THE BIDIRECTIONAL RELATIONSHIP BETWEEN ACADEMIC COMPETENCE AND PROBLEM BEHAVIOR AT SCHOOL ENTRY

by

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DISSERTATION ABSTRACT

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The primary purpose of this study was to explore the bidirectional influence of student academic competence and student problem behavior during the early elementary school years. The study used data from the Kindergarten Study, including a sample of 321 early elementary school students from the Pacific Northwest. Using a cross-lagged structural equation model, we addressed two main study questions: (a) does early academic competence influence future student problem behavior and (b) is early student problem behavior in kindergarten significantly associated with future academic competence in second grade? The results suggest that high academic competence in kindergarten is associated with higher levels of problem behavior in second grade, and that kindergarten problem behavior was negatively associated with teacher perception of academic competence in second grade.

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CHAPTER I

INTRODUCTION

The relationship between problem behaviors and academic underachievement has been well established (e.g. Reid, Gonzalez, Nordness, Trout, & Epstein, 2004; Razza, Martin, & Brooks-Gunn, 2012). Co-morbidity rates of academic and behavior problems have been shown to be as high as 50%, according to Hinshaw's (1992) comprehensive review of the literature. Several studies show substantial evidence of a relationship between academic underachievement and behavior problems (e.g., Moilanen, Shaw, & Maxwell, 2010; Reid, Gonzalez, Nordness, Trout, & Epstein, 2004; Risi, Gerhardstein, & Kistner, 2003). In a 2007 study on preschool children, Bracken and Fischel found a significant correlation between student problem behavior and both literacy and mathematic skills at school entry. Historically, this relationship has been understood as problem behaviors disrupting the learning process and leading to academic underachievement (e.g., Caprara, Barbaranelli, Pastorelli, Bandura, & Zimbardo, 2000; Reid, Gonzalez, Nordness, Trout, & Epstein, 2004). For example, in their longitudinal study on academic achievement, Jimerson, Egeland, and Teo (1999) found evidence that student behavioral problems resulted in lower achievement scores over time. However, growing literature suggests that the directionality of this relationship might be reversed (e.g., Peterson et. al, 2013) or that the relationship may be more complex, with problem behaviors and academic skills bidirectionally influencing one another over time (e.g., Miles & Stipek, 2006).

Based on the potential long-term negative consequences of academic and behavioral problems, it is important to consider the role of early intervention in

preventing academic underachievement and problem behaviors among young children. Prevention research indicates that breaking the negative cycle of academic failure and problem behavior early in development may be the most effective approach to improving the long-term trajectories of students (e.g., McIntosh, Horner, Chard, Boland, & Good, 2006). Further, understanding the interplay between student problem behavior and academic achievement, and examining these influences over time, may be particularly important for shaping effective interventions.

Student Problem Behavior and Academic Skills

The association between academic achievement and student behavior has been well-established in research (e.g., Moilanen, Shaw, & Maxwell, 2010). For instance, academic underachievement has been linked to problem behavior in the form of externalizing behaviors (Bierman, Torres, Domitrovich, Welsh, & Gest, 2009, Doctoroff, Greer, & Arnold, 2006), inattention (Polderman, Boomsma, Bartels, Verhulst, & Huizink, 2010), and general lack of behavioral regulation skills (Hindman, Skibbe, Miller, & Zimmerman, 2010). Typically, problem behavior is viewed as a predictor of low academic performance, such that problem behaviors are understood to disrupt the learning process (e.g., Reid, Gonzalez, Nordness, Trout, & Epstein, 2004; Trout, Nordless, Pierce, & Epstein, 2003). For example, a student who frequently misbehaves in class might miss instruction and therefore perform poorly on academic tasks (Risi, Gerhardstein, & Kistner, 2003). Additionally, studies have found evidence of a significant link between externalizing problem behaviors (e.g., aggression, disruption, oppositional problems) and future academic underachievement (Campbell, Spieker, Burchinal, & Poe, 2006; Fergusson & Woodward, 2000; French & Conrad, 2001;

Newcomb et. al, 2002). Moreover, student behavioral problems tend to remain stable beginning in early childhood, and evidence suggests that this early behavior may also influence functioning across other domains, including academic achievement (Dodge & Pettit, 2003; Hinshaw, 1992).

Longitudinal studies linking two primary domains of functioning—behavior and academic achievement—suggest that functioning in one domain may influence functioning in the other domain (Masten et al., 2005). Given the substantial evidence demonstrating a strong relationship between the critical domains of student problem behavior and academic underachievement, it is important to consider the mechanisms that may explain how each domain might impact the other. Extant literature has explored several explanations for the connection between student behavior and student academics, including the possible presence of an underlying factor (e.g. attentional difficulties) that may be contributing to challenges in both behavioral and academic areas (Hinshaw, 1992).

Another possible explanation is that students who demonstrate behavioral problems in the classroom may be more likely to miss instruction (e.g., they are sent out of the classroom, their behavior distracts them from instruction, teacher stops instruction to redirect problem behavior; Wheby, Lane, & Falk, 2003). Additionally, substantial evidence suggests that behavioral problems may undermine the learning process and lead to academic underachievement throughout the school age years (e.g., Reid, Gonzalez, Nordness, Trout, & Epstein, 2004; Risi, Gerhardstein, & Kistner, 2003).

Functional behavior is another explanation for how problem behavior and academic underachievement influence one another, such that the problem behavior may

function to help a student avoid an aversive academic task (Moore, Anderson, & Kumar, 2005; McIntosh, Horner, Chard, Dickey, & Braun, 2008; Filter & Horner, 2009). For example, when there is a discrepancy between a student's academic skill level and the assigned academic task, the student may engage in problem behavior to avoid the academic demands of the task at hand. Students who frequently struggle to understand and demonstrate grade-level academic content can often feel embarrassed, frustrated, and defeated within the context of school. These routine feelings of shame and frustration in relation to academic failure can often lead to task-avoidance or other problem behaviors, such as aggression and disruption (Calderhead, Filter, & Albin, 2006; Hiroven, Tolvanen, Aunola, & Nurmi, 2012; Marsh & O'Mara, 2008). Further, early academic difficulties tend to compound over time, leading students who are unable to master critical academic content to increasingly fall behind their peers and become more likely to engage in problem behavior to escape mismatched academic demands. In support of this theorized underlying mechanism, there is evidence that academic failure in older children (i.e., adolescents) may lead to increased risk of behavioral problems (Deater-Deckard, 2001).

Research suggests that early behavioral problems and academic underachievement may be causally related, and the negative cycle between misbehavior and academic problems may have long-term negative consequences for students. Further, students who experience significant challenges in early school years, both academically and behaviorally, may develop a loss of self-esteem and lower academic self-concept (Keiley, Lofthouse, Bates, Dodge, & Pettit, 2003; Lee and Stone, 2012; Marsh & O'Mara, 2008). This is an important area of concern, given that negative self-concept in students is associated with a higher risk of problem behavior (Marsh and O'Mara, 2008),

which, in turn, is related to increased risk of academic adjustment problems (Bulotsky-Shearer, Bell, & Domínguez, 2012).

Early Literacy Skills and Problem Behavior

As early as kindergarten, reading and literacy deficits can have a lasting effect on the academic trajectories of students (e.g., Adams, 1990). Literacy skills are particularly crucial to academic success, because knowing how to read can increase access to other core content areas (e.g., understanding written directions in math, reading primary source documents in social studies). Studies have well-documented the link between poor literacy skills and long-term lower educational attainment (Ladd & Dinella, 2009).

While there is an established relationship between general academic underachievement and behavioral problems, there is also evidence suggesting that the lack of literacy skills in particular is associated with problem behavior (e.g., Arnold et. al, 2005; McGee, Williams, Share, Anderson, & Silva, 1986). In a 2008 study, Morgan and colleagues investigated the relationship between reading and student behavior in early elementary school. Even when accounting for confounding variables such as family income, race, and gender, findings suggested that early reading skills and student behavior were significantly correlated. Further, the authors found evidence of a reciprocal relationship between literacy skills and behavior, such that first graders who struggled to read in first grade were more likely to demonstrate behavioral problems in third grade as compared to first graders without reading difficulties, and first graders with poor task management skills were more likely to struggle with reading in third grade as compared to their first grade peers with higher task management skills (Morgan et. al, 2008).

Several studies have also demonstrated that children with reading difficulties during early elementary school displayed behavior problems and experienced ongoing academic challenges throughout their education (e.g., Entwisle, Alexander, & Olson, 2007; Miles & Stipek, 2006). Further, students with low literacy skills have been shown to be more likely to consistently experience academic frustration and failure in school relative to students with high literacy skills (e.g., Aunola, Leskinen, Onatsu-Arvilommi, & Nurmi, 2002; Chapman, Tunmer, & Prochnow, 2000). Morgan and colleagues (2008) also reported that struggling readers were almost twice as likely to exhibit problematic behaviors as non-struggling readers. In a 2006 study, Trzesniewski and colleagues examined the relationship between antisocial behavior and reading ability, finding that antisocial behavior and reading skills of young children were best explained by reciprocal influence of one another over time over and above the effects of other environmental factors (Trzesniewski, Moffitt, Caspi, Taylor, & Maughan, 2006). In considering the critical role of early literacy skills on academic and behavioral outcomes, a model accounting for a bi-directional relationship may be particularly effective in examining the nature of the relationship between early literacy deficits and problem behavior in early elementary school children.

Early Mathematical Skills and Problem Behavior

Although the majority of studies on long-term educational achievement have focused on the literacy skills of young children, there is evidence that mathematics skills may also have a strong correlation with later achievement (Duncan et al., 2007) and broader social functioning (Escalon & Greenfield, 2009; Hindman, Skibbe, Miller, &

Zimmerman, 2010), including student problem behavior (Dobbs, Doctoroff, Fisher, & Arnold, 2006).

As is true with other academic skills, evidence suggests that early externalizing problem behavior may influence the development of math skills. For instance, one study found that student behavior in kindergarten predicted first grade math skills (Bramlett, Scott, & Rowell, 2000). Other studies have investigated how problem behavior may lead to increased risk for underachievement in math over a longer period of student development. Jimerson, Egeland, and Teo (1999) conducted a longitudinal study and found that student problem behavior in early and middle childhood predicted lower math achievement through high school.

Similar to early literacy deficits, research indicates that early challenges in math skill development and problem behavior may have a reciprocal relationship over time (Hirvonen, Tolvanen, Aunola, & Nurmi, 2012). Indeed, results of a 2012 study by Hirvonen and colleagues suggested that the development of mathematical skills and problem behavior are interrelated. The underlying mechanism explaining this reciprocal relationship between early math skills and problem behavior may be similar to the previously described relationship between problem behavior and early literacy skills. Specifically, students who routinely struggle in mathematics may develop task-avoidant problem behaviors to avoid feelings of shame and/or frustration and students who engage in problematic behavior are less likely to be engaged in the learning process (Hirvonen, Tolvanen, Aunola, & Nurmi, 2012).

Kindergarten as a Critical Intervention Period

Prevention research has documented the critical need for early intervention related to academic skills and behavioral support, which can significantly impact the long-term trajectories of students (e.g., Bodovski & Youn, 201; McIntosh, Horner, Chard, Boland, & Good, 2006). The kindergarten year is a particularly unique and critical transition period for students, including those students who transition to kindergarten from a preschool environment and those children with no prior experience in a structured setting. Regardless of their earlier experiences, kindergarten students are generally met with a wide range of new academic, social, and behavioral challenges (Hughes, 2015). For instance, kindergarten typically has explicit goals for literacy, numeracy, and socialization that are generally not present in preschool or home contexts (Haines, Fowler, Schwartz, Kottwitz, & Rosenhoetter, 1989). The new goals and the new environment in kindergarten mark a student's introduction to formal instruction (Rimm-Kaufman & Pianta, 2000) and how students adapt to the kindergarten environment can have a profound impact on their long-term trajectory (McIntosh, Horner, Chard, Boland, & Good, 2006). Research indicates that specific student outcomes, especially academic achievement outcomes, tend to remain stable after the first few years in school (e.g., Alexander & Entwisle, 1988). These findings further highlight that the early school transition period is a critical time when interventions might be particularly needed.

Extant literature indicates that both early academic (Council, 1998) and early behavior problems (Campbell, Shaw, & Gilliom, 2000) can develop into a stable pattern, leading to long-term negative outcomes (e.g., Show & Gross, 2008). Although interventions at any age may influence the long-term trajectory of students, evidence suggests that children in Grade 4 who continue to demonstrate non-developmentally

appropriate problem behavior and/or cannot perform academic tasks at grade level are more likely to develop significant, potentially harmful behavior problems (i.e., substance abuse, serious academic misconduct) and are at greater risk of subsequent academic consequences (Biglan, Mrazek, Carnine, & Flay, 2003). Moreover, the development of a poorer academic self-concept is associated with increased risk for problem behaviors that may affect students long-term (Marsh and O'Mara, 2008). Research suggests that problem behaviors displayed in early childhood may solidify during the transition period into kindergarten (Eisenhower, Taylor, & Baker, 2016). These findings emphasize the need for early school interventions aimed at increasing prosocial behavior and grade-level academic competence, given that they could significantly protect students' long-term trajectories.

The Current Study

The current study seeks to examine the relation between the critical domains of academic competence and problem behavior during the early elementary school time period. Specifically, the study will use data from the Kindergarten Study including a sample of 321 early elementary school students from the Pacific Northwest to explore the relationship between early academic competence and behavioral problems. The two primary study aims include:

1. Does early academic competence influence future student problem behavior? We predict that early academic underachievement will impact student behavior over time given that prior research suggests students who struggle with early academic skills are more likely to exhibit problem behavior at subsequent timepoints (Morgan et. al, 2008; Hirvonen et. al, 2012). We will examine whether student

academic competence in kindergarten is associated with the student problem behavior in second grade. We hypothesize that lower levels of academic competence in kindergarten will predict higher levels of student problem behavior in second grade.

2. Is early student problem behavior in kindergarten significantly associated with future academic deficits in second grade? We hypothesize that problem behavior demonstrated in kindergarten will disrupt the learning process and lead to deficits in academic skill development over the first three years of school. Therefore, we hypothesize that higher levels of student problem behavior in kindergarten will be associated with lower levels of academic competence in second grade.

This study will augment prior research focusing on the transition to elementary school by utilizing multi-rater reports of student problem behavior and reports of student academic competence at multiple timepoints during each academic year. The findings of this study are important for informing future intervention strategies for students at school entry. Early behavior and academic skills have been shown to have long-term implications for the success and well-being of students. A more comprehensive understanding of the relationship between these domains could benefit not only the students themselves, but also the larger education system that is tasked with preparing students for lifelong achievement.

CHAPTER II

METHODS

In this section, we describe our participants, recruitment and data collection procedures, measures, and analytic strategy.

Participants

Participating children were recruited from five U.S. public schools in the Greater Portland metropolitan area in Oregon. Participants included 321 kindergarten students, each child's kindergarten teacher, and each child's caregiver.

Descriptive statistics were used to describe the sample (n = 321). At the first time point of data collection, all children in the sample were either five (55%) or six years old (45%); 55% of the children were identified by their parents or caregivers as being male and 45% were identified as being female. The majority of children (58.56%) were identified as White/Caucasian only, 22.11% were identified as Multi-Ethnic, with the remainder of children identified as other ethnicities.

The majority of caregivers who completed questionnaires identified as female (89%) and White (73%). Approximately 79% of caregivers lived with a spouse or partner, and the average age of caregivers was 33.90 years (SD = 6.32). Caregivers reported that their average gross annual household income ranged from $30,000 to $49,999. Among caregivers who completed questionnaires, 13% did not have a high school degree, 25% had a high school degree, 25% had completed some college coursework, 11% had a junior college or associate's degree, 17% had a 4-year college degree, and 9% had graduate professional training or a graduate degree.

Procedures

All data used in this study were collected as part of a funded research project to support kindergarten children and their families at school entry funded by the Institute of Education Sciences, hereafter referred to as the Kindergarten Study (R305A140189; Stormshak, McIntyre, and Garbacz). Families were recruited at the start of the kindergarten year at five Pacific Northwest elementary schools. Of the five schools included in the study, four were Title I schools. Recruiters attended early registration events, the first week of school, and parent-teacher conferences to provide all kindergarten families information about the study and enroll them. Some parents agreed to all parts of the study, whereas others declined participation in the study, but consented to have their child's progress tracked via teacher surveys and district-level record collection. This study uses data from teacher surveys and caregiver surveys (see Stormshak et al., 2014). All measures were self-reported and completed on paper-based questionnaires. Data used for this study were collected at four time points: fall and spring of kindergarten (T1) and fall and spring of second grade (T3).

The data examined in this study will include teacher-reported and caregiver-reported survey data. Teacher-reported measures included concern about student problem behavior and perception of student academic competence. If parents consented for their children to be part of the study, the child's teacher was sent a teacher survey twice during the year. The survey was administered in the fall and spring (beginning and end of the school year), with selected items analyzed (see Measures).

Caregiver-reported measures include demographics (age, gender, and ethnicity) and concern about student problem behavior. Details of these measures are outlined in the next section. The caregiver survey was administered in the fall and spring (beginning and

end of the school year). The first caregiver survey, administered in the fall of kindergarten, included additional questions about preschool, kindergarten registration, and possible participation in other Prevention Science Institute research studies. Subsequent surveys did not include these items. Surveys administered in the spring included an additional item asking caregivers to report on their child's readiness for the next grade. In addition to the demographic items collected from the caregiver surveys, the selected items analyzed are comparable to the teacher surveys also used in the analysis (see Measures).

Attrition. Some variation exists in the number of items completed for each student due to missing data at some time points (i.e., children leaving or coming into the school in the middle of the school year, teachers or caregivers not completing questionnaires). Although missing data are a challenge in longitudinal studies, this study has shown high retention, with a teacher survey completion rate of 77% at fall of wave 1 (N = 247), 98% at spring of wave 1 (N = 314), 83% at fall of wave 3 (N = 266), 85% at spring of wave 3 (N = 273), and a caregiver survey completion rate of 95% at fall of wave 1 (N = 305), 61% at spring of wave 1 (N = 195), 80% at fall of wave 3 (N = 257), 36% at spring of wave 3 (N = 116).

Missing data. Although missing data are expected in a longitudinal study, it is important to account for the missing data within the analysis using appropriate techniques. Examination of the data used in this study indicate that there were missing data at each wave of the project. To account for missing data, this study utilized full information maximum likelihood (FIML). The FIML approach is considered superior to other methods, such as listwise deletion or multiple imputation procedures, because

FIML utilizes the raw data in the covariance/variance matrix to establish parameter estimates (Enders & Bandalos, 2001). In addition to FIML, stochastic regression imputation (SRI) was used to create a complete dataset. In their 2003 article, Newman explains that regression imputation is a method in which missing data points are regressed onto all other variables. This creates a regression equation and allows the missing values to be replaced with predicted values based on that regression equation. SRI includes an additional step by adding a random error term with a standard deviation equal to the standard error of estimate of the regression equation and a mean of zero to the imputed value (Newman, 2003). The data in this study were imputed ten times using SRI and then pooled into one full dataset.

Teacher surveys. The teacher survey includes items adapted for kindergarten and young students from the Gresham and Elliot Social Skills Improvement System (Gresham & Elliot, 2008) and items adapted from the Positive Family Support – Strength and Needs Assessment (Moore, Garbacz, Gau, Dishion, Brown, Stormshak, & Seeley, 2016).

Caregiver surveys. The caregiver survey is titled the School Year Readiness Check-In and includes items adapted from the Positive Family Support – Strength and Needs Assessment (Moore, Garbacz, Gau, Dishion, Brown, Stormshak, & Seeley, 2016). The survey asks caregivers to report on their level of concern about their student's behavior.

Measures

The data examined in this study included teacher-report and caregiver-report questionnaire data. Teacher-reported measures included concern about student problem

behavior and perception of student academic competence. Caregiver-reported measures include demographics (age, gender, and ethnicity) and concern about student problem behavior.

Problem behavior. In this study, student problem behavior was captured using latent variables. These latent variables were calculated from caregiver and teacher versions of the same measure at kindergarten (T1) and second grade (T3). More specifically, in both the fall and spring of kindergarten and second grade, caregivers and teachers reported on their level of concern about student problem behavior. Level of concern was assessed with nine items from comparable versions of the Strengths and Needs Assessment (Moore et al., 2016). Individual items in this measure included caregiver and teacher report of their level of concern about behavioral areas (e.g., follows directions; pays attention; aggressive toward others, behaves well). Items were rated on a 4-point scale ranging from 0 (*no concern*) to 3 (*serious concern*) and demonstrated strong internal reliability (α = .944 and .933 for teachers fall and spring at T1, .921 and .931 for teachers fall and spring in T3, .897 and .895 for caregivers fall and spring at T1, and .910 and .882 for caregivers fall and spring at T3).

Academic competence. The latent academic competence variables were calculated from teacher-reported perceptions of student academic competence during kindergarten and second grade. Teacher perception of student academic competence was assessed with seven items adapted from the Social Skills Improvement System Rating Scales (Gresham & Elliott, 2008) and demonstrated good internal reliability with the study sample (α = .979 and .978 for teachers in the fall and spring, respectively). Items in the measure included a comparison of overall academic competence, how the student

compared to other students in terms of reading and math skills, how the student met grade-level expectations of reading and math skills, and the teacher's perception of a student's overall intellectual functioning. For each of the seven items, teachers responded by rating students by academic competence percentile, with the possible responses of (a) lowest 10%, (b) next lowest 20%, (c) middle 40%, (d) next highest 20%, and (e) highest 10%.

Ethnicity. Student ethnicity was measured using caregiver report of ethnicity at T1 in kindergarten. In the analysis, students identified as White/Caucasian were coded as "0" and all other ethnicities were coded as "1."

Gender. Student gender was measured using caregiver report of gender at T1 in kindergarten. In the analysis, students identified as female were coded as "0" and male were coded as "1." The surveys administered to caregivers did not provide the opportunity for caregivers to report a child as having another or non-binary gender identity.

Analytic Strategy

The principal goal of the study was to examine whether and to what extent academic competence and problem behavior influence one another over time during early elementary school. The study explored to what extent early academic competence and problem behaviors predict future academic competence and problem behavior. Analyses were conducted using structural equation path modeling (SEM) using IBM SPSS Amos 26 (Arbuckle, 2019). Streiner describes SEM as an extension of path analysis that allows for an examination of both measured and unobserved, latent variables (2006). The SEM model in this study was specified as cross-lagged effect model, utilizing kindergarten

data (T1) and second grade data (T3). Further, due to the significant evidence that student ethnicity and gender can impact teacher perceptions of students (e.g., Auwarter & Aruguete, 2008; Pendergast, Nickems, Pham, et al., 2018; Rong, 1996; Tiedemann, 2002; Uhlenberg & Brown, 2002), ethnicity and gender were included in the model as control variables. The analysis utilized one cross-lagged panel model to investigate the two study aims.

Study aim one. The first aim of the study was to investigate whether teacher perceptions of student academic competence in kindergarten (T1) would predict level of concern about student problem behavior in second grade (T3). This study aim is based on our hypothesis that academic underachievement is expected to influence student behavior over time. More specifically, we predict that students who struggle with early academic skills will be more likely to exhibit problem behavior at subsequent timepoints (Morgan et. al, 2008; Hirvonen et al., 2012). We hypothesize that lower levels of teacher perception of academic competence in kindergarten (T1) will predict higher levels of concerns about student problem behavior in second grade (T3), when accounting for levels of concerns about student problem behavior at T1 and when controlling for student ethnicity and gender.

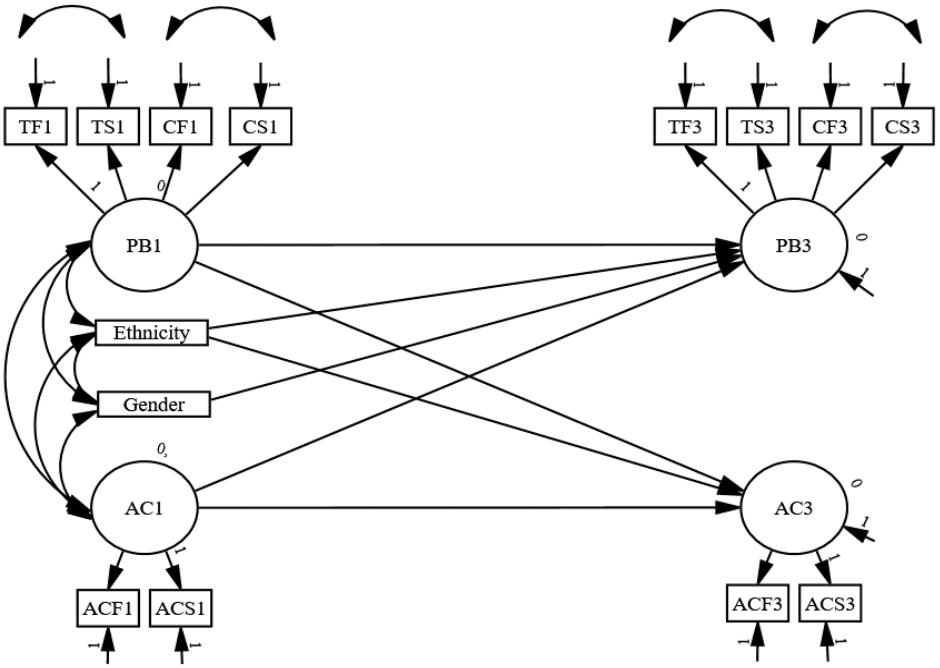
Study aim two. The second aim of the study was to investigate whether the level of concern about student problem behavior in kindergarten (T1) would predict teacher perception of student academic competence in second grade (T3). Our hypothesis is that problem behavior demonstrated in kindergarten will disrupt the learning process and lead to deficits in academic skill development over the first three years of school. Therefore, we hypothesize that higher levels of concern about student problem behavior in

kindergarten (T1) will predict lower levels of teacher perception of academic competence in second grade (T3), when accounting for teacher perception of academic competence at T1 and when controlling for student ethnicity and gender.

Figure 1 shows a graphical representation of the hypothesized theoretical model of early problem behaviors and early academic competence. As is standard in SEM models, ellipses represent latent (unobserved) variables and rectangles represent measured (observed) variables. The control variables (ethnicity and gender) are observed and therefore represented by a rectangle. Curved lines represent covariances or correlations, and straight lines (paths) represent regression coefficients defining the casual effect of the first variable on the second (Schrieber, Stage, King, Nora & Barlow, 2006).

Figure 1 (next page). Theoretical structural equation path model demonstration of the relation between academic competence and problem behaviors from kindergarten to second grade. PB1 = level of caregiver and teacher concern about student problem behavior in kindergarten; PB3 = level of caregiver and teacher concern about student problem behavior in second grade; AC1 = teacher perception of student academic competence in kindergarten; AC3 = teacher perception of student academic competence in second grade; TF1 = teacher concern about problem behavior fall of kindergarten; TS1 = teacher concern about problem behavior spring of kindergarten; TF3 = teacher concern about problem behavior fall of second grade; TS3 = teacher concern about problem behavior spring of second grade; CF1 = caregiver concern about problem behavior fall of kindergarten; CS1 = caregiver concern about problem behavior spring of kindergarten; CF3 = caregiver concern about problem behavior fall of second grade; CS3 = caregiver

concern about problem behavior spring of second grade; ACFI = teacher perception of academic competence fall of kindergarten; ACSI = teacher perception of academic competence spring of kindergarten; ACF3 = teacher perception of academic competence fall of second grade; ACS3 = teacher perception of academic competence spring of second grade.



Model fit. Fit of the measurement model was evaluated using several fit indices. Due to the wide and historic use of the chi-square test statistic to assess the fit of SEM models, we decided to include and report the chi-square test statistic. However, given the sample size of the current study, there is a potential that results of this test may lead to rejection of the model even though the actual fit may be good (i.e., the model may be overpowered to detect poor model fit; Kline, 2005). Due to this limitation, we did not rely solely on chi-square to assess goodness-of-fit. In addition to the chi-square test statistic,

the model was evaluated using the following fit indices: the comparative-fit index (CFI; Bentler, 1990; acceptable fit ≥ .95), Tucker-Lewis index (TLI; Hu & Bentler, 1999; acceptable fit ≥ .95), root mean square error of approximation (RMSEA; Browne & Cudeck, 1993; acceptable fit ≤ .06), and the standardized root mean square residual (SRMR; Hu & Bentler, 1999; acceptable fit ≤ .08).

Model assumptions. Prior to conducting the SEM analysis, several assumptions must be met. For all unmet assumptions, additional procedures and decisions are discussed.

Assumption one. The first relevant assumption for SEM is that the data do not include univariate outliers. This assumption was assessed using IBM SPSS 26 (Arbuckle, 2019) to create standardized values (*z* scores) for all variables in the model. Outliers were considered extreme if they fell more than three standard deviations away from the mean (Kline, 2005). Within this sample, we identified nine extreme outliers and they were removed from the subsequent analysis.

Assumption two. The second assumption was that data have univariate normality. This assumption was assessed using skew and kurtosis scores. For data to be considered univariately normal, kurtosis must be below the absolute value of 8 and skewness must fall below the absolute value of 3 (Kline, 2005). The data in this study were assessed in IBM SPSS 26 (Arbuckle, 2019) and met the assumption of univariate normality for all variables.

Assumption three. A third assumption of SEM is that the data do not have multivariate outliers. This was assessed by calculating the Mahalanobis distance (*D*) statistic in IBM SPSS 26 (Arbuckle, 2019). For our sample, the D^2 was distributed as a

Pearson chi-square statistic with the degrees of freedom equal to the number of independent variables in analysis (six). In line with accepted guidelines, we assessed the values conservatively, with any values less than $p < .001$ being considered multivariate outliers (Kline, 2005). The data in this study met the assumption of no multivariate outliers with all values being greater than $p < .001$ and therefore unlikely to be influential in the analysis.

Assumption four. A fourth assumption of SEM is that the data demonstrate multivariate normality. Multivariate normality was assessed using IBM SPSS Amos (Arbuckle, 2019) assessment of normality. The data failed to meet this assumption, and therefore Monte Carlo parametric bootstrapping procedures were utilized during the analysis. Bias-corrected confidence intervals and standard errors were estimated with 1000 bootstrapped samples.

Assumption five. A fifth assumption of SEM is that the data do not display multicollinearity. The data in this study were examined using IBM SPSS 26 (Arbuckle, 2019). A variance inflation factor (VIF) score of less than 4 is considered reasonable (Hair et al., 2010). The data in the study met the assumption of no multicollinearity with a VIF scores for all variables below 4.0.

Assumption six. A sixth relevant assumption is that there are linear relationships between the study variables. This assumption was assessed using curve estimation in IBM SPSS 26 (Arbuckle, 2019) and examining whether there is a linear relationship (indicated by a significant *p* value) and whether a linear relationship is the best fit for the data (indicated by a higher *F* value for the linear relationship than other relationships). Based on the above criteria, the data in this study met the linear relationship assumption.

CHAPTER III

RESULTS

Results of the study are discussed below. A graphical representation of the results of the structural model is shown in Figure 2.

Overall Model Fit Results.

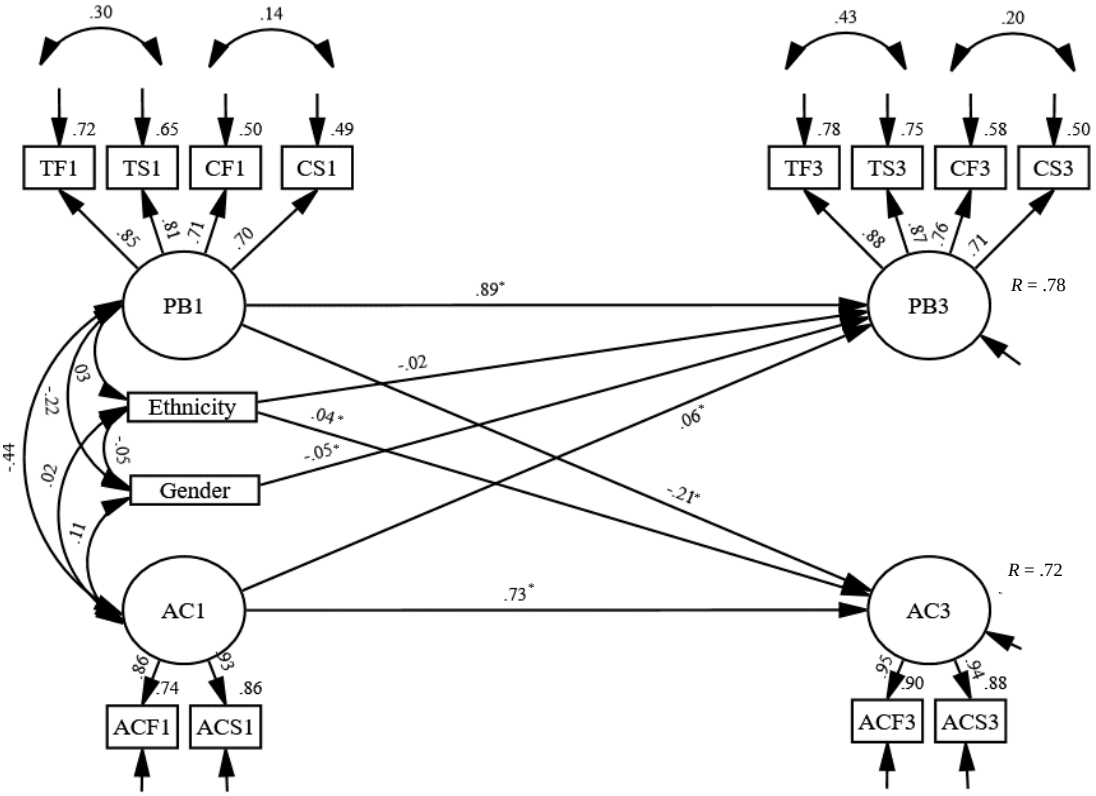
The structural model was evaluated against six criteria: the comparative-fit index (CFI; Bentler, 1990), Tucker-Lewis index (TLI; Hu & Bentler, 1999), root mean square error of approximation (RMSEA; Browne & Cudeck, 1993), standardized root mean square residual (SRMR; Hu & Bentler, 1999), chi-square minimization *p* value > .05 (Hair, 2010). The chi-square test of the model was statistically significant $\chi^2(61) = 904.55$, $p = .00$, which indicates that the model did not demonstrate a good fit with the data. The results of the chi-square test were unsurprising, given our sampe size of 319. Additionally, the model yielded acceptable fit indices for all other indices [CFI = 0.976, TLI =0.964, RMSEA = 0.066 [CI_{95} = 0.062, 0.070], SRMR = .033].

Study Aim One

The first aim of the current study was to utilize structural equation path modeling (SEM) to examine whether teacher perception of student academic competence in kindergarten (T1) would predict the level of concern about student problem behavior in second grade (T3). To investigate this question, a theoretical cross-lagged panel model was tested to investigate whether it was supported by the data. The theoretical model is based on our hypothesis that academic underachievement is expected to influence student behavior over time during early elementary school. We hypothesized that lower levels of teacher perception of academic competence in kindergarten (T1) would predict higher

levels of concerns about student problem behavior in second grade (T3), when accounting for levels of concerns about student problem behavior at T1 and when controlling for student ethnicity and gender.

Figure 2. Structural equation cross-lagged path model for test of relation between student roblem behaviors and academic competence at school entry. Paths are standardized estimates. Model fit [$\chi^2(61) = 904.55$, $p = .00$, CFI = .976, TLI = .964, RMSEA = .066[CI_{95} = 0.062, 0.070], SRMR = .033].* $p < .05$.



Study aim one results. In the cross-lagged model, problem behavior at T1, student ethnicity, student gender, and academic competence at T1 accounted for 99% of the variance in second grade problem behavior. The data suggest that student ethnicity

did not significantly alter teacher and caregiver reports of levels of concern about problem behavior, (β = -.02[CI_{95} = -0.05, 0.002], $p > .05$). However, teachers and caregivers reported higher levels of concern about behavior for boys relative to girls at second grade (β = -0.05 [CI_{95} = -0.08, -0.024], $p < .05$). A significant portion of the explained variance in student problem behavior at second grade was accounted for by kindergarten levels (β = 1.03[CI_{95} = 1.00, 1.06], $p < .05$). Nevertheless, after controlling for student ethnicity and student gender, academic competence in kindergarten predicted higher levels of concern about behavioral problems in second grade (β = 0.11[CI_{95} = -0.07, -0.15], $p < .05$). Although these results suggest a relationship between kindergarten academic skills and second grade behavioral problems, our findings do not support our hypothesis. Potential explanations for these findings will be discussed in the discussion below.

Study Aim Two

The second aim of the study was to use SEM to explore whether the level of concern about student problem behavior in kindergarten (T1) would predict teacher perception of student academic competence in second grade (T3). To address this question, a theoretical cross-lagged panel model was tested to examine whether it was supported by the data. The theoretical model was based on our hypothesis that problem behavior demonstrated in kindergarten would disrupt the learning process and lead to deficits in academic skill development during early elementary school. We hypothesized that higher levels of concerns about student problem behavior in kindergarten (T1) would predict lower levels of teacher perception of academic competence in second grade (T3),

when accounting for teacher perception of academic competence at T1 and when controlling for student ethnicity and gender.

Study aim two results. In the model, academic competence at T1, student ethnicity, student gender, and problem behavior at T1 accounted for 74.4% of the variance in second grade academic competence. Results of the analysis suggest that teachers reported lower levels of academic competence for non-White students in second grade ($\beta = .07[CI_{95} = .05, .09]$, $p < .05$) and for boys relative to girls ($\beta = .033[CI_{95} = .01, .06]$, $p < .05$). A significant portion of the explained variance in academic competence at second grade was accounted for by kindergarten levels ($\beta = .71[CI_{95} = .68, .73]$, $p < .05$). Nevertheless, after controlling for student ethnicity and perceived academic competence at kindergarten, student problem behavior in kindergarten predicted lower levels of academic competence in second grade ($\beta = -.26[CI_{95} = -.29, -.23]$, $p < .05$). These results align with our hypothesis that early behavioral problems may lead to future academic challenges.

CHAPTER IV

DISCUSSION

The primary purpose of this study was to explore the bidirectional influence of student academic competence and student problem behavior during the critical early elementary school years. Using a cross-lagged structural equation model, we addressed two main study aims: (a) whether early academic competence predicts future student problem behavior and (b) whether early student problem behavior predicts future academic competence.

The findings from the first study aim did not support the hypothesis that academic competence in kindergarten would predict student problem behavior in second grade. Although the data suggested a statistically significant relationship between academic competence in kindergarten and problem behavior in second grade, the relationship was the inverse of our hypothesis. This hypothesis was based on literature that suggests that students who struggle with early academic skills may be more likely to misbehave in order to avoid their frustration and/or embarrassment when performing academic tasks (e.g., Aunola, Leskinen, Onatsu-Arvilommi, & Nurmi, 2002; Chapman, Tunmer, & Prochnow, 2000; Hirvonen et al., 2012). However, the results of this analysis indicated that higher levels of academic competence in kindergarten were associated with high levels of concerns about problem behavior in second grade.

Current literature provides little rationale for why academic competence may lead to future behavioral problems. One speculation may be that kindergarten students who are academically performing at grade level may be more likely to experience boredom in the classroom and engage in misbehavior. Indeed, there is some evidence that academic

tasks can become aversive to students once they have mastered the academic content (Umbreit, Lane, & Dejud, 2004). Further, knowing that behavior tends to remain stable over time, it is possible this kindergarten misbehavior may lead to future concerns about the student in second grade. Future research should further investigate this relationship to see if it holds up in other samples of young students, or whether the directionality of the relationship is specific to the sample assessed in this study.

The findings of our second study aim provided evidence supporting our hypothesis. We predicted that higher levels of concern about student problem behavior in kindergarten would predict lower teacher perception of academic competence in second grade. The results of the cross-lagged model suggest that there was a statistically significant relationship between kindergarten problem behavior and second grade academic competence. Further, the direction of the relationship was as expected, such that kindergarten problem behavior was negatively associated with teacher perception of academic competence in second grade. Our results might suggest that kindergarten students whose teachers and caregivers are concerned about their behavior are more likely to be perceived by their teachers at future timepoints as having lower academic competence relative to their peers. These findings align with previous literature demonstrating that behavioral challenges may disrupt the learning process and make it more difficult for students to learn and fully access their education (e.g., Caprara, Barbaranelli, Pastorelli, Bandura, & Zimbardo, 2000; Reid, Gonzalez, Nordness, Trout, & Epstein, 2004).

Results from the second aim have important implications for interventions aimed at positively shaping the long-term trajectories of students. Specifically, our findings

suggest that students who demonstrate behavioral challenges at school entry may benefit from behavioral support not only to influence their future behavior, but also to increase their academic competence. Indeed, teachers and caregivers with concerns about a young student's behavior should view behavioral interventions as having the capacity for impacting the long-term educational attainment of the student.

Study Limitations

Although this study was designed with theory grounded in well-established literature and with close attention being paid to relevant statistical norms and guidelines, there are some limitations to this analysis and the findings.

First, academic competence measured using district data of student academic skills might have been more valid than teacher reports. Although we did have access to some academic data (e.g., standardized test scores), the tests were inconsistently administered and a majority of students were not assessed at all timepoints. Further, as this study relied on the school district to assess academic skills, it was subject to the changes made by the district (e.g., transitioning from STAR Early Literacy to DIBELS between waves two and three). Given the level of missingness and the changing assessments, it was not feasible to utilize these academic data for a longitudinal study.

Second, attrition (i.e., the effect of participants dropping out) presents a threat to the internal validity of the present study analyses (Heppner, Wampold, & Kivlighan, 2008). Internal validity increases the confidence with which causal claims can be made from the results of a study (Heppner et al., 2008). While it was expected to experience some level of attrition, missing data represents a significant limitation of the present study. In line with current practices in the field, missing data was accounted for using

FIML and stochastic regression. However, attrition and the resulting missing data can still influence the outcomes of the analysis and alter the discussion about how academic competence and problem behaviors may influence one another. Therefore, results should be interpreted with caution.

The present study included threats to external validity, impacting the generalizability of the results across units, treatments, outcomes, and settings (Heppner et al., 2008). Specifically, the current study draws exclusively from Oregon schools in the North Clackamas School District; therefore, participants may not be reflective of the entire national population, which indicates a threat to external validity (Heppner et al., 2008). Therefore, it is important to be cautious regarding the generalizability of results from the present study. For instance, it may be important to research these study aims in schools with more ethnic diversity, and in areas of the country with different cultural norms regarding child behavior including both cultural norms in the home as well as how school personnel respond to student behavioral challenges.

Finally, the current study reports the statistical significance of the pathways between the model variables. Future research should include additional analyses to be able to report the effect size magnitude of these relationships to clarify whether there is a clinically relevant effect.

Recommendations for Future Research

Based on the findings of the current study, further investigating is needed to examine the potential causal relationship between early academic competence and problem behavior. One direction particularly relevant for future research might be to consider narrowing the domains of academic competence and problem behaviors. For

example, both early literacy and early mathematics skills have been shown to have a relationship with student behavior. However, few studies have investigated these relationships distinctly using the same sample and the same analysis. As such, researchers should consider including both literacy and mathematics separately in the same analysis so that comparisons can be made between the influence of these two content areas on behavior. Moreover, the operationalization of literacy and math could be further broken down into more specific domains, such as key skills or types of comprehension.

In addition to narrowing the construct of academic competence, researchers might take a more nuanced approach to examining problem behaviors. The measurement used in the present study included both internalizing and externalizing behavioral problems. However, future studies could investigate how different types of behavioral problems (e.g., externalizing, internalizing, attention) may differentially impact academic competence. By narrowing the domains of academic competence and problem behaviors, future research could provide more specific suggestions for early elementary interventions that improve the short- and long-term trajectories of students.

Last, in addition to accounting for gender and ethnic identities, future research to take into consideration other potentially confounding variables, such as time and developmental stage. For instance, it would be interesting to follow students during a longer period of development and assess how current special education or behavioral intervention practices or frameworks within schools may influence the relationship between academic and behavioral domains. It may also be important to account for prosocial skills, in additional to the behavior problems assessed in this study.

Applied Implications

The results of the current study suggest that there may be a bidirectional relationship between early academic competence and student behavior, with both of these critical domains influencing one another over time during early elementary school. These findings have important clinical and applied implications. Applying these results to a school context could mean building school-wide frameworks and interventions that are designed to disrupt the harmful cycle of misbehavior and academic failure. The results suggest that students would benefit from a school culture that supports the socioemotional development of students. For example, schools could teach students how to identify their emotions and then how to use strategies to regulate themselves. And students should be given plenty of opportunities to practice these self-regulation skills in a school context. This would help students to learn how mange the feelings of frustration or anger in the face of mismatched academic tasks or an academic disappointment. If students know how to identify their feelings and use self-regulation techniques, they may be less likely to engage in problem behavior that could exclude them from academic instruction. Teachers and school personnel can further support this process by practicing co-regulation and modeling for students what it looks and feels like to self-regulate in a moment of strong emotion.

Additionally, schools must invest time and resources to appropriately match academic tasks with the ability level of each student.This focus on matching skills with demand may represent a paradigm shift for some school districts where there may be the goal of providing similar grade-level instruction to all students in a classroom. Further, schools should strive to create classrooms that are calm, safe, and predictable for students. For instance, classrooms should have predictable and clear routines. Well-established

routines decrease the need for verbal prompting, which may be missed by students who are momentarily disengaged. Routines also allow teachers to better monitor the classroom or individual student arousal level and modify academic demands prior to a student feeling the need to engage in avoidant problem behavior. Overall, the results of my dissertation support the idea that behavior and academics are linked during early elementary school and that practices that support student behavior and academic learning could benefit not only the students themselves, but also the larger education system that is tasked with preparing students for lifelong achievement.

APPENDIX A

Table 1

Descriptive Statistics for Model Variables in Imputed Dataset

	N	*M*	*SD*
Gender	3190	0.46	0.50
Ethnicity	3190	0.59	0.49
Teacher Concern Fall T1	3190	5.75	6.59
Teacher Concern Spring T1	3190	5.67	6.50
Teacher Concern Fall T3	3190	5.80	6.63
Teacher Concern Spring T3	3190	5.87	6.91
Caregiver Concern Fall T1	3190	4.66	4.84
Caregiver Concern Spring T1	3190	4.25	4.77
Caregiver Concern Fall T3	3190	4.91	5.13
Caregiver Concern Spring T3	3190	4.20	4.45
Academic Competence Fall T1	3190	95.85	16.50
Academic Competence Spring T1	3190	97.15	16.19
Academic Competence Fall T3	3190	94.80	16.79
Academic Competence Spring T3	3190	96.38	15.90

APPENDIX B

Table 2

Correlations of Model Variables

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Gender		-	-	-	-	-	-	-	-	-	-	-	-	-
2. Ethnicity	-.05		-	-	-	-	-	-	-	-	-	-	-	-
3. Teacher Concern Fall T1	-.20**	.00		-	-	-	-	-	-	-	-	-	-	-
4. Teacher Concern Spring T1	-.17**	-.01	.79**		-	-	-	-	-	-	-	-	-	-
5. Teacher Concern Fall T3	-.23**	-.08	.71**	.66**		-	-	-	-	-	-	-	-	-
6. Teacher Concern Spring T3	-.18**	-.00	.65**	.53**	.85**		-	-	-	-	-	-	-	-
7. Caregiver Concern Fall T1	-.17**	.04	.61**	.58**	.47**	.45**		-	-	-	-	-	-	-
8. Caregiver Concern Spring T1	-.15*	.09	.55**	.53**	.46**	.46**	.68**		-	-	-	-	-	-
9. Caregiver Concern Fall T3	-.17**	.09	.46**	.48**	.58**	.61**	.64**	.63**		-	-	-	-	-
10. Caregiver Concern Spring T3	-.26**	.09	.68**	.48**	.50**	.41**	.57**	.52**	.81**		-	-	-	-
11. Academic Competence Fall T1	.04	.01	-.47**	-.30**	-.32**	-.23**	-.26**	-.14	-.13	-.24*		-	-	-
12. Academic Competence Spring T1	.13*	-.00	-.35**	-.33**	-.33**	-.22**	-.23**	-.20**	-.18**	-.21*	.79**		-	-
13. Academic Competence Fall T3	.15*	.09	-.49**	-.37**	-.48**	-.38**	-.30**	-.32**	-.41**	-.36**	.65**	.74**		-
14. Academic Competence Spring T3	.11	.12	-.44**	-.33**	-.41**	-.39**	-.31**	-.25**	-.36**	-.35**	.65**	.72**	.89**	

Note. *$p < .05$; ** $p < .001$

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