance across racial/ethnic groups for the one-factor solution.

Personal Accomplishment Does Not Contribute to Residualized Change in Teachers' Emotional Exhaustion or Psychological Distress

Counter to our hypothesis, Time 1 PA was not significantly associated with Time 2 EE, controlling for Time 1 EE. This finding stands in contrast to recent work that found PA to be significantly associated with decreases in EE over time (Corbin et al., 2019). It seems that the association between Time 1 PA and Time 2 EE is attenuated when considered alongside teachers' more general psychological distress. This is not surprising given that the effect size for the relation between PA and EE in the Corbin et al. (2019) study was small ($f^2 = .05$), and extant research has shown components of psychological distress to be highly correlated with the EE component of burnout (Osman et al., 2012; Sinclair et al., 2012).

Time 1 PA was similarly unassociated with Time 2 psychological distress. Unlike EE, the conceptualization that PA is *confined* to the work environment is supported by the current study's findings, at least as it concerns relations to psychological distress. Questions remain, however, regarding what associations might have emerged between PA and a more general *positive* psychological construct (e.g., wellbeing). Much like psychological distress, evidence has shown aspects of positive psychological functioning, like positive relations and happiness, to be associated with stable personality traits like extraversion (Abbott et al., 2008; Hayes & Joseph, 2003). If general psychological wellbeing is partially a product of stable personality traits, it is likely to influence context dependent psychological states, like the PA component of burnout. While some work

investigates positive psychological factors like teacher resilience in relation to burnout (Hong, 2012), very little work connects teachers' broader positive psychological functioning to components of their psychological adjustment in the professional context (Collie, Shapka, Perry, & Martin, 2016). The field would benefit from prioritizing positive psychological constructs in continuing to develop an understanding of teachers' psychological adjustment.

Residualized Change in Personal Accomplishment is Associated with Prior Emotional Exhaustion and Psychological Distress

Both Time 1 EE and psychological distress were negatively associated with Time 2 PA, controlling for Time 1. This means that teachers beginning the year with elevated EE and psychological distress reported decreased PA across the academic year. The prosocial classroom posits that teachers experiencing diminished psychological adjustment may be more likely to respond to student misbehavior in reactive ways or using overly harsh and punitive measures (Jennings & Greenberg, 2009). Because such teacher responses are unlikely to effectively manage students' behavior (Clunies-Ross, Little, & Kienhuis, 2008; Oliver, Wehby, & Reschly, 2011), teachers' sense of professional efficacy may diminish over time. Future work could leverage structural equation modeling to test this hypothesis. While these are empirical questions that merit investigation, future efforts should consider that the effect size for EE ($f^2 = .02$) and psychological distress related to PA ($f^2 = .01$) were small in the present study, indicating limited practical applicability.

Limitations

Though the proposed study contributes to the understanding of teachers' psychological adjustment in meaningful ways, a number of limitations must be noted. First, all measures of psychological adjustment are teacher-reported. While this is a strength in measuring teachers' perceptions, other, more physiological measures (e.g., cortisol; Oberle & Schonert-Reichl, 2016) could provide an independent measure of psychological adjustment. Further, while the DASS-21 items were shown to measure one underlying construct (i.e., psychological distress) in the present study, there are symptomatic (American Psychological Association, 2013) and conceptual (Hammen, 2005; Lazarus, 1991) distinctions between depression, anxiety, and stress. For example, while stress is frequently invoked related to teachers' psychological adjustment, depression, anxiety, and burnout are theorized to be a *response* to chronic levels of stress (Hammen, 2005; Lazarus, 1991; Maslach et al., 2001). Future work would benefit from utilizing measures that better distinguish between depression, anxiety, and stress so as to test this hypothesis.

The path models used to investigate bidirectional associations between components of burnout and psychological distress model between and not *within* person associations. For example, results from the present study provide insight into whether teachers reporting higher or lower than the average level of psychological distress in this sample experience fewer gains in personal accomplishment. These results, however, will not provide insight with regard to within person fluctuations over time (i.e., how much a teacher deviates from their own mean levels of any construct; Hoffman, 2015), which would require a greater number of within-teacher assessments.

While the sample of racially/ethnically heterogeneous sample of teachers is a strength, it does not represent more racially/ethnically homogenous populations of teachers. Further, this sample is drawn from an urban area, and a high proportion of students served by teachers in this sample were economically disadvantaged and members of historically racially/ethnically minoritized groups. Findings from the present study cannot be assumed to generalize to populations defined by other socio-demographic characteristics.

Conclusion

Teachers' psychological adjustment is paramount to their ability to provide high quality instruction (McLean et al., 2018) and support students' success in school (McLean & O'Connor, 2015). Despite its significance, little is known about how discrete components of teachers' psychological adjustment are interrelated over time, limiting our understanding of how and where to best support teachers to thrive. The present study shows how job-embedded (e.g., burnout) and more general (e.g., psychological distress) aspects of teachers' psychological adjustment influence one another bidirectionally over the course of an academic year.

Acknowledgements

This study was supported by Institute of Education Sciences U.S. Department of Education grant #R305A140559 to Fordham University. The opinions expressed are those of the authors and do not represent views of the Institute or the U.S. Department of Education.

References

Abbott, R. A., Croudace, T. J., Ploubidis, G. B., Kuh, D., Wadsworth, M. E. J., Richards, M., & Huppers. F. A. (2008). The relationship between early personality and midlife psychological well-being: evidence from a UK birth cohort study. *Social Psychiatry and Psychiatric Epidemiology, 49,* 679-687. doi:10.1007/s00127-008-0355-8

Abdullah, T., & Brown, T. L. (2011). Mental illness stigma and ethnocultural beliefs, values, and norms: An integrative review. *Clinical Psychology Review, 31,* 934-948. doi:10.1016/j.cpr.2011.05.003

Allen, J. P., Pianta, R. C., Gregory, A., Mikami, A. Y., & Lun, J. (2011). An interaction-based approach to enhancing secondary school instruction and student achievement. *Science, 333,* 1034-1037. doi: 10.1126/science.1207998

Aloe, A. M., Shisler, S. M., Norris, B. D., Nickerson, A. B., & Rinker, T. W. (2014). A multivariate meta-analysis of student misbehavior and teacher burnout. *Educational Research Review, 12,* 30-44. doi: 10.1016/j.edurev.2014.05.003

American Psychiatric Association (2013). Diagnostic and statistical manual of mental disorders (5th ed.). Arlington, VA: American Psychiatric Publishing.

Antony, M. M., Bieling, P. J., Cox, B. J., Enns, M. W., & Swinson, R. P. (1998). Psychometric properties of the 42-item and 21-item versions of the Depression Anxiety Stress Scales in clinical groups and a community sample. *Psychological Assessment, 10*(2), 176-181.

Arens, A. K., & Morin, A. J. S. (2016). Relations between teachers' emotional exhaustion

and students' educational outcomes. *Journal of Educational Psychology, 108,* 800-813. http://dx.doi.org/10.1037/edu0000105

Bakker, A. B. (2009). The crossover of burnout and its relation to partner health. *Stress and Health, 25,* 343-353. doi: 10.1002/smi.1278

Bakker, A. B., Schaufeli, W. B., Demerouti, E., Janssen, P. P. M., Van Der Hulst, R., & Brouwer, J. (2000). Using equity theory to examine the difference between burnout and depression. *Anxiety, Stress, & Coping, 13,* 247-268. https://doi.org/10.1080/10615800008549265

Bakker, A. B., Van Der Zee, K. I., Lewig, K. A., & Dollard, M. F. (2006). The relationship between the Big Five Personality Factors and burnout: A study among volunteer counselors. *The Journal of Social Psychology, 146,* 31-50. doi: 10.3200/SOCP.146.1.31-50.

Barrett, A. E. (2000). Marital trajectories and mental health. *Journal of Health and Social Behavior, 41*(4), 451-464.

Beer, J., & Beer, J. (1992). Burnout and stress, depression and self-esteem of teachers. *Psychological Reports, 71,* 1331-1336.

Beilock, S. L., Gunderson, E. A., Ramirez, G., & Levine, S. C. (2010). Female teachers' math anxiety affects girls' math achievement. *Proceedings of the National Academy of Sciences, 107*(5), 1860-1863.

Beltman, S., Mansfield, C., & Price, A. (2011). Thriving not just surviving: A review of research on teacher resilience. *Educational Research Review, 6,* 185-207. doi:10.1016/j.edurev.2011.09.001

Bianchi, R., Schonfeld, I. S., & Laurent, E. (2015a). Burnout-depression overlap: A review. *Clinical Psychology Review, 36,* 28-41. http://dx.doi.org/10.1016/j.cpr.2015.01.004

Bianchi, R., Schonfeld, I. S., & Laurent, E. (2015b). Is burnout separable from depression in cluster analysis? A longitudinal study. *Social Psychiatry and Psychiatric Epidemiology, 50,* 1005-1011. doi: 10.1007/s00127-014-0996-8

Bottiani, J. H., Duran, C. A. K., Pas, E. T., & Bradshaw, C. P. (2019). Teacher stress and burnout in urban middle schools: Associations with job demands, resources, and effective classroom practices. *Journal of School Psychology, 77,* 36-51. https://doi.org/10.1016/j.jsp.2019.10.002

Bronfenbrenner, U., & Morris, P. A. (2007). The bioecological model of human development. In R. M. Lerner (Ed.) *Handbook of child development: Vol. 1. Theoretical models of human development* (6th ed., pp. 793-828). Hoboken, NJ: Wiley.

Brouwers, A., & Tomic, W. (2014). A longitudinal study of relationships between three burnout dimensions among secondary school teachers. *Sensoria: A Journal of Mind, Brain, & Culture, 10*(2), 23-33.

Brunsting, N. C., Sreckovic, M. A., & Lane, K. L. (2014). Special education teacher burnout: a synthesis of research from 1979 to 2013). *Education and Treatment of Children, 37,* 681-712. https://doi.org/10.1353/etc.2014.0032

Cameron, A. C., & Miller, D. L. (2015). A practitioner's guide to cluster-robust inference. *The Journal of Human Resources, 50*(2), 317-372.

Cano-García, F. J., Padilla-Muñoz, E. M., & Carrasco-Ortiz, M. A. (2005). Personality

and contextual variables in teacher burnout. *Personality and Individual Differences, 38,* 929-940. doi: 10.1016/j.paid.2004.06.018

Chan, D. W. (1998). Stress, coping strategies, and psychological distress among secondary school teachers in Hong Kong. *American Educational Research Journal, 35*(1), 145-163.

Clark, L. A., Watson, D., & Mineka, S. (1994). Temperament, personality, and the mood and anxiety disorders. *Journal of Abnormal Psychology, 103*(1), 103-116.

Clement, S., Schaumann, O., Graham, T., Maggioni, F., Evans-Lacko, S., Bexborodovs, N., Morgan, C., Rüsch, N., Brown, J. S. L., & Thornicroft, G. (2015). What is the impact of mental health-related stigma on help-seeking? A systematic review of quantitative and qualitative studies. *Psychological Medicine, 45,* 11-27. doi:10.1017/S0033291714000129

Clunies-Ross, P., Little, E., & Kienhuis, M. (2008). Self-reported and actual use of proactive and reactive classroom management strategies and their relationship with teacher stress and student behavior. *Educational Psychology, 28,* 693-710. https://doi.org/10.1080/01443410802206700

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Lawrence Earlbaum Associates.

Collie, R. J., Shapka, J. D., & Perry, N. E. (2012). School climate and social-emotional learning: Predicting teacher stress, job satisfactory, and teaching efficacy. *Journal of Educational Psychology, 104,* 1189-1204. doi: 10.1037/a0029356

Collie, R. J., Shapka, J. D., Perry, N. E., & Martin, A. J. (2016). Teachers' psychological

functioning in the workplace: Exploring the roles of contextual beliefs, need satisfaction, and personal characteristics. *Journal of Educational Psychology, 108,* 788-799. http://dx.doi.org/10.1037/edu0000088

Corbin, C. M., Alamos, P., Lowenstein, A. E., Downer, J. T., & Brown, J. L. (2019). The role of teacher-student relationships in predicting teachers' personal accomplishment and emotional exhaustion. *Journal of School Psychology, 77,* 1-12. https://doi.org/10.1016/j.jsp.2019.10.001

de Souza, J. C., de Sousa, I. C., Belisio, A. S., Macedo de Azevedo, V. (2012). Sleep habits, daytime sleepiness, and sleep quality of high school teachers. *Psychology & Neuroscience, 5*(2), 257-263

DeMauro, A. A., & Jennings, P. A. (2016). Pre-service teachers' efficacy beliefs and emotional states. *Emotional and Behavioral Difficulties, 21*, 119-132. https://doi.org/10.1080/13632752.2015.1120057

Dimsdale, J. E. (2008). Psychological stress and cardiovascular disease. *Journal of American College of Cardiology, 51*(13), 1237-1246. doi:10.1016/j.jacc.2007.12.024

Enders, C. K. (2001). The performance of the full information maximum likelihood estimator in multiple regression models with missing data. *Educational and Psychological Measurement, 61*(5), 713-740.

Franco, C., Mañas, I., Canagas, A. J., Moreno, E., & Gallego, J. (2010). Reducing teachers' psychological distress through a mindfulness training program. *The Spanish Journal of Psychology, 12*(2), 655-666.

Frenzel, A. C., Pekrun, R., Goetz, T., Daniels, L. M., Durksen, T. L., Becker-Kurz, B., &

Klassen, R. M. (2016). Measuring teachers' enjoyment, anger, and anxiety: The Teacher Emotions Scale (TES). *Contemporary Educational Psychology, 46,* 148-163. http://dx.doi.org/10.1016/j.cedpsych.2016.05.003

Goddard, R., Patton, W., & Creed, P. (2004). The importance and place of neuroticism in predicting burnout in employment service case managers. *Journal of Applied Social Psychology, 34*(2), 282-296.

Hakanen, J. J., Schaufeli, W. B., & Ahola, K. (2008). The job demands-resource model: A three-year cross-lagged study of burnout, depression, commitment, and work engagement. *Work & Stress, 22,* 224-241. https://doi.org/10.1080/02678370802379432

Hammen, C. (2005). Stress and depression. *Annual Review of Clinical Psychology, 1,* 293-319. doi: 10.1146/annurev.clinpsy.1.102803.143938

Hayes, N., & Joseph, S. (2003). Big 5 correlates of three measures of subjective well-being. *Personality and Individual Differences, 34,* 723-727. https://doi.org/10.1016/S0191-8869(02)00057-0

Heflin, C. M., & Iceland, J. (2009). Poverty, material hardship, and depression. *Social Science Quarterly, 90,* 1051-1071. https://doi.org/10.1111/j.15406237.2009.00645.x

Henry, J. D., & Crawford, J. R. (2005). The short-form version of the Depression Anxiety Stress Scales (DASS-21): Construct validity and normative data in a large non-clinical sample. *British Journal of Clinical Psychology, 44,* 227-239. https://doi.org/10.1348/014466505X29658

Hindman, A. H., & Bustamante, A. S. (2019). Teacher depression as a dynamic variable:

Exploring the nature and predictors of change over the head start year. *Journal of Applied Developmental Psychology, 61,* 43-55. https://doi.org/10.1016/j.appdev.2018.09.004

Hirai, R., Frazier, P., & Syed, M. (2015). Psychological and sociocultural adjustment of first-year international students: Trajectories and predictors. *Journal of Counseling Psychology, 62,* 438-452. http://dx.doi.org/10.1037/cou0000085

Hoglund, W. L. G., Klingle, K. E., & Hosan, N. E. (2015). Classroom risks and resources: Teacher burnout, classroom quality and children's adjustment in high needs elementary schools. *Journal of School Psychology, 53,* 337–357. doi: 10.1016/j.jsp.2015.06.002

Hoffman, L. (2015). *Longitudinal analysis: Modeling within-person fluctuation and change.* New York, NY, USA: Routledge.

Hong, J. Y. (2012). Why do some beginning teachers leave the schools, and others stay? Understanding teacher resilience through psychological lenses. *Teachers and Teaching, 18,* 417-440. https://doi.org/10.1080/13540602.2012.696044

Ingram, R. E., & Luxton, D. D. (2005). Vulnerability-stress models. In B. L. Hankin & J. R. Z. Abela (Eds.), *Development of Psychopathology: A vulnerability-stress perspective* (pp. 32-46). Thousand Oaks, CA: Sage.

Herman, K. C., Prewett, S. L., Eddy, C. L., Savala, A., & Reinke, W. M. (2020). Profiles of middle school teacher stress and coping: Concurrent and prospective correlates. *Journal of School Psychology, 78,* 54-68. https://doi.org/10.1016/j.jsp.2019.11.003

Jacobson, N. C., & Newman, M. G. (2017). Anxiety and depression as bidirectional risl

factors for one another: A meta-analysis of longitudinal studies. *Psychological Bulletin, 143,* 1155-1200. http://dx.doi.org/10.1037/bul0000111

Jennings, P. A., Brown, J. L., Frank, J. L., Doyle, S., Oh, Y., Davis, R., Rasheed, D., DeWeese, A., DeMauro, A. A., Cham, H., & Greenberg, M. T. (2017). Impacts of the CARE for Teachers program on teachers' social and emotional competence and classroom interactions. *Journal of Educational Psychology, 109,* 1010-1028. http://dx.doi.org/10.1037/edu0000187

Jennings, P. A., & Greenberg, M. T. (2009). The prosocial classroom: Teacher social and emotional competence in relation to student and classroom outcomes. *Review of Educational Research, 79*(1), 491-525.

Jeon, L., Buettner, C. K., Grant, A. A., & Lang, S. N. (2019). Early childhood teachers' stress and children's social emotional, and behavioral functioning. *Journal of Applied Developmental Psychology, 61,* 21-32. https://doi.org/10.1016/j.appdev.2018.02.002

Jones, S. M., Brown, J. L., & Aber, L. J. (2011). Two-year impacts of a universal school-based social-emotional and literacy intervention: An experiment in translational development research. *Child Development, 82,* 533-554. doi: 10.1111/j.1467-8624.2010.01560.x

Katz, D. A., Greenberg, M. T., Jennings, P. A., & Klein, L. C. (2016). Associations between the awakening response of salivary α-amylase and cortisol with self-report indicators of health and wellbeing among educators. *Teaching and Teacher Education, 54,* 98-106.

Klein, R. B. (2016). *Principals and practice of structural equation modeling.* New York:

Guilford.

Klusman, U., Richter, D., & Lüdtke, O. (2016). Teachers' emotional exhaustion is negatively related to students' achievement: Evidence from a large-scale assessment study. *Journal of Educational Psychology, 108,* 1193-1203. http://dx.doi.org/10.1037/edu0000125

Kokkinos, C. M. (2011). Job stressors, personality and burnout in primary school teachers. *British Journal of Educational Psychology, 77,* 229-243. https://doi.org/10.1348/000709905X90344

Kyriacou, C. (2001). Teacher stress: Directions and future research. *Educational Review, 53,* 27-35. https://doi.org/10.1080/00131910120033628

Lambert, R., Boyle, L., Fitchett, P., & McCarthy, C. (2019). Risk for occupational stress among U. S. kindergarten teachers. *Journal of Applied Developmental Psychology, 61,* 13-20. https://doi.org/10.1016/j.appdev.2018.07.003

Langelaan, S., Bakker, A. B., van Doornen, L. J. P., & Schaufeli, W. B. (2006). Burnout and work engagement : Do individual differences made a difference? *Personality and Individual Differences, 40,* 521-532. doi:10.1016/j.paid.2005.07.009

Lazarus, R. S. (1991). Progress on a cognitive–motivational–relational theory of emotion. *American Psychologist, 46,* 819–834. doi: 10.1037/0003-066X.46.8.819

Lieter, M. P. (1989). Conceptual implications of two models of burnout: A response to Golembiewski. *Group & Organization Studies, 14*(1), 15-22.

Lieter, M. P., & Maslach, C. (1988). The impact of interpersonal environment on burnout and organizational commitment. *Journal of Organizational Behavior, 9,* 297-308.

Lerner, R. M. (1998). Theories of human development: Contemporary perspectives. In

W. Damon & R. M. Lerner (Eds.), *Handbook of child psychology: Vol. 1. Theoretical models of human development* (5th ed. pp. 1-24).

Lovibond, S. H., & Lovibind, P. F. (1995). *Manual for the Depression Anxiety Stress Scales. (2nd Ed.)* Sydney: Psychology Foundation.

Maslach, C. (1998). A multidimensional theory of burnout. In C.L. Cooper (Eds.) *Theories of organizational stress* (pp. 68-85). Oxford, United Kington: Oxford University Press.

Maslach, C., Jackson, S. E., & Schwab, R. L. (1996). *Maslach Burnout Inventory – Educator Survey* (MBI – ES). In C. Maslach, S. E. Jackson, & M. P. Leiter, MBI Manual (3rd ed.) Palo Alto, CA: Consulting Psychologists Press.

Maslach, C., Schaufeli, W. B., & Leiter, M. P. (2001). Job burnout. *Annual Review of Psychology, 51*(1), 397-422.

McLean, L., Abry, T., Taylor, M., & Connor, C. M. (2018). Associations among teachers' depressive symptoms and students' classroom instructional experiences in third grade. *Journal of School Psychology, 69,* 154-168. https://doi.org/10.1016/j.jsp.2018.05.002

McLean, L., & O'Connor, C. M. (2015). Depressive symptoms in third-grade teachers: Relations to classroom quality and student achievement. *Child Development, 86,* 945-954. doi: 10.1111/cdev.12344

Metalsky, G. I., & Joiner, T. E. (1992). Vulnerability to depressive symptomology: A prospective test of the diathesis-stress and causal mediation components of the hopelessness theory of depression. *Journal of Personality and Social Psychology, 63*(4), 667-675.

Norton, P. J. (2007). Depression Anixety and Stress Scales (DASS-21): Psychometric analysis across four racial groups. *Anxiety, Stress, and Coping, 20*, 253-265. https://doi.org/10.1080/10615800701309279

Oberle, E., & Schonert-Reichl, K. A. (2016). Stress contagion in the classroom? The link between classroom teacher burnout and morning cortisol in elementary school students. *Social Science & Medicine, 159,* 30-37. doi: 10.1016/j.socscimed.2016.04.031

Oliver, R. M., Wehby, J. H., & Reschly, D. J. (2011). *Teacher classroom management practices: Effects on disruptive or aggressive student behavior*. Evanston, IL: Society for Research on Educational Effectiveness.

Osman, A., Wong, J. L., Bagge, C. L., Freedenthal, S., Gutierrez, P. M., & Lozano, G. (2012). The Depression Anxiety Stress Scales – 21 (DASS-21): Further examination of dimensions, scale reliability, and correlates. *Journal of Clinical Psychology, 68,* 1322-1338. doi: 10.1002/jcpl.21908

Parcesepe, A. M., & Cabassa, L. J. (2013). Public stigma of mental illness in the United States: A systematic literature review. *Administration and Policy in Mental Health and Mental Health Services Research, 40,* 384-399. doi:10.1007/s10488-012-0430-z

Pas, E. T., Bradshaw, C. P., & Hershfeldt, P. A. (2012). Teacher- and school-level predictors of teacher efficacy and burnout: Identifying potential areas for support. *Journal of School Psychology, 50,* 129-145. doi: 10.1016/j.jsp.2011.07.003

Pieterse, A. L., Todd, N. R., Neville, H. A., & Carter, R. T. (2012). Perceived racism and

mental health among Black American adults: A meta-analytic review. *Journal of Counseling Psychology, 59,* 1-9. https://doi.org/10.1037/a0026208

Plieger, T., Melchers, M., Montag, C., Meermann, R., & Reuter, M. (2015). Life stress as a potential risk factor for depression and burnout. *Burnout Research, 2,* 19-24. http://dx.doi.org/10.1016/j.burn.2015.03.001

Roberts, A. M., Gallagher, K. C., Daro, A. M., Iruka, I. U., & Sarver, S. L. (2019). Workforce well-being: Personal and workplace contributions to early educators' depression across settings. *Journal of Applied Developmental Psychology, 61,* 4-12. http://dx.doi.org/10.1016/j.appdev.2017.09.007

Roberts, A., LoCasale-Crouch, J., Hamre, B., & DeCoster, J. (2016). Exploring teachers' depressive symptoms, interaction quality, and children's social-emotional development in Head Start. *Early Education and Development, 27,* 642-654. http://dx.doi.org/10.1080/10409289.2016.1127088

Roeser, R. W., Schonert-Reichl, K. A., Jha, A., Cullen, M., Wallace, L., Wilensky, R., Oberle, E., Thomson, K., Taylor, C., & Harrison, J. (2013). Mindfulness training and reductions in teacher stress and burnout: Results from two randomized, waitlist-control field experiements. *Journal of Educational Psychology, 105,* 787-804. doi: 10.1037/a0032093

Satorra, A., & Bentler, P. M. (2001). A scaled difference chi-square test statistic for moment structure analysis. *Psychometrika, 66,* 507-514.

Schonfeld, I. S., & Bianchi, R. (2015). Burnout and depression: Two entities or one? *Journal of Clinical Psychology, 71,* 22-37. doi: 10.1002/jclp.22229

Selya, A. S., Rose, J. S., Dierker, L. C., Hedeker, D., & Mermelstein, R. J. (2012). A

practical guide to calculating Cohen's f^2, a measure of local effect size, from PROC MIXED. *Frontiers in Psychology, 2,* 1-6. doi: 10.3389/fpsyg.2012.00111

Shen, B., McCaughtry, N., Martin, J., Garn, A., Kulik, N., & Fahlman, M. (2015). The relationship between teacher burnout and student motivation. *British Journal of Educational Psychology, 85,* 519-532. doi: 10.1111/bjep.12089

Shin, H., Noh, H., Jang, Y., Park, Y. M., & Lee, S. M. (2013). A longitudinal examination of the relationship between teacher burnout and depression. *Journal of Employment Counseling, 50,* 124-137. doi: 10.1002/j.2161-1920.2013.00031.x

Sinclair, K. E., & Ryan, G. (1987). Teacher anxiety, teacher effectiveness, and student anxiety. *Teaching & Teacher Education, 3*(3), 249-253.

Sinclair, S. J., Siefert, C. J., Salvin-Mulford, J. M., Stein, M. B., Renna, M., & Blais, M. A. (2012). Psychometric evaluation and normative data for the Depression, Anxiety, and Stress-21 (DASS-21) in a nonclinical sample of U.S. adults. *Evaluation & the Health Professions, 35,* 259-279. doi: 10.1177/0163278711424282

Skaalvik, E. M., & Skaalvik, S. (2009). Does school context matter? Relations with teacher burnout and job satisfactory. *Teaching and Teacher Education, 25,* 518-524. doi:10.1016/j.tate.2008.12.006

Skaalvik, E. M., & Skaalvik, S. (2011). Teacher job satisfaction and motivation to leave the teaching profession: Relations with school context, feeling of belonging, and emotional exhaustion. *Teaching and Teacher Education, 27,* 1029-1038. doi:10.1016/j.tate.2011.04.001

Steinhardt, M. A., Smith Jaggars, S. E., Faulk, K. E., & Gloria, C. T. (2011). Chronic

work stress and depressive symptoms: Assessing the mediating role of teacher burnout. *Stress and Health, 27,* 420-429. https://doi.org/10.1002/smi.1394

Strine, T. W., & Chapman, D. P. (2005). Associations of frequent sleep insufficiency with health-related quality of life and health behaviors. *Sleep Medicine, 6,* 23-27. doi:10.1016/j.sleep.2004.06.003

Taris, T. W., Le Blanc, P. M., Schaufeli, W. B., Schreurs, P. J. G. (2005). Are there causal relationships between the dimensions of the Maslach Burnout Inventory? A review and two longitudinal tests. *Work & Stress, 19,* 238-255. doi: 10.1080/02678370500270453

Tolan, P., Molloy Elreda, L., Bradshaw, C. P., Downer, J. T., & Ialongo, N. (2020). Randomized trial testing the integration of the Good Behavior Games and MyTeachingPartner™: The moderating role of distress among new teachers on student outcomes.

Yarnell, L. M., & Bohrnstedt, G. W. (2017). Student-teacher racial match and its association with Black student achievement: An exploration using multilevel structural equation modeling. *American Educational Research Journal, 55,* 287-324. doi: 10.3102/0002831217734804

Zinsser, K. M., Zulauf, C. A., Das, V. N., & Silver, C. H. (2019). Utilizing social-emotional learning supports to address teacher stress and preschool expulsion. *Journal of Applied Developmental Psychology, 61,*33-42. https://doi.org/10.1016/j.appdev.2017.11.006

Table 1.
Analytic sample counts by cohort and treatment status.

	Treatment		Control		Total Sample	
	Cohort 1	Cohort 2	Cohort 1	Cohort 2	Cohort 1	Cohort 2
Teachers	69	81	78	98	147	179
Schools	14	17	13	16	27	33

Table 2.
Sample characteristics.

	Mean	SD	Skewness	Kurtosis	Minimum	Maximum
Teacher						
White	0.39	0.49	0.45	-1.81	0	1
Hispanic/Latino	0.28	0.45	1.01	-0.99	0	1
Black	0.22	0.41	1.36	-0.15	0	1
Other	0.11	0.32	2.43	3.93	0	1
Female	0.91	0.29	-2.83	6.05	0	1
Years of Experience	10.61	7.51	0.90	0.63	1	40
Classroom						
Third Grade	0.45	0.50	0.19	-1.97	0	1
Fourth Grade	0.44	0.50	0.23	-1.96	0	1
Mixed Grade	0.11	0.31	2.57	4.65	0	1
Class Size	22.38	5.93	-0.68	-0.11	6	33
Proportion ELL	0.20	0.24	1.60	2.05	0	1
Proportion IEP	0.31	0.33	1.18	0.12	0	1

Note. $N_{teachers} = 326$. SD = standard deviation, ELL = English Language Learner, IEP = Individualized Education Plan.

Table 3.
Univariate statistics for key study variables.

	Mean	SD	Skewness	Kurtosis	Minimum	Maximum
T1 Emotional Exhaustion	2.25	1.38	0.43	-0.63	0	5.78
T1 Personal Accomplishment	5.20	0.71	-1.47	2.44	2.29	6
T1 Psychological Distress FS	0.05	0.88	0.31	-0.36	-1.32	2.95
T2 Emotional Exhaustion	2.53	1.49	0.25	-0.89	0	6
T2 Personal Accomplishment	5.13	0.72	-1.01	0.67	2.25	6
T2 Psychological Distress FS	0.18	1.04	0.32	-0.32	-1.44	3.78

Note. $N = 326$. T1 = time 1; T2 = Time 2; SD = standard deviation, FS = factor scores.

Table 4.
Bivariate correlations for all key study variables.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1. T2 EE	1																	
2. T2 PA	-.36***	1																
3. T2 PD	.60***	-.42***	1															
4. T1 EE	.66***	-.28***	.48***	1														
5. T1 PA	-.22***	.48***	-.23***	-.17***	1													
6. T1 PD	.46***	-.29***	.77***	.44***	-.24***	1												
7. Female	.89	.01	.00	.06	.05	-.01	1											
8. Tch. Yrs. Exp.	-.04	-.09†	-.03	.07	-.12*	-.01	.09†	1										
9. Class Size	-.05	.01	-.04	.01	.00	-.03	.04	.10†	1									
10. White	.15**	.03	.11*	.18***	.18***	.05	-.08	-.26***	.07	1								
11. Hisp.	-.02	-.03	-.04	-.12*	-.05	.00	.04	.04	.05	-.49***	1							
12. Black	-.10†	-.04	-.07	-.05	-.18***	-.02	.02	.26***	-.08	-.42***	-.33***	1						
13. Other	-.07	.05	-.03	-.05	.03	-.06	.04	.01	-.07	-.29***	-.22***	-.19***	1					
14. Grade 3	.04	-.04	.11*	.08	-.05	.08	.02	-.02	.18***	.01	.02	.00	-.04	1				
15. Grade 4	-.03	.01	-.12*	-.08	.00	-.11*	.04	.07	.17	.01	.00	-.02	.01	-.81	1			
16. Mixed Grade	-.02	.05	.01	.00	.08	.05	-.10†	-.08	-.56***	-.03	-.02	.03	.05	-.31***	-.31***	1		
17. ELL	-.18	-.01	-.03	-.17***	.04	-.01	-.05	-.16**	-.09†	-.09	.28***	-.20***	.01	.00	-.09	.14*	1	
18. IEP	.01	.04	.00	-.09	.03	-.03	.11*	-.17***	-.68***	.02	-.05	-.03	.08	-.17***	-.20***	.59***	.10†	1

Note. $N_{teachers} = 326$. Bivariate correlations were conducted prior to use of FIML to recover missing cases. T1 = time 1, T2 = time 2, EE = emotional exhaustion, PA = personal accomplishment, PD = psychological distress factor scores, Tch. Yrs. Exp . = teacher's years of experience, Hisp. = Hispanic or Latino, ELL = proportion of English Language Learners in the classroom; IEP = proportion of students in a classroom with an Individualized Education Plan.
*** $p \leq .001$. ** $p \leq .01$. * $p \leq .05$. † = $p \leq .10$.

Table 5.
Fit statistics and inter-factor correlations from confirmatory factor analyses examining a one- and three-factor solution for DASS-21 items.

	One-Factor		Three-Factor	
	Time 1	Time 2	Time 1	Time 2
CFI	.94	.95	.97	.96
TLI	.94	.94	.96	.96
RMSEA	.06	.07	.05	.06
Factor Correlations				
Dep. with Anx.	-	-	.76	.88
Dep. with Stress	-	-	.81	.90
Anx. with Stress	-	-	.91	.87

Note. CFI = comparative fit index; TLI = Tucker-Lewis index; RMSEA = root mean square error of approximation; Dep. = depression; Anx. = anxiety.

Table 6.
Results from fully cross-lagged model testing bidirectional associations between teacher-reported emotional exhaustion, personal accomplishment, and psychological distress.

	T2 Emotional Exhaustion			T2 Personal Accomplishment			T2 Psychological Distress		
	Estimate	(S.E.)	f^2	Estimate	(S.E.)	f^2	Estimate	(S.E.)	f^2
T1 Emotional Exhaustion	.56***	(.05)	.47	-.15**	(.05)	.02	.16***	(.04)	.05
T1 Personal Accomplishment	-.09†	(.05)		.44***	(.05)	.25	-.05	(.04)	
T1 Psychological Distress	.20***	(.05)	.06	-.11*	(.05)	.01	.68***	(.03)	.94
Teachers' Years of Experience	-	-		-.07	(.05)		-	-	
Teachers' Race/Ethnicity									
Hispanic or Latino	-.02	(.06)		-	-		-.05	(.04)	
Black	-.10*	(.05)	.01	-	-		-.08*	(.04)	.01
Other	-.04	(.04)		-	-		.00	(.03)	
Grade Taught									
Third	-	-		-	-		.06*	(.03)	.01
Mixed	-	-		-	-		.01	(.03)	
Treatment	.04	(.05)		.08†	(.05)		-.02	(.03)	
Cohort 1	-.03	(.05)		.08	(.05)		.03	(.03)	
Time Lag	.11**	(.04)		-.13***	(.04)		.05	(.04)	
R-squared	.50			.31			.63		

Note. N = 326. Standardized estimates are presented. Standard errors are in parentheses. Local effect sizes (f^2) are reported for significant associations. Models were estimated using full information maximum likelihood (FIML). Standard errors were clustered by school. T1 = Time 1; T2 = Time 2; S.E. = standard error.
*** $p \leq .001$. ** $p \leq .01$. * $p \leq .05$. † $p \leq .10$.

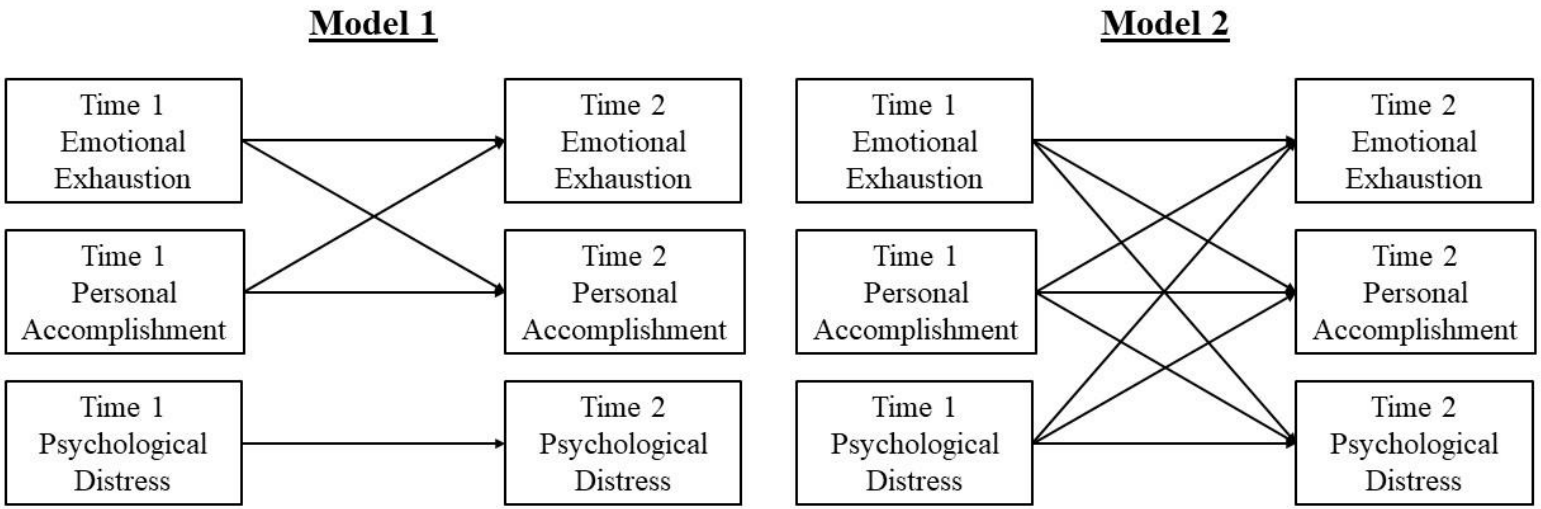

Figure 1. Visual representation of models testing the bidirectional association between components of burnout (Model 1) and the bidirectional association between components of burnout and psychological distress (Model 2). Covariates and correlations among residual variances are not pictured.

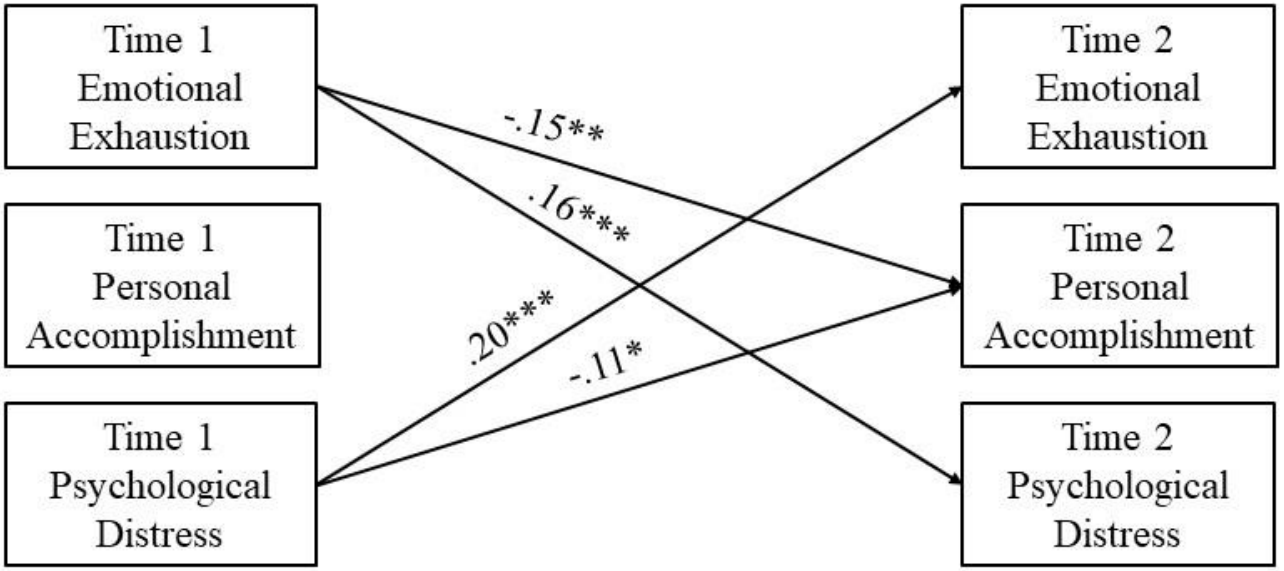

Figure 2. Results for Model 2 examining the bidirectional association between teachers' emotional exhaustion, personal accomplishment, and psychological distress. Only significant cross-lagged paths are included. Standardized estimates are presented. Autoregressive paths, covariates and correlations among residual variances are not pictured.

* $p \leq .05$. ** $p \leq .01$. *** $p \leq .001$.