Transitioning to University: The Effect of Changes in Academic Engagement and Pressure and Support from Friends on Grades

by

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Abstract

In Canada, over half of high school graduates attend post-secondary education (PSE); however, up to 32% of these students fail to graduate. Given that PSE completion requires meeting academic performance standards and that persistence in PSE is strongly associated with academic performance, a better understanding of factors that influence PSE students' academic performance can inform educators', students', and other stakeholders' efforts to improve persistence in PSE. This dissertation longitudinally examines two aspects of students' motivational systems proposed to impact academic performance following the Self-Systems Motivational Model: academic engagement and friends' influences.

Whereas extensive research exists on the role of academic engagement and friends on students' academic performance during elementary and junior high school, research on these issues during high school is limited and during PSE is even scarcer. To address this gap, this dissertation examines university-level students' academic engagement and their perceived academic pressure and support from friends across their first semester of post-secondary education, the relation of friendship and engagement to one another, and their roles in students' academic performance (GPA).

First-year full-time university students (N = 544) were tracked four times across their first semester. Latent growth curve models showed that all aspects of academic engagement changed across the semester, with some differences in patterns of change over time across different aspects of engagement. Students experienced steady declines in in-class behavioral engagement across the semester while experiencing declines in the first half of the semester followed by slower loss and a slight uptake by the end in all other aspects of engagement investigated, with slight differences in rates of change among them (out-of-class behavioral

engagement, cognitive engagement, and social behavioral engagement). Different aspects of friends' influences also showed different patterns of change across the semester, with students experiencing steady increases in school-supportive pressure throughout, decreasing school-obstructive pressure in the first half of the semester followed by slight increases, and increasing academic instrumental support in the first half of the semester followed by slight decreases.

Parallel process models showed significant associations between aspects of academic engagement and aspects of friends' influences at baseline in seven out twelve assessed models. In general, at the beginning of the semester, more academically engaged students experienced higher school-supportive pressure and academic instrumental support from friends and lower school-obstructive pressure from friends compared to less academically engaged students. Students' experiences of friends' influences at the beginning of the semester did not predict change over time in students' engagement nor did students' engagement at the beginning of the semester predict change over time in students' experiences of friends' influences. There were no consistent associations between change in aspects of academic engagement across the semester and changes in aspects of friends' influences across the semester (significant in two out of twelve models). In terms of academic performance, students who were more academically engaged (all aspects except cognitive engagement) at the beginning of the semester received higher GPAs at the end of the semester. Conversely, students experiencing more school-supportive pressure from friends at the beginning of the semester received lower GPAs.

Overall, first year students experienced changes in academic engagement and perceived academic pressure and support from friends across their first semester at university. How much students engage with their academics was linked to their experiences of perceived academic pressure and support from friends at the beginning of the semester and both of these predicted

their academic performance outcome at the end of the semester. Students' academic engagement and friends' influences experiences across their first university semester were not linked to one another and did not matter for their academic performance once the impact of initial levels of engagement and friends' influences were taken into accounted. What students bring with them to university, then, in terms of engagement and friendship support seems to impact their academic performance at the end of the semester more than changes in these two areas across the semester. Working with high school teachers and students to help students develop habits linked to academic success in PSE may help PSE institutions improve the academic performance of their students as much as providing academic support services to them once they start their PSE studies.

Preface

This thesis is an original work by Dayuma Ixchel Vargas Lascano. The research project, of which this thesis is a part, received research ethics approval from the University of Alberta Research Ethics Board, Project Name “Student Engagement in Higher Education: Peer Influences and Academic Success”, No. 42289, September 5, 2013.

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CHAPTER I

Introduction

Academic success during post-secondary education (PSE) is important for the individual and society at large. Research shows that degree attainment, as a measure of academic success, is linked to later-life outcomes. For example, on average, PSE graduates have higher annual earnings (on average 37% higher; Pascarella & Terenzini, 1998; Perna, 2003), are more active citizens (Gidengil, Blais, Nevitte, & Nadeau, 2003; Hall, McKeown, & Roberts, 2001), and enjoy better physical and mental health compared to high school graduates (Pascarella & Terenzini, 1998; Stephens & Graham, 1993). Academic success can also be conceptualized in terms of experiences during PSE such as performance (grades) and academic activities. In this respect, better grades and higher academic involvement in PSE (e.g., contact with faculty and peers outside of class for academic purposes) have been associated with later outcomes such as higher early career earnings after PSE (Hu & Wolniak, 2010, 2013; Roth & Clarke, 1998).

Although researchers have only recently started to understand the breadth of these benefits, the importance placed on PSE in Canadian society in general is evident in governmental and philanthropic efforts over the past half century aimed at increasing access to higher education. These include the Veteran's Rehabilitation Act (providing veterans with access to PSE after World War II), the Canada Student Loan Program in 1964, and the Canada Health and Social Transfer program in the early 1990s (allowing federal financial support toward provincial expenditures for PSE). In 1997, while discussing access to PSE in the 21st century, Prime Minister Jean Chrétien stated that "[t]here can be no greater millennium project for Canada and no better role for government than to help young Canadians prepare for the knowledge based society of the next century" and pledged to increase PSE funding by one billion dollars. Not

surprisingly, overall participation rates in PSE have increased in the last 50 years, with over half of high school graduates in Canada and the U.S. entering some form of PSE by the age of 19 (Finnie & Muller, 2008; U.S. Bureau of Labor Statistics, 2011).

Unfortunately, along with increased rates of participation in PSE, there has been an increase in the proportion of PSE students who fail to finish their studies. In 1967 about 13% of the labor force of the U.S. reported having some college education but not a college degree nor being enrolled in college any more while by 1996 this number had increased to 27% (Grubb, 2002). Although it is unclear whether drop-out rates have continued to increase in the last two decades or not, it is clear that today's PSE drop-out rates are still high. Almost half of 18- to 20-year-old PSE students in the U.S. fail to graduate with any credentials within six years (Shapiro et al., 2012). Although dropout rates in Canada are lower than in the U.S., they are still concerning; the national average is as high as 25%, and Alberta holds the highest rate across provinces at 32% (Shaienks, Gluszynski, & Bayard, 2008).

There are many factors that may cause students to leave their PSE studies before degree completion. Much attention has been given to the role of financial limitations as a barrier to PSE, yet recent research shows that, in Canada, financial factors such as family income and access to financial aid rarely play a role on PSE persistence (Finnie & Qiu, 2008). Although less attention has been given to non-financial factors involved in PSE dropout, there is evidence that students' academic experiences play a role on their decision to drop out. Indeed, low achievement is one of the most common reasons given by Canadian students for leaving PSE, and up to 45% of dropout in early PSE may be attributed to students' poor first semester performance, even when this performance is not low enough to place students at risk of failing out of school (Finnie, Childs, & Qiu, 2012; Stinebrickner & Stinebrickner, 2012, 2014). Given the impact that PSE has

on a variety of life domains and the importance placed on PSE by our society, it is important to identify the factors that may promote good academic performance in PSE and the *processes* through which these factors assert their influence.

The present study investigated the process through which two factors may contribute to academic performance, as measured by grades, during the first semester of university studies: academic engagement and peers. Focus on students' first semester at PSE is important as this is a key transitional period during which the foundations for later academic success are established (ACT, 2001; Astin, 1985, 1993, Kuh, 2009; Pascarella & Terenzini, 2005). Academic engagement and students' relationships with various social partners, including peers, are factors repeatedly identified as important to academic success in young students (elementary to high school age; Anderman & Anderman, 2000; Fredricks, Blumenfeld, & Paris, 2004). They have, however, received little empirical attention as potential influences on PSE academic outcomes.

Students' emotional and cognitive commitment to crucial academic activities and their behavioral involvement in them, termed *academic engagement*, are positively related to their academic performance (Fredricks et al., 2004; Salanova, Schaufeli, Martínez, & Bresó, 2010; Wolf-Wendel, Ward, & Kinzie, 2009). Higher academic engagement is linked to higher grades and lower likelihood of school dropout and grade retention (Li & Lerner, 2011; Reschly & Christenson, 2012). However, most of this research has focused on elementary and junior high students. The few studies on PSE students' academic engagement provide support for its positive association with academic performance (e.g., Salanova et al., 2010).

Similarly, extensive research shows that parents, teachers, and peers are social partners who can impact students' academic outcomes such as grades and school completion (Grolnick, Friendly, & Bellas, 2009; Wentzel, 2002, 2009). Among these, peers have been identified as one

of the most important and potentially influential types of social partners during childhood and adolescence (Prinstein & Dodge, 2008). For example, mere association, friendship quality, and peer influence are a few of the vast features of peer interactions and peer relationships that have been found to be associated with adolescents' academic outcomes (Brown & Larson, 2009). Given that the impact of peers, especially friends, may increase as students grow older and experience normative increases in (1) the amount of time they spend with peers, and (2) the importance they place in the expectations and opinions of their peers (Brown & Larson, 2009), friends may be particularly influential for PSE students' academic performance. Yet empirical attention to the role that friends may have on PSE students' academic outcomes has been limited. The scarce research on the influence of peers on PSE students' academic experiences shows that supportive university friendships are positively associated with students' academic adjustment (Buote et al., 2007) and grades (Dennis, Phinney, & Chuateco, 2005).

What are the processes by which academic engagement and peers impact academic performance? Although the importance of academic engagement and peers for students' academic outcomes has been generally established, still missing is empirical work investigating *the processes* that tie academic engagement and peer relations to PSE students' academic outcomes. The self-systems motivational model (Skinner, Kindermann, Connell, & Wellborn, 2009) provides a theoretical framework that identifies *how* contextual factors (e.g., peers), and individuals' motivated action (emotion guided attention and/or behavior such as engagement), facilitate or undermine outcomes, academic or otherwise. According to this model, internal psychological processes (e.g., self-perceptions) and context (e.g., peers) contribute to individuals' motivated action, which determines academic outcome. In turn, individuals' motivated action informs their psychological processes and impacts their context. These

reciprocal relationships involving individuals' motivated action, internal psychological processes, and context form a system that determines motivational outcomes, which in the area of academics include commitment to school, coping with challenges, and learning (often indirectly measured in terms of grades; Skinner, Kindermann, Connell, & Wellborn, 2009). Lacking in this model, however, are stipulations about how *changes* in students' engagement and in their interpersonal conditions may impact students' outcomes. For this reason, the study of academic engagement could benefit from a developmental perspective (Skinner et al., 2009).

The lifespan developmental perspective (LSDP; Baltes, 1987) provides a framework to investigate *change over time* in engagement and social factors and the role it may play for students' outcomes within the self-systems motivational model. According to the LSDP, interactions between the individual and his or her contexts bring about changes in the individual –that is, individual-context interactions impact the individual's emotions, cognitions, and behaviors. Change across time in social contexts produce developmental change (within-person change) and, therefore, impact developmental outcomes beyond the impact that a stable social context has on developmental outcomes (Baltes, 1987; Lerner, 2006). From a motivational perspective this includes academic performance. As such, understanding the roles that academic engagement and peer relations play in students' academic outcomes requires investigation of the *changes* students experience in their engagement and peer relations, particularly during periods of more intense contextual changes such as the transition from high school to PSE.

In the present study, the self-systems motivational model and the LSD perspective were integrated to address three research questions: Across PSE students' first semester,

a) how do students' academic engagement and perceived academic pressure and support from friends, change across time?

b) how are academic engagement and perceived academic pressure and support from friends linked across time?

c) how are initial levels of and changes in students' academic engagement and perceived academic pressure and support from friends associated with their academic performance?

Theories and empirical findings relevant to answering these questions are outlined next. First, the self-systems motivational model and the LSDP are discussed to establish the theoretical framework guiding the present research. Second, relevant literature on academic engagement and peer relations as well as on their ties to one another and to academic performance is presented. Third, the role of potentially important covariates for investigations focusing on engagement and peer experiences are examined. The main research questions of the present study are revisited last, with a brief discussion of expected results.

Theoretical Framework I: The Self-Systems Motivational Model

When applied to the area of education and schooling, theories of human motivation have focused on a rich and extensive variety of constructs that explain the basis of, the influences on, or the reasons why students seek, initiate, and maintain behaviors that are goal-oriented and that allow them to succeed academically (Wentzel & Wigfield, 2009). That is, these theories try to identify the origins of, processes behind, and reasons for student motivation to achieve specific academic goals. Scholarship on educational motivation has identified both person-level factors (e.g., values, Eccles & Wigfield, 2002; internalization of values, Ryan & Deci, 2000; perceived self-efficacy, Pajares, 1996; achievement goals, Dweck, 1986; attribution beliefs, Weiner, 1985) and contextual factors (e.g., autonomy support, competence feedback, supportive social environment, Ryan & Deci, 2000; Pajares, 1996; Weiner, 1985) that shape motivation and determine performance in the context of academics. The self-systems motivational model as

presented by Skinner and colleagues (2009) represents an effort to (a) integrate multiple motivational theories, and (b) identify the core features of motivation and the roles these play in determining individuals' outcomes, including academic performance.

According to this model, there are four classes of constructs involved in the motivational process that takes place as students tackle specific academic tasks, as well as throughout and across academic terms (e.g., semesters and academic years), and these constructs are presumed to be linked to one another in a particular causal sequence: context → self → action → outcomes. Figure 1 presents a simplified version of the process model provided by Skinner and colleagues (2009) with examples of constructs within each class from different motivational theories integrated in this model.

Context. The self-systems motivational model asserts that the social features of students' environment can play an important role in shaping their motivational experiences and development (Skinner et al., 2009). Motivational theories informing this integrative model identify different features of the social context as important, including the characteristics and quality of students' social relationships (e.g., whether rejection is experienced within the relationship, how supportive or coercive the relationship is) as well as the social activities in which students are involved (e.g., type of instruction, group work). Thus far the features of students' relationships with social partners within the classroom (teachers and classmates) have received the most empirical attention (Skinner et al., 2009). However, according to this model, any social relationship that provides input into students' perceptions and actions related to their academic abilities and experiences can play an important role in students' motivational processes, regardless of whether or not it is part of students' classroom. Friends are one group of

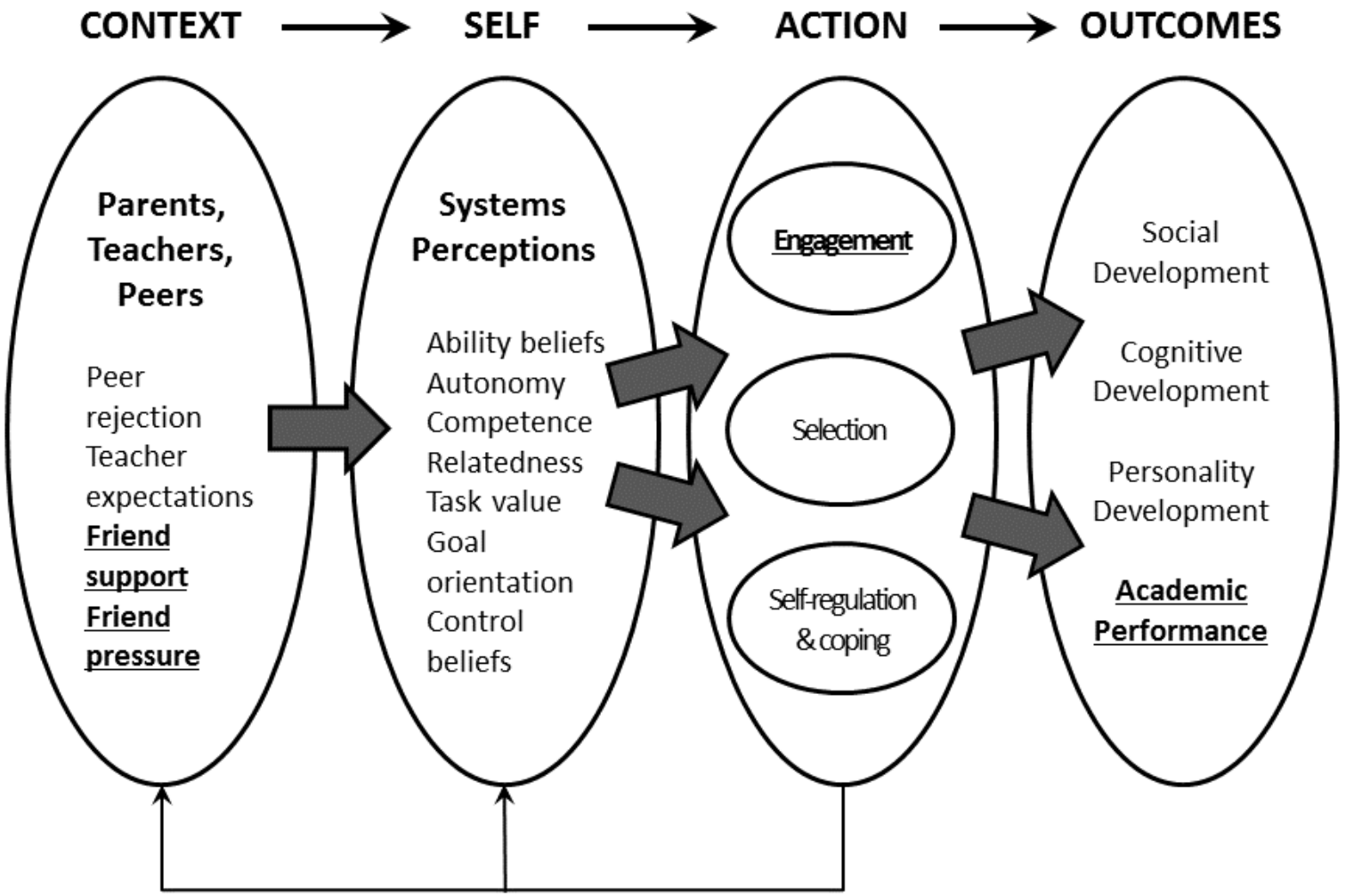

Figure 1. Simplified general processes of motivation according to the self-systems motivational model (Skinner et al., 2009).

Note. Constructs assessed in the present study within each construct class appears in bold and underlined.

social partners that may impact students' motivational processes in their academics from outside the classroom. Friends differ from other peers such as classmates and playmates most importantly in that friends choose each other (versus involuntary association based on, for instance, sharing a common class space) and they are more emotionally intimate toward one another than they are toward non-friend peers (Krappmann, 1996; Selman, 1980). Although in elementary and junior high school friends may frequently share the same classes and therefore also fulfill the role of classmates, friendships are less school-based as students move through secondary and post-secondary schooling (Brown & Larson, 2009). Extensive research shows a link between friendship features (e.g., friendship quality, conflict, personal characteristics of friends) and academic outcomes (e.g., Dennis et al., 2005), but the impact of friends on academic motivation has not been widely examined (Ladd, Herald-Brown, & Kochel, 2009).

The small but growing body of research on friendships and motivation during childhood and adolescence has investigated the role of several features of these relationships on student motivation. For instance, students whose friendships provide (or at least who perceive their friendships as providing) emotional support (e.g., positive affirmation, companionship) and instrumental aid (e.g., help with social and scholastic problems) are more academically engaged (Ladd, Kochenderfer, & Coleman, 1996; Wentzel, 1998). Friendships can also impact students' engagement negatively. Conflict and rejection within friendships, for example, have been found to stifle academic engagement (Berndt, 1996). In addition, given that the impact of friendships on development increases normatively across adolescence (Brown & Larson, 2009), friendships may become more important for students' motivational processes as they progress through their education. Although there is a recognized need to account for peers as an important factor in

adolescent socialization, motivation, and achievement (Nichols & White, 2001), investigation of the role of friends in PSE students' engagement and development is almost non-existent.

In the present study, three features of PSE students' friendships were investigated as potentially important for students' motivation and engagement in school. Labeled *perceived academic pressure and support from friends* as a group, these features are *school-supportive pressure*, *school-obstructive pressure*, and *academic instrumental support*. School-supportive pressure is conceptualized as expectations or pressures students experience (or believe they experience) from their friends to do well in school and to choose academically beneficial activities (e.g., doing homework) over competing available activities (e.g., going out). School-obstructive pressure also involves expectations or pressures students experience (or believe they experience) from their friends, but in this case to put less effort or importance toward academic work. Academic instrumental support is conceptualized as help and advice in the area of academics that students receive from their friends, whether requested or spontaneously provided. More detailed information about what is known regarding friendship influence in the realm of academics is presented later in this chapter.

Self. The self-systems motivational model identifies cognitions about the self and about the activities within achievement-related contexts, such as school, as individual characteristics that are proximal predictors of engagement and other motivated action (Skinner, Zimmer-Gembeck, Connell, Eccles, & Wellborn, 1998; Weiner, 1985). According to this model, individuals' interactions in their social context cumulatively shape their cognitions about themselves and their environment, which in turn guide their engagement behaviors, emotions, and cognitions. Attitudes, values, and beliefs about oneself and one's activities are some of the cognitions that make up the *self* component within this motivational system.

Theories informing this model focus on specific attitudes, values, and beliefs for motivational outcomes in school and academics. For example, expectancy-value theory focuses on ability beliefs and subjective task value (Eccles & Wigfield, 2002), self-determination theory centers on sense of autonomy, competence, and relatedness, and motivational orientations (Ryan & Deci, 2000), and social cognitive theory identifies people's aspirations, self-efficacy beliefs, personal standards, and other cognitions as important person-level factors that help determine human functioning (Bandura, 1986; Pajares, 1996). The common thread across these theories is an interest in predicting some form of behavior, emotion, or cognition that, according to Skinner and colleagues (2009), falls within the construct of action and, in many cases, within the specific concept of academic engagement. This points to the importance of academic engagement (exemplifying action) as part of the motivational system.

Action. Borrowing from action theory (Heckhausen, 1977), the concept of *action* in the self-systems motivational model describes the amalgam of goal-directed behaviors, cognitions, and emotions (Skinner at al., 1998; Skinner at al., 2009). Actions represent more than behaviors as any given behavior can be enacted with different goals and emotions. For example, slapping someone on the back likely reflects a different motivated action if it is done in anger and with the goal of producing pain than if it is done cheerfully with the goal of showing pride. As such, and according to this model, it is the integrated action involving these three intrapersonal processes (behavior, cognition, emotion) that reflect the individual's motivation and not a behavior on its own. In addition, context is expected to exert its impact not only on the individual's behavior but on his or her broader *actions.* Actions, in turn, are expected to most proximally bring about the outcomes of motivation (Connell & Wellborn, 1991; Skinner et al., 2009).

Although there are multiple classes of motivated action, Skinner and colleagues (1998,

2009) identify engagement as the action that most centrally reflects human motivation and is, therefore, essential to the motivational process. This view of engagement as an *action* is congruent with the most recommended definition of academic engagement (i.e., student engagement in academic work) within educational research as a multifaceted construct composed of separate but interconnected dimensions. Most commonly, these dimensions are identified as behavioral, emotional, and cognitive engagement (Fredricks et al., 2004; Jimerson, Campos, & Greif, 2003). *Behavioral engagement* refers to participation in activities relevant to academic functioning (e.g., attending classes, completing homework) as well as the avoidance of disruptive behaviors (e.g., off-task behavior during class-time). *Emotional engagement* refers to the student's positive or negative affective responses to school and also includes a sense of belonging and identification with the academic environment. *Cognitive engagement* is related to investment and amount of effort students exert to master their academic tasks and learning materials (e.g., connecting learned material to their personal experiences; Fredricks et al., 2004).

Fredricks and colleagues (2004) also point out that other dimensions of academic engagement are possible and have been studied. Regardless of the specific dimensions under study, the conceptualization of academic engagement as multidimensional opens up the possibility that different dimensions are impacted differently by contextual factors. In turn, the different dimensions may impact different aspects of motivational outcomes, including academic performance. Therefore, to fully understand the role of engagement in the motivational system, it is necessary to use explicitly multidimensional assessments of engagement and evaluate the role of each dimension separately (Connell & Wellborn, 1991; Skinner et al., 2009). Yet most research on academic engagement, and particularly on academic engagement in PSE, has either used one-dimensional assessments of engagement or combined separately measured dimensions

of engagement to create a general engagement score (Fredricks et al., 2004). The present study followed the multidimensional conceptualization of academic engagement and investigated the role each dimension played within the motivational system of PSE first year students.

Outcomes. The self-systems motivational model organizes classes of constructs and their theorized antecedents with the purpose of predicting developmental and educational outcomes. Within the area of education, outcomes of interest center on cognitive development and learning, the promotion of which is the primary mission of schooling (Wentzel & Wigfield, 2009). *Academic achievement*, defined as how proficient students are in the knowledge and skills related to a specific school subject or academic area (Crow & Crow, 1969), is an outcome of motivation at school of particular importance. High levels of academic achievement represent students' acquisition of the knowledge and skills they were expected to learn. In addition, academic achievement has been associated with non-educational outcomes in the short term (e.g., less externalizing problems, less anxiety, higher life satisfaction; Fogarty, Davies, MacCann, & Roberts, 2014; Schwartz, Hopmeyer-Gorman, Nakamoto, & McKay, 2006) and in later life (e.g., higher annual earnings; Pascarella & Terenzini, 1998; Perna, 2003). Although academic achievement has been operationalized in a wide variety of ways, it is most typically measured in terms of *academic performance* (school grades or scores on standardized achievement tests). The present study investigated how social context and motivated action factors work together to impact PSE students' academic performance.

As depicted in Figure 1, there are also feedback paths from engagement to both context and the self. Skinner and colleagues propose that engagement's key role in the motivational system is not only as a mediator of the effects of contextual and individual factors on short- and long-term outcomes, but also as a source of changes in the context and self (Connell & Wellborn,

1991; Skinner, Furrer, Marchand, Kindermann, 2008; Skinner et al., 2009). For contextual factors, social partners may consciously or unconsciously adjust their behavior toward students in response to students' engagement. Research on student-teacher relationships as well as peer relationships supports this proposition (e.g., Kindermann, 2007; Skinner & Belmont, 1993). In addition, Skinner and colleagues (2009) propose that students' academic engagement experiences inform their own appraisals, attitudes, and beliefs about themselves and their educational activities (self-systems). This feedback effect of engagement on students' self-systems and context has received little empirical attention. In the present study the potential effect of students' engagement on their academic experiences with friends were investigated alongside the potential effects of academic experiences with friends on students' engagement.

Theoretical Framework II: The Lifespan Developmental Perspective

If academic engagement is malleable, as proposed by the self-systems motivation model, then it may change across time as the individual develops and as the academic context changes (Eccles & Wigfield, 2002). The same can be true for the features of students' friendships – they can change and evolve over time as social needs and contexts change (Brown & Larson, 2009). The first semester of PSE may be a particularly sensitive period for changes in both engagement and friendships as students experience novel academic settings and social environments (Arnett, 2006; Oswald & Clark, 2003). The Lifespan Developmental Perspective (LSDP) is a framework to conceptualize development and investigate it empirically. It postulates that development is impacted by the sociocultural contexts in which the individual is embedded. These contextual influences belong to one of three classes: *normative age-graded*, *normative history-graded*, or *non-normative* (idiosyncratic) influences (Baltes, Lindenberger, & Staudinger, 2006).

Normative age-graded influences refer to those that are closely related to one's age and are

therefore widely experienced within society (e.g., finishing high school in the late teens). At the same time, different groups of individuals may experience different age-graded influences or may be differentially affected by the same age-graded influences, contributing to variations in developmental pathways (Baltes et al., 2006). As such, to understand developmental pathways, it is necessary to consider age-graded influences. During late adolescence, the transition to PSE is an age-graded influence that involves changes in students' educational and social environments and can therefore impact students' academic engagement and friendships (Bukowski, Buhrmester, & Underwood, 2011; Montgomery & Côté, 2003; Tinto, 2003).

In terms of the academic demands, students starting PSE must take greater responsibility for managing their own studies than they did in high school as they face higher student-instructor ratios, higher expectations for autonomous learning, and heavier academic workload (Tinto, 1993). As such, academic engagement may be compromised during the first semester of PSE because it represents a novel and challenging achievement environment that does not meet students' expectations based on their high school experiences. Throughout the semester students may become discouraged by the return they receive from their behavioral, cognitive, and emotional efforts toward their learning (e.g., grades are not what students expected, no positive feedback from instructors is received, academic work is perceived as 'never-ending') thus reducing their engagement.

With respect to social context, the transition into PSE often involves changes in proximity and access to the network of friends established during high school. High school friends choose different PSE institutions for their studies, potentially moving away from home (Oswald & Clark, 2003). Research shows that students experience changes in the quality and quantity of pre-PSE friendships and their satisfaction with these relationships during their first year in PSE (Paul

& Brier, 2001; Paul & Kelleher, 1995; Shaver, Furman, & Buhrmester, 1985). In addition, students develop new friendships within the PSE environment, further altering their previously established social context (Oswald & Clark, 2003).

In addition to postulating that development is impacted by the sociocultural contexts in which the individual is embedded, the LSDP also suggests that contexts may change over time and that these changes should be taken into account in empirical work because they may be as influential as initial contextual conditions (Baltes, 1987; Lerner, 2006). Thus, considering the impact that *change over time* in friendships and *change over time* in academic engagement may have on one another and on academic performance may provide a more comprehensive account of the associations tying together social context, academic engagement, and academic performance. Incorporating change over time associations may thus be an advantage over creating a stable model of these associations.

Figure 2 depicts the theoretical model examined in the present study. This model integrates the self-systems motivational model with the framework provided by the LSDP by considering initial levels and change over time in students' academic engagement and perceived academic pressure and support from friends (school-supportive pressure, school-obstructive pressure, and academic instrumental support) together influencing grades. Dynamic, reciprocal relations between social context and motivated action are represented by double-headed arrows between initial levels of perceived academic pressure or academic instrumental support from friends and academic engagement and between change over time in these two constructs.

The LSDP also emphasizes plurality in development, in terms of both *multidirectionality* and *multidimensionality* (Baltes et al., 2006). That is, development includes multiple directions, rates, and forms of change (multidirectionality) that, within the same developmental period, can

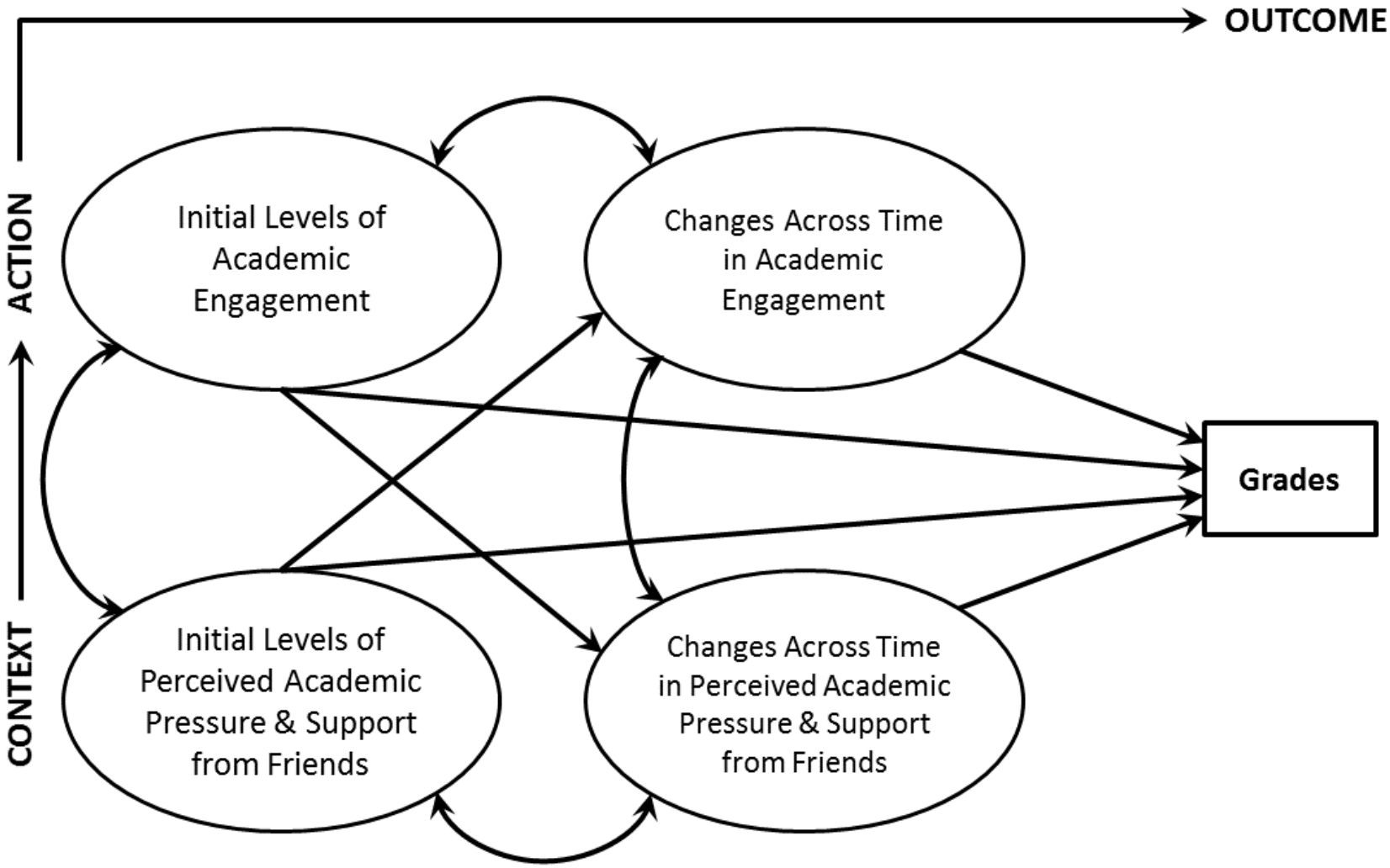

Figure 2. General model of the hypothesized relationships among perceived academic pressure and support from friends, academic engagement, and grades.

differ among components of a developmental domain (multidimensionality). It is possible, then, that different components of academic engagement and aspects of students' friendships show different directions, rates, and forms of change across the semester. This is congruent with the self-systems motivational model's presentation of academic engagement as composed of three separate but interconnected components: behavioral, emotional, and cognitive engagement.

Although research on how various components of academic engagement change differently across time is scarce, evidence suggests that behavioral engagement is less variable across time than emotional and cognitive engagement (Li & Lerner, 2013). There is also evidence from research on young adolescents that students' emotional engagement becomes more positively associated with peer support from Grades 6 to 8, while behavioral engagement becomes more negatively associated with friends' problem behavior (Li, Lynch, Kalvin, Liu, & Lerner, 2011). Based on the multidimensional nature of academic engagement identified by the self-systems motivational model and following the LSDP as well as this empirical evidence, components of academic engagement were evaluated separately in the present study.

Extensive research on peer influence identifies multiple aspects of peer relationships and friendships (e.g., relationship quality, peer attitudes and expectations, peer behaviors) that affect adolescents' development and school-related outcomes (Brown & Larson, 2009; Buote et al., 2007; Wentzel, 2009). There is also evidence that aspects of peer influence (e.g., peer support and friends' problem behavior) associate differently with separate components of academic engagement (e.g., emotional and behavioral engagement; Li et al., 2011). Thus, some aspects of peer relationships positively impact students' experiences while others may pose risks to their academics. Research also shows that not all peers are equally influential –friends have more impact than other peers and their importance increases through adolescence (Beyers & Seiffge-

Krenke, 2007; Morgan & Grube, 1991; Urberg, 1992).

Although the importance of friendships for adolescent development and their association with academic engagement is well established, little is known about adolescent friendships during the transition to PSE and their role in students' academic engagement (Berndt, 1996). To address this, two types of perceived academic pressure (school-supportive and school-obstructive) from friends and academic instrumental support from friends were investigated in this study as potential mechanisms of influence through which friends impact different components of first-year PSE students' academic engagement. A review of relevant literature on academic engagement and peer (including friends) influences, their ties to one another, and their ties to academic performance is presented next.

Academic Engagement, Peer Influences, and Academic Performance

Academic engagement across time. Longitudinal research on academic engagement has focused on primary and secondary education and has examined mainly changes across *years* (grades). For example, Wang and Eccles (2012) found that the behavioral, emotional, and cognitive engagement of U.S. students decreased from Grade 7 to 11. This decline in academic engagement has been found consistently across samples of high school students, whether dimensions of engagement are examined separately or combined (Melby, Conger, Fang, Wickrama, & Conger, 2008; Van de gaer, Pustjens, Van Damme, & De Munter, 2009).

Only a few studies have focused on changes in academic engagement over the course of one semester or academic term, but these studies also found patterns of decreasing engagement. Dutch and Indonesian high school students followed bi-monthly across a 10-month academic term showed decreases in academic engagement measured as a combination of behavioral and emotional dimensions (Maulana, Opdenakker, Stroet, & Bosker, 2012). Similarly, students in

their first or second year of secondary education in the Netherlands showed declines in behavioral and cognitive academic engagement measured four times across one school year (Peetsma & van der Veen, 2011). Given the lack of longitudinal studies on academic engagement during PSE and evidence from studies of high school students' academic engagement, behavioral, emotional, and cognitive academic engagement are expected to decrease during PSE students' first semester at university.

Although all three components of academic engagement may show decreases over time, it is possible that the rate and form of decrease will differ among behavioral, emotional, and cognitive academic engagement. However, no studies investigating differences in trajectories of change over time across components of academic engagement in adolescents or youth were found. Li and Lerner's (2013) cross-lagged analysis of cognitive, behavioral and emotional academic engagement in high school students followed from Grade 9 to 11 found that behavioral engagement was highly stable across these grades (high autoregressive coefficients from grade to grade) while emotional and cognitive engagement were moderately stable (moderate autoregressive coefficients). Emotional and cognitive engagement may, therefore, show more change over time than behavioral engagement. To inform this issue, components of academic engagement in PSE students were tested separately to identify their specific trajectories of change over one semester.

Peer influences across time. Peers comprise the primary social world for adolescents and are highly important during the transition to adulthood in terms of increased amount of contact (which occurs largely within school settings). Of the different peer affiliations, friendships may become especially important as the developmental task of intimacy moves to the forefront during late adolescents and the transition to adulthood (Arnett, 2006; Erikson, 1968). Specifically, there

is a new focus on establishing mature emotionally supportive relationships outside the family, including but not limited to romantic partners (Barry, Madsen, Nelson, Carrol, & Badger, 2009). The increased contact and emotional centrality of peers, especially friends, provides a multitude of opportunities for them to impact one another's behaviors, skills, and attitudes (Brown & Larson, 2009; Bukowski et al., 2011; Rubin, Bukowski, Parker, & Bowker, 2008; Seiffge-Krenke, 2007).

Given that research on how friends' influences may change across time during late adolescence and the transition to adulthood is virtually non-existent, the following literature review encompasses research regarding peers in general and not only friends. Similarly, empirical work on peer influences on health and antisocial behaviors can provide some insight into how friends' influences may change across adolescence in general as research on peer influences within the area of academics is very limited.

For conformity to peers (complying to peer norms or pressures to engage in a particular behavior; Steinberg & Monahan, 2007), seminal work on antisocial or rule-breaking behavior identified an inverted U-shaped pattern across adolescence with increasing conformity during early and middle adolescence, peaking around age 14, and declining thereafter (e.g., Berndt, 1979; Brown, 1990; Steinberg & Silverberg, 1986). Although later work identified domain-specific differences in conformity trends, decreasing conformity from middle to late adolescence appears to be the most common pattern (Sim & Koh, 2003; Steinberg & Monahan, 2007). A relevant exception is in school involvement, with conformity and perceived peer pressure to engage in academic and school extracurricular activities remaining stable or increasing slightly from middle to late adolescence (Clasen & Brown, 1985; Sim & Koh, 2003). Most of this work relied on adolescents' self-reports of whether or not they would conform in hypothetical

scenarios. Adolescents' decision making in emotionally neutral situations (such as hypothetical scenarios), however, does not represent their decision making and behavior in emotionally charged situations such as those created by the presence of peers in real life (Casey, Getz, & Galvan, 2008; Dahl, 2003, 2004). Examining peer influence in real life therefore is necessary.

Studies of friends' influences using direct measures of teens' and their friends' behaviors do not show the same inverted U-shaped pattern across adolescence, instead showing more variability by domain. For example, peer influence on cigarette-smoking and alcohol consumption shows stability from mid to late adolescence (Urberg, Değirmencioğlu, & Pilgrim, 1997; Van Ryzin, Fosco, & Dishion, 2012) or even increases (Li, Barrera, Hops, & Fisher, 2002), while peer influence on antisocial and delinquent behavior wanes during this period (Monahan, Steinberg, & Cauffman, 2009). Perhaps most important for the present study, there is evidence that friends' influence on education (college attendance expectations) is stronger for older than younger adolescents (grade 12 vs. 10; Hallinan & Williams, 1990), similar to the pattern identified by Clasen and Brown (1985) for conformity between middle and late adolescence. In terms of peers' behaviors, then, this research indicates that friends' influences on academics may remain stable or increase across late adolescence.

At the same time, peer pressure (i.e., direct attempts, whether intentional or unintentional, to effect certain attitudes or behaviors in another individual; Brown, Bakken, Ameringer, & Mahon, 2008) may change during this period. The scant research examining developmental changes in peer pressure across adolescence does not provide a consistent picture. Although late adolescents perceive their friends as pressuring them less in terms of alcohol use than teens in mid adolescence, teens age 14 to 18 show similar levels of perceived peer pressure regarding misconduct (e.g., petty theft, vandalism) and peer involvement (e.g., going to parties, pursuing

other-sex relationship). When asked about their own peer pressure behavior in terms of promoting and deterring smoking, similar proportions of grade nine and ten students reported trying to influence their friends' smoking habits (Brady, Morrell, Song, & Halpern-Felsher, 2013; Keefe, 1994). More research is needed to understand developmental changes that may take place in late adolescents' experiences of peer pressure. The present study examined changes across time in PSE students' experience of peer pressure within the realm of academics (academic pressure and support from friends) and their associations with academic engagement.

Peer influences and academic engagement. Both peer selection and peer socialization are part of a cycle that can bring about cumulative advantages (or disadvantages) to students' development and academic outcomes. Selection, the tendency of individuals to choose peers and group membership based on the sharing of similar attributes with those peers or groups, starts the cycle by creating a social context that is supportive of attributes similar among group members (e.g., high engagement or low interest in education). Once this context is established, peer socialization – the tendency of social partners to influence one another – brings about changes in students' attitudes, values, beliefs, and behaviors. Those changes are such that attributes usually become more similar among group members over time (Prinstein & Dodge, 2008).

In short, socialization effects build on and strengthen selection effects. Academically engaged students may be more likely to choose (either intentionally or unintentionally) friends who also are academically engaged, ensuring that their peer context is one that supports academic engagement. These academically engaged peers then socialize one another toward maintaining or even increasing academic engagement and thus positively impacting students' academic outcomes. At the same time, the socialization of students who select academically disengaged peers would likely accentuate low levels of academic engagement across time,

negatively influencing academic outcomes.

Research on the role played by peers in junior high and high school students' academic engagement demonstrates the wide range of sources of peer influence. For example, in terms of relationship quality, warm, caring, supportive friendships and other peer relations have been positively associated with students' concurrent (Chen, 2005; Li et al., 2011; Van Ryzin, 2011) and later (Lynch, Lerner, & Leventhal, 2013) behavioral and emotional academic engagement. In addition, adolescents with more supportive peer relations experience less steep decreases in all three components of academic engagement across grades seven through 11 (Wang & Eccles, 2012). Peers' behaviors appear to impact students' academic engagement. Students who associate with more peers involved in deviant behavior (trouble at school, smoking, drug consumption, risky sexual behavior) show lower levels of behavioral, emotional, and cognitive academic engagement (Li et al., 2008; Stanard, Belgrave, Corneille, Wilson, & Owens, 2010).

Although limited, empirical evidence also exists for a potential impact of students' academic engagement on their social relationships. Specifically, Kindermann (2007) found that middle school students' selection of peer groups was predicted by the students' academic engagement. When changing peer groups, students sorted themselves so that new peer groups showed levels of academic engagement similar to those of the individual students' previous academic engagement. Importantly, Kindermann also found support for socialization effects of peer groups – students who initially shared networks with highly engaged peers remained engaged or even increased in engagement, whereas students belonging to less engaged groups showed declines in engagement across the school year. No research on the impact of PSE students' academic engagement on their peer relationships was found.

Research on the effects of peers on PSE students' academic experiences also shows that

peers may impact academic engagement. Direct peer influences have ranked as one of the top reasons why undergraduate students report attending classes (attending class because they like their classmates and because friends expect them to go), but not for skipping class, and a good relationship with classmates is more important for the emotional engagement of students in vocational PSE than a good teacher-student relationship (Elffers, Oort, & Karsten, 2012; Friedman, Rodriguez, & McComb, 2001). However, this research is scarce. These studies, in conjunction with those of younger students, indicate that peers' behaviors can be supportive of academic pursuits or can distract from them. At the same time, this research focuses on associations between academic engagement and general peer relationships, with little attention given specifically to friendships and how friends' behaviors, attitudes, and pressures related to the academic domain predict students' academic engagement. By contrast, the present study investigated the associations of perceived academic pressure and support specifically from friends with dimensions of academic engagement.

Academic engagement and academic performance. A growing body of research based on motivational perspectives, especially self-determination theory (SDT; Ryan & Deci, 2000), provides support for the importance of academic engagement for academic outcomes, with higher academic engagement associated with better grades and a higher likelihood of grade promotion and graduation (Covington, 2000; Salanova et al., 2010; Skinner et al., 2009; Wang & Sheikh-Khalil, 2014). However, this research has focused on elementary and junior high school students with little attention given to academic engagement in PSE.

Of the research available on academic engagement during PSE, most studies have used general measures of engagement such as the National Survey of Student Engagement (NSSE) and have found that higher levels of engagement are associated with better grades (e.g., Fuller,

Wilson, & Tobin, 2011; Hu & McCormick, 2012). However, the utility of these findings is limited. General measures of engagement like the NSSE amalgamate a wide range of features of collegiate academic experiences beyond academic engagement. For example, PSE students' academic engagement has been often combined with questions about institutional characteristics believed to impact students' engagement (e.g., faculty accessibility; Wolf-Wendel et al., 2009). Therefore, it is not possible to uncouple the effects of academic engagement from those of other relevant experiences sampled in the same measure. Furthermore, the potentially different effects of various components of academic engagement have also been ignored in these studies by combining questions about behavioral and emotional engagement into single measures.

A small number of studies conceptualizing academic engagement in a manner congruent with Fredricks and colleagues' (2004) recommendations provide evidence that PSE students' engagement plays a role in their academic outcomes. Salanova and colleagues (2010), for example, found that higher levels of university students' behavioral, emotional, and cognitive academic engagement, when combined into one construct, predicted better grades regardless of year of study. Similarly, Svanum and Bigatti's (2009) cross-sectional study of undergraduates revealed that more behaviorally engaged students had better academic achievement in terms of earning higher grades, completing their university studies, and attaining their degree faster. Dollinger, Matyja, and Huber (2008) examined the cross-lagged associations between behavioral engagement (class attendance) and academic performance (test grades) across one semester using multiple waves of data. Earlier behavioral engagement positively predicted later academic performance. Based on the reviewed evidence, the dimensions of academic engagement used in the present study were expected to positively predict final semester grades.

Peer influences and academic performance. Research on the quality of peer

relationships, including friendships, has found that positive, supportive friendships within the university environment have a significant positive association with students' academic outcomes in terms of general academic adjustment (Buote et al., 2007) as well as grades (Dennis et al., 2005). Although informative, this research provides limited understanding of the specific mechanisms of influence at play: what is it about positive, supportive friendships that may bring about these better academic outcomes? What patterns of interactions facilitate academic success? What patterns of interactions hinder it?

Prinstein and Dodge (2008) propose that, to fully understand peer influence in children and adolescents, research must investigate the *distinct behaviors* enacted by peers that may affect each other's behaviors, attitudes, and beliefs. Although this calls for investigations using actual reports of friends' behaviors (i.e., the friends report on their own behaviors), or other objective data such as observations, Bauman and Ennett (1996) as well as Ryan (2010) propose that research using adolescents' perceptions of their friends' behaviors, attitudes, and beliefs (i.e., perceived behavior reports) can be equally informative. Perception is vital to influence; it may be what adolescents think their friends do, think, or believe that is more influential than what the friends actually do (e.g., Regnerus, 2002; Valente, Fujimoto, Soto, Ritt-Olson, & Unger, 2013). Given these arguments, the present study focused on how university students' perceptions of their friends' behaviors within the area of academics predict students' academic outcomes.

With no empirical research on the impact of friend influences on PSE students' academic outcomes, whether measured objectively or as students' perceptions, research based on younger students may provide some insight into this topic. Of the different forms of peer influence, behavioral display has received much attention in the area of academics. Behavioral display refers to the behaviors and attitudes that friends display, are seen by adolescents as desirable, and

are therefore modeled, thus increasing behavioral and attitudinal similarities among friends. For example, friends' smoking and alcohol use have been implicated in adolescent initiation of these health-risk behaviors (e.g., Bauman, Carver, & Gleiter, 2001; Visser, de Winter, Veenstra, Verhulst, & Reijneveld, 2013), even after controlling for initial similarities on attitudes about these behaviors among friends (Laursen, Hafen, Kerr, & Stattin, 2012).

Friends' GPA, as an indirect measure of academic behaviors, has been found to positively predict students' later GPA in junior high school and high school (Brown & Larson, 2009; Mounts & Steinberg, 1995). Adolescent students with high-achieving friends have also shown greater increases in achievement over time compared to students with lower achieving friends (Ryan, 2010). Behavioral display influences can also be negative. For example, Jones, Audley-Piotrowski, and Kiefer (2012) found that high school students who perceived their friends as regarding social behaviors (hanging out and being well-liked by others) as important received lower grades in mathematics than students who reported that these social behaviors were less important to their friends. This research, however, assumes that the increased similarity in academic outcomes among friends is due to modeling of academic-supportive behavior.

Increased similarity in academic outcomes among friends may occur because friends effect or encourage behaviors they regard as important or desirable (peer pressure and behavioral reinforcement respectively; Brown et al., 2008). However, no studies were found on academically related peer-pressure, whether positive or negative, and only one study was found on the possible role behavioral reinforcement within the area of academics. Chen (2005) investigated Chinese high school students' perceptions of behavioral reinforcement and found that students who perceived their friends as more willing to help them in school matters had better grades than students who perceived their friends as less willing to help. This evidence as

well as findings that peer pressure and peer behavioral reinforcement affect adolescents' outcomes and behaviors outside the area of academics (e.g., health behaviors, involvement in deviant activities; Granic & Dishion, 2003; Lieberman, Gauvin, Bukowski & White, 2001) indicate that further empirical attention to these forms of peer influence within the area of academics may add to our understanding of how peers impact students' academic outcomes.

The present study addressed this gap in knowledge by investigating three potential aspects of peer pressure and behavioral reinforcement on academics in PSE: perceived school-obstructive pressure from friends, perceived school-supportive pressure from friends, and academic instrumental support from friends. Based on the research reviewed, lower levels of perceived school-obstructive pressure from friends throughout the semester and higher levels of both perceived school-supportive pressure and academic instrumental support were expected to predict higher levels of academic achievement at the end of the semester.

Interindividual differences. Interindividual differences in students' experiences of engagement, friends' influences, and academic outcomes must be considered for meaningful examination of the role of academic engagement and friends' influences on academic achievement. In the present study, the role of relevant personal characteristics on specific components of the self-systems motivational model was considered when examining the relations among students' perceived academic pressure and academic instrumental support from friends, academic engagement, and academic performance. By doing so, the predictive value of academic engagement as well as friends' academic pressure and instrumental support for academic performance can be identified over and beyond that of previously identified interindividual differences in these constructs.

Five personal characteristics were controlled in the present study given that they have been

consistently identified as related to differences in one or more of the main aspects of this study (academic engagement, perceived academic pressure and support from friends, academic performance). These are: previous academic performance (previous grades), gender, ethnic background, future orientation (future-oriented thinking and planning), and academic strain (stress from the amount of academic work faced; Bingham & Okagaki, 2012; Gadzella, Baloğlu, Masten, & Wang, 2012; Wang & Eccles, 2012). Previous academic performance (previous grades), gender, and ethnic background are stable characteristics of the individual and are, thus, used as time-invariant covariates. Future orientation is also used as a time-invariant covariate given that it shows high levels of stability during the transition to adulthood (Luyckx, Lens, Smits, & Goossens, 2010). Academic strain, although based on individuals' levels of proclivity to stress, is also related to the amount of academic work students must tackle at a given point in time. Therefore, academic strain is not a static characteristic and was used in the present study as a time-varying covariate. Empirical evidence for the relevance of these five variables for academic engagement, friends' influence, and academic performance is briefly reviewed below.

Previous academic performance. From a motivational perspective, how successful individuals are at meeting their goals impacts their motivational processes and experiences when they next pursue similar activities (Csikszentmihalyi, Abuhamdeh, & Nakamura, 2005). Previous academic performance (i.e., previous grades), therefore, can be expected to predict PSE students' later academic engagement, school-related peer influences, and grades. Indeed, PSE students' grade point average (GPA) is best predicted by their previous grades, with high school grades explaining an average of approximately 25% of the variance in first-year PSE students' GPA (Robbins et al., 2004). In a study of undergraduates' social relationships with peers and instructors, student services, teaching practices implemented in class, and final high school GPA,

final GPA was the strongest predictor of university GPA (Fuller et al., 2011). It is possible that final school GPA is a proxy for academic preparedness, which would be more central to academic outcomes than their social relationships and classroom experiences (Finnie et al., 2008). Students who have better academic skills and habits in place during high school would likely finish high school with higher grades and also be better prepared for academic work in PSE than students less academically skilled or with poorer study habits.

The link between previous academic performance and later academic engagement has seldom been studied, but Salanova and colleagues (2010) found a positive link between university students' GPA at the end of the previous semester and their academic engagement (emotional and cognitive combined) the following semester. In addition, students' academic engagement partially mediated the link between students' earlier and later GPA. No studies investigating whether PSE students' previous academic performance predicts school-related peer influences were found. However, it is possible that students' previous experience of academic success or failure impact how actively they seek and how open they are to peers' influences that facilitate or hinder academic goals. For example, students who are used to receiving good grades may have a higher sense of self-sufficiency and, therefore, be less interested in seeking and receiving academic help from friends. Therefore, in this study, previous academic performance was used as a covariate in analyses examining students' academic engagement, perceived academic pressure and academic instrumental support from friends, as well as grades.

Gender. A wide range of psychological and educational research has examined differences in educational experiences and outcomes by gender. Boys have been consistently found to underachieve academically, be less academically engaged (behaviorally, cognitively, and emotionally), and experience steeper losses in academic engagement across their secondary

education compared to girls (Meece, Glienke, & Askew, 2009; Wang & Eccles, 2012). These gender differences are maintained in PSE (Reschly & Christenson, 2012) and have been linked to differences in achievement-related value beliefs.

Starting early in their educational career, boys show more negative attitudes toward schooling and value academic achievement less compared to girls (Graham & Taylor, 2002; Graham, Taylor, & Hudley, 1998; Meece et al., 2009; Renold, 2001; Whitelaw, Milosevic, & Daniels, 2000). In addition, there seems to be an anti-school culture among boys in which effortless achievement is tolerated but putting effort towards school tasks is seen as "for girls" (Francis, 1999; Paetcher, 1998). As value perceptions and conformity to gender norms impact students' decision making and behavior and these strengthen with age (Eccles, 1994; Galambos, Berenbaum, & McHale, 2009; Grabill et al., 2005; Parsons, Adler, & Meece, 1984; Wigfield & Eccles, 1992), it is not surprising that young men and women differ in their academic engagement and achievement during adolescence and the transition to adulthood.

Gender differences in adolescents' social relationships have also been established. Adolescent girls and women typically experience higher quality (e.g., more closeness, less conflict), more intimate and supportive relationships with peers than do adolescent boys and men (Brown & Larson, 2009; Crosnoe & Elder, 2004; Wentzel, 1998). As higher quality relationships are linked to higher academic engagement and achievement, it may be expected that friends' influences would be stronger for girls than for boys (Dennis et al., 2005; Li et al., 2011).

However, gender differences in the social influence of peers show a different picture. Although boys experience on average lower quality peer relations compared to girls, it is harder for boys to deviate from group norms and they are more concerned with their status within peer groups than are girls (Warrington, Younger, & Williams, 2000; Younger & Warrington, 1996).

In addition, boys and young men seem to be more susceptible to antisocial peer pressure and more negatively affected by associations with deviant peers compared to girls and young women (Jensen, 2003; Mears, Ploeger, & Warr, 1998; Walters, 2014). Although these lines of research present different directions of gender effects, they support the importance of including gender as a control variable for students' academic engagement, perceived academic pressure as well as academic instrumental support from friends, and grades in the present study.

Ethnic background. Research has found differences among race/ethnic groups in students' behavioral academic engagement. Differences have been consistently found when comparing Caucasian students to students from other ethnic backgrounds, but the directionality of differences has been inconsistent across studies. Lynch and colleagues (2013) found that African American and Asian/Pacific Islander students showed higher levels of behavioral academic engagement than Caucasian students, while Native American students showed lower levels than Caucasian students. Crosnoe and Elder (2004) as well as Wang and Eccles (2012), however, found that Caucasian students showed higher behavioral engagement than African American and Latin American students. Caucasian and Asian students did not differ in behavioral engagement in the Crosnoe and Elder study. There is less evidence of differences among ethnic groups for emotional academic engagement. Wang and Eccles found only one difference –African American students showed higher emotional academic engagement than Caucasian students. In addition, there is evidence that ethnic differences in behavioral and emotional engagement are maintained over time (Wang & Eccles, 2012).

Research consistently shows that Caucasian students receive higher grades than students from other (minority) ethnic backgrounds (e.g., First Nations, Black, Latin American, East Asian, West Asian) in high school and university (Bingham & Okagaki, 2012; Grayson, 1998).

In PSE students, these differences between Caucasian and ethnic minority students remain even after controlling for ethnic group differences in final high school averages (Grayson, 2009). Wang and Eccles (2012) and Crosnoe and Elder (2004) also examined ethnic differences in peer relationships and peer influence. No differences were found in peer influences by students' ethnic background in either study, but Crosnoe and Elder found that, compared to all other ethnic groups, Asian American adolescents had the most friends and Caucasian adolescents spent the most time with friends. Given the consistent evidence that engagement, peer relations, and grades differ between Caucasian students and non-Caucasian students, who in North America are in general the minority, ethnic background (Caucasian or ethnic minority dichotomy) was used as a control variable in the analyses of students' academic engagement, perceived academic pressure as well as academic instrumental support from friends, and grades in the present study.

***Future orientation*.** How concerned one is with one's future and how much thought is put into long-term goals or consequences (Cauffman & Steinberg, 2000; Nuttin, 2014) has been theoretically identified as an important asset during the transition to adulthood, a time when most youth in North America will go through PSE (approximately 18 to 25 years of age; Arnett, 2000; Finnie & Muller, 2008). Research indicates that a stronger future orientation (high concern with future outcomes and high degree of planfulness) is positively associated with better outcomes in various domains of life, including education (Masten et al., 2004). Indeed, Horstmanshof and Zimitat (2007) found an association between higher levels of future orientation and academic engagement in first year undergraduate students.

Using longitudinal data, Peetsma and van der Veen (2011) found that high school students with more long-term perspectives concerning their schooling and careers at the beginning of the school year received higher grades at the end of the school year. In addition, Masten and

colleagues (2004) found that individuals with more long-term perspectives early in their transition to adulthood showed more academic success (higher grades, higher degrees obtained) at the end of the transition. No studies on the link between future orientation and peer influences were found. However, Masten and colleagues (2004) found that future orientation during the transition to adulthood was positively associated with friendship quality in young adulthood, indicating that future orientation is related to at least some aspects of peer relations and may, therefore, predict peer academic influence. Based on these findings, future orientation was used as a control variable in the present study.

Academic strain. Academic strain, conceptualized as a combination of the amount of academic hassles students face and the level of stress they experience from these hassles, combines contextual (amount of academic work) and individual (stress response to academic work) factors that can impact students' academic engagement. Indeed, first year students' perceived stress from facing academic demands has been linked to poor psychological well-being and functioning (Kohn, Hay, & Legere, 1994; Little & Garber, 2004). It is possible that when academic demands and related stress are high, students have fewer cognitive and other resources available to function adequately within the academic context, leading to lower academic engagement and higher student burnout (Alarcon, Edwards, & Menke, 2011).

Research on constructs conceptually related to academic strain provides guidance regarding the potential associations between academic strain and academic outcomes. For example, greater examination anxiety has been linked to lower grades in university students (Gadzella et al., 2012; Lang & Lang, 2010). Similarly, Larose, Bernier, and Tarabulsy (2005) reported that fear of failure on academic tasks negatively predicted university students' grades. According to the self-systems motivational model, the effects on grades of *context* and *self*

factors (both of which are present in academic strain) are mediated by motivated action such as academic engagement. For this reason, it is important to control for academic strain.

No empirical studies examining the link between PSE students' academic strain or stress and peer influences were found. Research on related constructs shows that greater anxiety (e.g., social anxiety, anxiety about physical appearance) predicts higher susceptibility to influence from others (e.g., peers, marketers) and higher perceptions of pressure from friends (e.g., pressured about dieting; Anderson, Tomlinson, Robinson, & Brown, 2011; Rayner, Schniering, Rapee, & Hutchinson, 2013). Based on the studies reviewed, academic strain was used as a time-varying covariate in the present study.

The Present Study

As represented in Figure 2, this research examined the relationships among three major constructs within the self-systems motivational model –namely, friends' academic pressure and support, academic engagement, and grades – over time as suggested by the LSDP. Next I briefly articulate the integration of these perspectives.

First, engagement is identified as a proximal determinant of individuals' outcomes, which, within the educational context, means that academic engagement is important for students' academic performance. As previously mentioned, empirical work has shown this association: higher levels of academic engagement are linked to better grades, grade promotion, and graduation (Covington, 2000; Skinner et al., 2009). However, research on how different components of academic engagement may change across time and how their change predicts academic performance is scarce. As an exception, Li and Lerner (2013) showed that behavioral engagement may show more variability across time than emotional and cognitive engagement in middle adolescence (Grade 9). The present work expands on this by investigating developmental

changes in different dimensions of the academic engagement of PSE students across their first semester at university, the launching platform for later academic performance (ACT, 2001).

Second, pressure and support from friends represent an important social context in the self-systems motivational model. In academics, peers –especially friends –as social partners are expected to provide specific supports or hindrances to the motivational processes (e.g., engagement) leading to academic outcomes. Extensive research documents that quality of friendships, friends' attitudes toward school, and friends' deviant behaviors may influence students' academic performance. Higher quality friendships, peers' stronger views of school as important, and less frequent peer deviant behavior have been linked to more positive academic outcomes (Brown & Larson, 2009; Ladd et al., 2009). Investigation of the association of pressure and support from friends to academic engagement specifically, however, is lacking. Considered over time, there is some evidence that peer influences, including from friends, undergo normative developmental changes with the direction of change depending on the behavioral outcome under investigation. Pressure and support from friends on academics have not been investigated longitudinally and thus the present work addresses this empirical gap focusing specifically on two types of perceived academic pressure (school-supportive and school-obstructive) from friends as well academic instrumental support from them.

Research questions. Based on the self-systems motivational model and guided by the LSDP, the present study investigated academic engagement in PSE, its role in academic performance, and its relationship with perceived academic pressure and academic support from friends. More specifically, the present study asked the following three questions:

1) How do academic engagement, perceptions of academic pressure from friends (school-supportive pressure and school-obstructive pressure), and academic instrumental support

from friends change across university students' first semester at university?

2) How are initial levels of and changes over time in students' academic engagement associated with initial levels of and changes over time in their perceptions of academic pressure from friends and with initial levels of and change over time in academic instrumental support from friends? and
3) How are the initial levels and change over time in students' academic engagement, their perceptions of academic pressure from friends, and the academic instrumental support they received from friends related to students' first-semester GPA?

This study also examined whether these predictive relations, if present, hold when controlling for students' previous academic performance (final high school GPA), gender, ethnic background, future orientation, and academic strain.

Concerning the first question, based on the self-systems motivational model, the LSDP, and previous empirical findings, after controlling for covariates, all dimensions of academic engagement were expected to decrease across the semester. Behavioral engagement was expected to show less change over time than other dimensions of engagement. Because the transition to adulthood is considered a period of great flux in most aspects of life, including individuals' social contexts (Masten et al., 2004), most university students should experience changes in perceived academic pressure from friends and in academic instrumental support from friends across the semester. However, as there is no previous research on change over time in these friendship variables, no a priori hypotheses regarding the direction of change were made.

Concerning question two, higher initial levels of friends' school-obstructive pressure and lower initial levels of friends' school-supportive pressure and academic instrumental support were expected to be associated with lower initial levels of behavioral, emotional, and cognitive

engagement. In line with socialization processes, higher initial levels of school-supportive pressure and academic instrumental support and lower initial levels of school-obstructive pressure were expected to predict less loss in behavioral, emotional, and cognitive engagement across the semester. Allowing for selection processes, lower initial levels of academic engagement were expected to be associated with increasing school-obstructive pressure and decreasing school-supportive pressure and academic instrumental support from friends. Changes over time in the three friendship variables were expected to covary with changes over time in behavioral, emotional, and cognitive engagement such that increases in school-supportive pressure and academic instrumental support and decreases in friends' school-obstructive pressure should be linked to less steep losses across all dimensions of academic engagement.

Concerning question three, higher initial levels of behavioral, emotional, and cognitive engagement and increases in engagement across time were expected to predict higher first-semester GPAs. Higher initial levels of perceived school-supportive pressure and academic instrumental support from friends and lower initial levels of perceived school-obstructive pressure from friends were expected to predict higher first-semester GPAs. Change over time in these friendship variables was also expected to predict students' first-semester GPAs, with increased levels of school-supportive pressure and academic instrumental support as well as decreased levels of school-obstructive pressure associated with higher GPAs.

CHAPTER II

Method

Participants

During September 2013 (baseline, Wave 1), data were collected from 1106 introductory psychology students (64.9% women) from the Department of Psychology research pool at a large Western Canada university. In October of the same year (Wave 2), data were collected from 544 participants in the baseline sample and these students were invited to complete two more waves of data collection scheduled for November (Wave 3, $n = 511$, 6% attrition) and December (Wave 4, $n = 479$, 12% attrition) of that year. Full-time student status in the first semester of the first year of any PSE program and an age of 20 years or younger at Wave 1 were used as criteria for inclusion in this study. These selection criteria ensured that the study sample consisted only of members of the target population - students who were simultaneously transitioning to PSE and in the early stages of transitioning to adulthood. Treatment of missing data is describe toward the end of this section.

Sample characteristics for participants followed longitudinally across four waves (longitudinal sample) and for participants surveyed only at baseline (cross-sectional sample) are presented in Table 1. There were more women than men in both the cross-sectional and longitudinal samples and the percentage of women in the longitudinal sample was significantly larger than in the cross-sectional sample. The mean age of participants in the longitudinal sample at baseline was under 18 (ranged from 16 to 19) and did not differ from the mean age of participants in the cross-sectional sample (ranged from 16 to 19). Both samples had similar ethnic distributions: about half the participants were Caucasian, one third Asian, and the rest were other visible minorities. Comparisons to data from the Canadian University Survey

Table 1

Description of Cross-Sectional and Longitudinal Samples for the Present Study

	Sample Distribution (mean (*SD*) or %)	
	Cross-Sectional (*N* = 562)	Longitudinal (*N* = 544)
Men	39.4%[a]	30.7%[a]
Women [reference]	60.6%[a]	69.3%[a]
Age	17.9 (.58)	17.8 (.59)
Ethnic background		
Caucasian [reference]	53.7%	47.9%
Asian	30.6%	36.6%
African	2.3%	3.1%
Middle Eastern	2.8%	2.6%
Hispanic	1.9%	1.7%
First Nations	1.5%	.7%
Other	7.2%	7.4%

Note. [a]Distributions differ significantly ($p \leq .05$) between cross-sectional and longitudinal samples.

Consortium indicates that the present sample was generally representative of students in their first year of university in 2013 in Canada based on the measured characteristics. Across 35 universities, the average age of first-year students was just over 18 years, 66% of these students were women, and about 36% self-identified as visible ethnic minorities (CUSC, 2013). In addition, the population of full-time first year students 20 years of age or younger from which the sample for this study was drawn had rates of enrollment across faculties similar to the university-wide rates for first year students: 41% were from the Faculty of Arts, 37% from the Faculty of Science, 13% from the Faculty of Engineering, and the remaining 9% from six other faculties (e.g., Education, Agriculture).

Procedure

Participants were recruited through the Department of Psychology research pool and received partial course credit for their participation. Data collection occurred in three steps. First, baseline data, background information, and consent for access to official grades were collected using mass testing procedures in place as part of the introductory psychology class research participation requirement. All introductory psychology students had access to an online survey through their online course accounts for one week during September 2013 (Wave 1). Students received credit toward their final grade for their participation in mass testing. Demographic information and measures for the present study were included in this larger survey. Mass testing was completed by 2039 students. Eighty percent of responders were full-time students, 76% were 20 years old or younger, and 60% were in their first year of PSE ever. Baseline data from 1106 of these students were used for this study as they met all selection criteria.

Of the 1106 students who completed mass testing and met this study's selection criteria, 993 provided consent for accessing their official grades at the end of the semester. These 993

students were given the option to participate in the longitudinal part of this study among with other research participation options for further credit toward their final psychology course grade. To reduce self-selection into specific studies, students only received descriptions of the studies once they had signed up to participate in them. Research pool management set a limit of a maximum of 545 participants for the present study out of the 993 students given online access to it. Students were allowed to sign up to participate in the present study until the participant limit was reached, which occurred before the end of data collection for Wave 2. To ensure voluntary participation, students who signed up for this study could choose to complete an alternate assignment for equal credit instead of answering the study surveys. One participant opted to complete the alternate assignment, reducing the final longitudinal sample to 544 participants.

Participants in the longitudinal sample completed a 15-minute online questionnaire three times across the Fall 2013 semester. The questionnaire was open for completion for one week each time, on October 14 to 18 (Wave 2), November 13 to 17 (Wave 3), and December 4 to 8 (Wave 4). Dates were selected to avoid overburdening participants with survey completion and to avoid holidays falling shortly before data collection, as students' academic behavior is likely to be out of their normal routine during holidays. Email reminders to complete the survey were sent on the first day of each data collection week. Finally, in part 3 of the study, official academic data for students who provided the necessary consent during mass testing were collected from the university's Office of the Registrar in February 2014.

Measures

Time was coded as the number of months since baseline at each wave: Wave 1 = 0, Wave 2 = 1, Wave 3 = 2, Wave 4 = 2.67.

Demographic variables. Participants' date of birth, gender, and ethnic background information were collected at baseline. Students' *gender* was coded as woman = 0, man = 1. *Age* in years was calculated by subtracting birthdates from the date of the first day of classes for the Fall 2014 semester. *Ethnic background* information was collected using seven categories. Due to cell sizes and to simplify this control variable, ethnic background was recoded into Caucasian = 0*,* Ethnic Minority = 1.

Academic engagement. Students' academic engagement was assessed at all four waves (W_1 to W_4) with 20 of the 23 items in the Student Course Engagement Questionnaire (SCEQ; Handelsman, Briggs, Sullivan, & Towler, 2005). Three SCEQ items were omitted in this study as they focused on students' grades (e.g., 'doing well on tests') and may have been confounded with the measure of academic performance assessed in this study. The 20 SCEQ items used in the study asked students about behaviors pertaining to academic functioning (e.g., doing all the homework problems, staying up on the readings), feelings they experienced regarding academic work (e.g., really desiring to learn the material, having fun in class), and the cognitive investment they put forth during academic functioning (e.g., applying course material to my life, finding ways to make the course interesting to me).

Students were asked to rate to what extent each item described them, considering all their current courses in the period since the beginning of the semester (Wave 1: 'in the last 30 days') or since the last wave of data collection (Waves 2 and 3: 'in the last three weeks'; Wave 4: 'in the last two weeks'). Items were rated using a five-point scale from 1 = *not at all characteristic of me* to 5 = *very characteristic of me*. Although SCEQ items have previously been grouped into four subscales (skills, emotional engagement, participation, performance), the factor structure underlying these items was analyzed in this study. Detailed information about instrument

validation is presented in the results section. Alpha values across the final subscales and across time ranged from .62 to .92. Higher mean scores indicated higher academic engagement.

Perceived academic pressure and support from friends. Fourteen items were created to measure the concept that friends exert pressure and provide support specifically within the area of academics during students' first PSE year. These 14 items, as a whole labeled the Perceived Academic Pressure and Support from Friends (PAPS-F) Scale, were hypothesized to represent three separate though related variables: two perceived academic pressure from friends variables (school-supportive pressure and school-obstructive pressure) and academic instrumental support from friends. Students responded to these items at all four waves (W_1 to W_4). Detailed information about instrument validation is presented in the results section.

School-supportive pressure from friends. Five items measured the frequency (*How often have your friends…*) of perceived support or encouragement students experienced from their friends to engage in behaviors beneficial to their academics (e.g., "urged you to avoid doing things that would take time away from your studies") in the period since the beginning of the semester (Wave 1) or since the last wave of data collection (Waves 2 to 4). Items were rated using a five-point scale ranging from 1 = *never* to 5 = *almost always*. Alpha values across waves ranged from .79 to .87. Higher mean scores indicated higher perceived rates of school-supportive pressure from friends.

School-obstructive pressure from friends. Five items measured the frequency (*How often have your friends…*) of perceived pressure students experienced from their friends to engage in behaviors detrimental to their academics (e.g., "pressured you to skip class") in the period since the beginning of the semester or since the last wave of data collection depending on the wave. Items were rated using a five-point scale ranging from 1 = *never* to 5 = *almost always*. Alpha

values across waves ranged from .77 to .85. Higher mean scores indicated higher perceived rates of school-obstructive pressure from friends.

Academic instrumental support from friends. Four items measured how often (*How often have you…*) students sought or received academic help from their friends (e.g., "turned to friends for help on school work") in the period since the beginning of the semester or since the last wave of data collection depending on the wave. Items were rated using a five-point scale ranging from 1 = *never* to 5 = *almost* always. Alpha values across waves ranged from .84 to .87. Higher mean scores indicated more instrumental support from friends in the area of academics.

Academic performance. Information regarding students' current and previous academic performance was collected, with permission, from the university Registrar. Students' official semester GPA for Fall 2013 was used as indicator of *academic performance*. Semester GPA was calculated as weighted averages of the GPAs for courses completed that semester. GPA was measured on a scale ranging from 0 (*letter grade of F*) to 4 (*letter grade of A and A+).* Higher GPAs indicate better academic performance. *Previous academic performance* was measured using students' high school grade average at graduation, as calculated by the university as part of its entrance requirements. As the metric used for high school grades varied across school boards (percentages, 7-point scale, etc.), all high school grades were converted into a common 4-point scale following the conversion guidelines used by the university, with higher scores indicating better academic performance in high school.

Future orientation. The extent to which students consider future or distant consequences of their choices and behaviors (future orientation) was measured at Wave 2 using the Consideration of Future Consequences (CFC) short questionnaire (Strathman, Gleicher, Boninger, & Edwards, 1994). This measure, designed for use with college students, consists of 8

items (e.g., “Often I engage in a particular behavior in order to achieve outcomes that may not result for many years”, “I think that sacrificing now is usually unnecessary since future outcomes can be dealt with at a later time”, “My convenience is a big factor in the decisions I make or the actions I take”) rated on a scale ranging from 1 = *extremely uncharacteristic of me* to 5 = *extremely characteristic of me*. Higher mean scores indicate a more future-oriented perspective. This scale had a Cronbach’s alpha of .83 and showed scalar gender invariance (Longitudinal sample: $\chi^2(54, 535) = 130.71$, $p < .05$; RMSEA (90% CI) = .08 (.06 - .09); SRMR = .07; $\Delta\chi^2 = 10.65$, $df = 7$, $p \geq .05$), indicating this measure has relatively high internal consistency and adequate equivalence for men and women.

Academic strain. Students’ experiences of academic strain were evaluated at all four waves using a scale developed for this study and consisting of seven items, with each item referring to a specific academic event (e.g., "*had a term paper due*"). For each event, participants were asked to report the frequency of its occurrence since the beginning of the semester or since the last wave of data collection depending on the wave (*Please indicate the frequency in which you experienced each event*); there were six response options (0, *1, 2, 3, 4, more than 4*). Students were also asked to report their event-related stress for each endorsed task (*In general, how stressful was this?*) using a four-point scale ranging from 1 = *not stressful* to 4 = *extremely stressful*. Tasks not endorsed received a stress score of zero. Scale scores were calculated by taking the mean of the stress scores for all seven tasks. Higher scale scores indicate higher levels of academic strain.

Exploratory factor analysis (EFA) identified a two-factor underlying structure for this scale (Subsample 1: $\chi^2(8, 272) = 5.27$, $p > .05$; RMSEA (90% CI) = .00 (.00 - .05); SRMR = .02). The first factor, *strain from major academic work*, consisted of items tapping into students’ stress

related to academic work usually worth high percentages of final course grades (midterms, presentations, term papers). The second factor, *strain from other academic work*, was composed of indicators of students' stress related to minor academic work as well as feedback on their academic work (quizzes, homework, receiving bad grades). Confirmatory factor analysis (CFA) in showed good model fit (Subsample 2: $\chi^2(7, 290) = 11.89$, $p > .05$, CFI = .97, RMSEA (90% C.I.) = .05 (.00 - .10), SRMR = .03; Longitudinal sample: $\chi^2(7, 539) = 4.04$, $p \geq .05$, CFI = 1.00, RMSEA (90% C.I.) = .00 (.00 - .04), SRMR = .01) and scalar invariance across gender groups (Subsample 2: $\chi^2(22, 286) = 25.96$, $p \geq .05$; CFI = .97; RMSEA (90% CI) = .04 (.00 - .08); SRMR = .05; $\Delta\chi^2 = 1.55$, $df = 4$, $p \geq .05$; Longitudinal sample: $\chi^2(22, 535) = 21.99$, $p \geq .05$; CFI = .97; RMSEA (90% CI) = .04 (.00 - .08); SRMR = .05; $\Delta\chi^2 = 1.55$, $df = 4$, $p \geq .05$). These analyses indicated that the academic strain scale showed a stable (replicable) two-factor underlying structure with adequate equivalence for men and women. For invariance across time, the two-factor CFA model could not be tested for invariance across all Waves due to multicollinearity (correlations above .95) among latent factors across Waves 2, 3, and 4. This multicollinearity indicates that values for the latent factors representing academic strain at Waves 2, 3, and 4, show such similar rank order equivalence that they contain redundant information (Tabachnick & Fidell, 2007). Although all instrument validation results showed that the academic strain scale consists of two subscales (factors), the present study used a mean score across all items to decrease model complexity given that academic strain is only a control variable in the main analysis.

Attrition and Treatment of Missing Data

As with most longitudinal studies, the present study had missing data due to attrition. Of the 544 participants in the longitudinal sample at baseline and Wave 2, 457 students completed

all four waves, 76 completed only three waves, and 11 completed only two waves of data collection. With an attrition rate of approximately 12% over the semester, attrition effects were examined in three stages. First, those who participated in all four waves of data collection were compared to those absent at one or more waves on variables measured at Wave 1 (academic engagement, perceived academic pressure and academic instrumental support from friends, academic strain), demographic information (gender, age, ethnic background), and GPA (first-semester and high school). Second, students present at the last wave (Wave 4) were compared to the 65 participants absent from this wave on baseline and Wave 2 measures, first-semester GPA, and high school GPA. Third, students present at each wave were compared to those missing at that wave on variables measured in the immediately preceding wave (i.e., students present at Wave 3 were compared to those missing at Wave 3 on Wave 2 variables and students present at Wave 4 were compared to those missing at Wave 4 on Wave 3 variables) as well as on their demographics. In total, 47 *t*-tests and 8 χ^2 tests were conducted across the three stages. Due to the large number of comparisons, a Bonferroni correction was applied: given a total of 55 individual tests and a desired family-wise (FW) error rate of no more than 5% (i.e., α_{FW}= .05), the alpha value for each individual test was adjusted to .001.

Only two significant differences arose from these analyses. Compared to participants absent in at least one wave, those present at all waves received higher GPAs at the end of the Fall 2013 semester (attritors: $M = 2.70$, $SD = .78$; non-attritors: $M = 2.98$, $SD = .64$; $t\,(541) = 3.65$, $p < .001$). Similarly, participants present at Wave 3 received higher GPAs at the end of the Fall semester compared to those absent at that wave (present at Wave 3: $M = 2.97$, $SD = .64$; absent at Wave 3: $M = 2.49$, $SD = .94$; $t\,(541) = 3.98$, $p < .001$). These findings suggest that the sample is not strongly biased by attrition and that the missing data were largely independent of the

values of variables used in the analyses, which satisfies the *missing at random* assumption underlying the estimation of models involving change over time (Raudenbush & Bryk, 2002).

Full information maximum likelihood estimation (FIML) was used to handle missing data (item non-response, wave drop-outs, and attrition) when calculating parameter estimates and standard errors in all modeling conducted in the present study. In the presence of missing data in large samples, FIML estimates are less biased than listwise deletion, pairwise deletion, mean substitution, or single imputation and are equally accurate as those produced by multiple imputations (Acock, 2005; Allison, 2002; Johnson & Young, 2011; Widaman, 2006). FIML permitted inclusion of all cases with data for at least one main variable used in a given model in the cross-sectional analysis (instrument validation analyses) and with data for at least one wave of measurement in the longitudinal analysis as long as data for control variables used in the given model (e.g., gender) were available for that case. As such, the analytic sample includes all 1106 participants who provided at least one wave of data.

Analytic Approach

Analyses were conducted in five stages. First, the validity and reliability of all multi-item scales used in the proposed study were evaluated using exploratory factor analysis and Cronbach's alpha respectively. Instruments created or modified for this study were examined using the cross-sectional sample and, once altered as necessary to ensure that they accurately represented the constructs of interest, were re-examined in the longitudinal sample. All other instruments were examined in the longitudinal sample only. Second, basic descriptive statistics (means, standard deviations, and range) and zero-order correlations within and across time for the primary constructs for the longitudinal sample were examined. Third, a set of latent curve growth models (LGMs) were estimated separately for each academic engagement and friendship

variable to identify their respective functional forms of change over time (i.e., their best fitting latent growth models).

Fourth, a set of parallel process latent growth curve models was estimated for each pairing between academic engagement components and friendship variables to examine the associations of PSE students' academic engagement with perceived academic pressure and academic instrumental support from friends. Fifth, the value of academic engagement and friendship variables and their change over time as predictors of students' semester GPA was examined by modeling GPA as an outcome in the LGMs and parallel process latent growth curve models identified in the previous steps. In stages three to five, covariates (previous academic performance, gender, ethnic background, future orientation, and academic strain) were added to tested models as control variables and, if found to be significant, were retained for subsequent analyses.

All data modeling was performed using Mplus 6.12 (Muthén & Muthén, 1998-2011). Model fit was examined using the exact fit chi-square test (χ^2) and three approximate fit indices: the comparative fit index (CFI), the root mean square error of approximation (RMSEA), and the standardized root mean square residual (SRMR). Non-significant chi-squares indicate an exact fit between the model and the data. CFI values of .95 or greater indicate excellent model fit whereas values of .90 to .94 suggest adequate fit. RMSEA and SRMR values of .05 or less are indicative of excellent fit whereas values of .06 to .08 suggest adequate model fit (Kline, 2011). Chi-square difference tests compared nested models to determine which best fit the observed data (significantly smaller χ^2 values indicate better fitting model). The Bayesian Information Criterion (BIC) was used to compare non-nested models fit to an identical set of data (better fitting models show smaller information criterion values; Singer & Willett, 2003).

CHAPTER III

Results

Instrument Validation

As recommended practices for instrument validation, a two-step factor-analytic approach was used to form groupings of items that accurately represented each construct of interest within each measure stably across samples (i.e., homogeneous and stable groupings; Worthington & Whittaker, 2006). Each analytical step was conducted with a different subsample of the larger cross-sectional sample of 562 first year students who completed the survey only at baseline. This allowed for independent replication of the factor structures, providing support for the validity of the final scales. Once stable structures were identified, construct validity and stability were assessed on the main longitudinal sample prior to conducting the main analysis of this study.

For the first two steps of instrument validation, the 562 participants of the cross-sectional sample were randomly assigned to one of two roughly equivalent subsamples. Subsample 1 (n = 271) was composed of 61% women, had an ethnic distribution of 50% Caucasian, 26% East Asian, 8% South Asian, and 16% other ethnicities (e.g., African, Hispanic, mixed ethnic background), and had a mean age of 17.83 (SD = .57; range: 16-19). Subsample 2 (n = 291) was composed of 61% women, had an ethnic distribution of 57% Caucasian, 20% East Asian, 8% South Asian, and 15% other ethnicities, and had a mean age of 17.87 (SD = .58; range: 17-19). The subsamples did not differ significantly in age, gender, or ethnic background.

The first step of instrument validation was to appraise in Subsample 1 the underlying factor structure of the academic engagement, perceived academic pressure and academic instrumental support from friends, and academic strain scales through exploratory factor analysis (EFA). Although the Student Course Engagement Questionnaire (SCEQ) was validated previously

(Handelsman et al., 2005), the 14 items regarding academic pressure and instrumental support from friends, and the academic strain scale were created as indicators of specific factors (i.e., perceived school-supportive pressure, perceived school-obstructive pressure, and academic instrumental support from friends for the former scale and academic strain for the latter scale), were examined to determine empirically their factor structure and confirm their replicability. The Consideration of Future Consequences scale (future orientation) is a well-established measure with an underlying factor structure replicated by multiple studies (e.g., Hevey et al., 2010; Petrocelli, 2003) and was therefore not submitted to EFA.

EFA models allow each item to be related to all factors underlying the data, enabling the researcher to identify items that may need elimination (i.e., items not identifying the intended factor or simultaneously measuring multiple factors). In this study, items with factor loadings below the recommended cut-off point of .45 were removed (Comrey & Lee, 1992). Rotated solutions (orthogonal varimax) with differing numbers of factors were tested and two criteria were used to determine the best number of factors for retention: the Kaiser–Guttman retention criterion (eigenvalues > 1.0, Kaiser, 1974) and the scree plot test (break point indicates number of factors, Cattell, 1966).

In the second step of instrument validation, the measurement models identified using EFA were applied to Subsample 2 to assess their replicability. Confirmatory factor analysis (CFA) was used for this purpose. CFA constrains items to load only on one factor. Second-order CFA models were examined for each scale if the latent factors identified in the first-order CFA models showed significant correlations among each other. Finally, multiple-group CFAs were used to examine measurement invariance of gender in this subsample. In these analyses, the same structural model was applied to the data for women and men simultaneously but as two

distinct groups to test whether the model was equivalent for both. The test for gender invariance involved the comparison of factorial models with sequentially more constraints of equality between gender groups. A significant ($p < .05$) difference in the chi-square of two consecutive models would indicate different factor structures for men and women.

Finally, the measurement models established through the first two steps were applied to the longitudinal sample to assess their validity (CFA) as well as their stability across genders (multi-group CFA) and, for academic engagement and perceived academic pressure and support from friends, across time (multi-group CFA). Invariance over time was examined to ensure that the items and measures tapped into the same construct across different measurement waves. Note that relevant results of the instrument validation assessments for the future orientation and academic strain scales are provided in the measures section of Chapter 2.

Academic engagement.

Underlying structure. EFA models with one to ten factors were tested on the 20 items from the SCEQ scale. Although the Kaiser–Guttman retention criterion suggested a four-factor solution, the scree plot test suggested an eight-factor solution. Based on these findings, the eight-factor solution was retained for further analysis. One item (*helping fellow students*) in this solution showed all factor loadings below the recommended cut-off point and was removed.

After dropping this item, the seven-factor solution was supported by the scree plot while the Kaiser–Guttman retention criterion still supported a four-factor solution. Further analysis of the seven-factor solution showed that one factor contained only one item (*thinking about the course between class meetings*) loading above the recommended cut-off point. This item did not load above the cut-off value on any other factor and was therefore removed. After dropping this second item, on the basis of the analysis of eigenvalues, scree plots, and the theoretical

interpretability of the factors, the four-factor solution was retained. This solution showed good model fit ($\chi^2(116, 272) = 230.39$, $p < .05$; RMSEA (90% CI) = .06 (.05 - .07); SRMR = .04). Table 2 shows the factor pattern matrix from the four-factor EFA as well as Cronbach's alpha coefficient for each factor.

The four factors in the retained solution accounted for 17.47%, 9.54%, 12.79%, and 10.84% of item variance, respectively. The eigenvalues of all four factors were over 1.0. Each item loaded highly on only one factor. The first factor (six items) was identified as *out-of-class behavioral engagement* because it consisted of items tapping into students' completion of basic course-related work outside the classroom (e.g., doing all the homework problems, staying up on the readings). The second factor (four items), labeled *in-class behavioral engagement*, was composed of indicators of students' basic behaviors within the classroom (e.g., taking good notes in class, listening carefully in class). The third factor (three items) was identified as *cognitive engagement* because its items represent students' mental effort to connect with school material at a personal level (e.g., applying course material to my life, finding ways to make the course material relevant to my life). Finally, the fourth factor (five items) was identified as *social behavioral engagement* because its items represent student behaviors that would require interaction with others (e.g., asking questions when I don't understand the instructor, participating actively in small-group discussions). All four factors showed acceptable internal consistency (see Table 3 for Cronbach's alpha coefficients).

Replicability of structure. Overall, the underlying factor structure identified in Subsample 1 was replicated in Subsample 2. The four-factor model showed good fit and all items loaded moderately to highly on their respective factors ($\chi^2(124, 291) = 268.70$, $p < .05$, CFI = .93, RMSEA (90% C.I.) = .06 (.05 - .07), SRMR = .07). Figure 3 depicts this first-order CFA

Table 2

Factor Loadings and Cronbach's Alpha for Final EFA Solution for Academic Engagement

Items	Factors				α
	1	2	3	4	
Making sure to study on a regular basis	**.839**	.076	.113	.081	.846
Putting forth effort	**.746**	.287	.141	.077	
Doing all the homework problems	**.623**	.106	.180	.033	
Staying up on the readings	**.638**	.261	.103	.117	
Looking over class notes between classes to make sure I understand the material	**.644**	.155	.187	.153	
Being organized	**.470**	.214	.003	.060	
Taking good notes in class	.369	**.468**	.034	.037	.681
Listening carefully in class	.249	**.553**	.225	.138	
Coming to class every day	.178	**.516**	-.016	.037	
Really desiring to learn the material	.238	**.511**	.328	.206	
Finding ways to make the course material relevant to my life	.120	.152	**.863**	.131	.823
Applying course material to my life	.128	.120	**.849**	.107	
Finding ways to make the course interesting to me	.116	.425	**.480**	.193	
Raising my hand in class	.002	.080	.097	**.768**	.782
Asking questions when I don't understand the instructor	.075	.047	-.010	**.745**	
Having fun in class	.065	.356	.153	**.472**	
Participating actively in small-group discussions	.079	.251	.182	**.498**	
Going to the professor's office hours to review assignments or tests or to ask questions	.300	-.093	.117	**.620**	
Helping fellow students	*.165*	*.443*	*.181*	*.295*	*Removed*
Thinking about the course between class meetings	*.171*	*.126*	*.033*	*.333*	*Removed*

Note. Numbers in bold show the highest factor loadings for each item. Factor 1 = Out-of-class Behavioral Engagement, Factor 2 = In-class Behavioral Engagement, Factor 3 = Cognitive Engagement, Factor 4 = Social Behavioral Engagement. Italicized items were removed from final scale. α = Cronbach's Alpha.

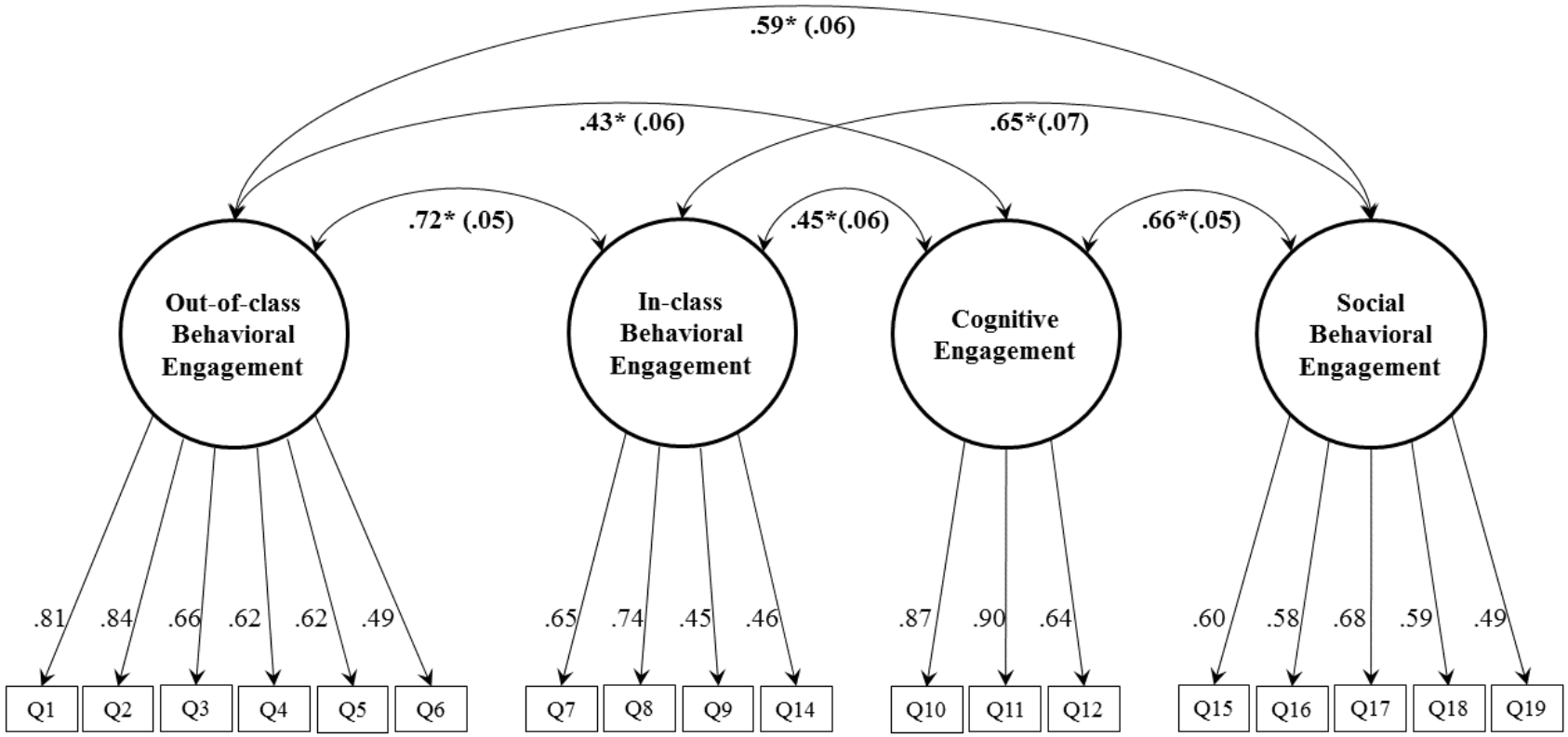

Figure 3. First-order confirmatory factor analysis model for academic engagement.

Note. Standardized coefficients presented with standard errors in brackets. * $p < .05$.

model. Latent correlations showed that all four latent factors were strongly and positively correlated with one another. A second-order CFA modeling these four first-order factors as indicators of a higher general academic engagement factor showed adequate model fit ($\chi^2(126, 291) = 287.41$, $p < .05$, CFI = .92, RMSEA (90% C.I.) = .07 (.06 - .08), SRMR = .07), but was less well-fitting than the first-order CFA ($\Delta\chi^2(2) = 18.71$, $p < .05$). This indicated that they are best represented as unique but interrelated dimensions of academic engagement. Based on these results and previous research, the four subscales were used separately in all subsequent analyses.

The general CFA models at Wave 1 of the longitudinal sample for the three behavioral engagement subscales (out-of-class, in-class, social) demonstrated adequate fit to the data (see Table 3). The fit of the general CFA model at Wave 1 for the cognitive engagement subscale could not be assessed as it was just-identified (i.e., has as many parameters as observed means) and therefore mean residuals could not be calculated to assess how estimated means differ from observed means (Kline, 2011).

Equivalence across gender. As shown in Table 4, the CFA models for all four subscales demonstrated metric (in-class behavioral engagement) or scalar (out-of-class behavioral, cognitive, and social behavioral engagement) factorial invariance across gender in Subsample 2. In the longitudinal sample, all subscales showed metric (out-of-class behavioral engagement, in-class behavioral engagement, social behavioral engagement) or residual (cognitive engagement) invariance, indicating adequate equivalence of the subscales across gender (see Table 3). This indicates that in both samples, each academic engagement subscale tapped into the same construct for both men and women.

Equivalence across time. For invariance across time, the CFA models for all four subscales demonstrated metric invariance, indicating that their factor structure held across time,

Table 3

Factorial Invariance across Gender for Academic Engagement Subscales for Longitudinal Sample at Wave 1

Model	Exact Fit Test $\chi^2(df, N)$	Approximate Fit Indices			Range of Standardized Loadings	Model Comparisons $\Delta\chi^2$ (df_{diff})
		CFI	*RMSEA* (90% CI)	SRMR		
Out-of-Class Behavioral Engagement						
CFA	30.00 (9, 543)*	.98	.07 (.04 - .09)	.03	.469 - .835	
Configural	44.32 (18, 539)*	.98	.07 (.05 - .10)	.03	.437 - .855	
Metric	**53.98 (23, 539)***	**.97**	**.07 (.05 - .10)**	**.06**	**.412 - .856**	**Conf. vs. Met.: 9.66 (5)**
Scalar	65.37 (28, 539)*	.97	.07 (.05 - .09)	.07	.412 - .855	Met. vs. Scal.: 11.39 (5)*
In-Class Behavioral Engagement						
CFA	2.32 (2, 543)	1.00	.02 (.00 - .09)	.01	.390 - .882	
Configural	7.30 (4, 539)	.99	.06 (.00 - .12)	.02	.304 - .904	
Metric	**14.09 (7, 539)**	**.98**	**.06 (.00 - .11)**	**.07**	**.376 - .932**	**Conf. vs. Met.: 6.79 (3)**
Scalar	42.20 (10, 539)*	.90	.11 (.08 - .14)	.08	.378 - .904	Met. vs. Scal.: 11.39 (3)*
Cognitive Engagement						
CFA	0 (0, 543)*	1.00	.00 (.00 - .00)	.00	.680 - .917	
Configural	0 (0, 539)*	1.00	.00 (.00 - .00)	.00	.676 - .944	
Metric	1.27 (2, 539)	1.00	.00 (.00 - .11)	.02	.676 - .936	Conf. vs. Met.: 1.27 (2)
Scalar	**2.32 (4, 539)**	**1.00**	**.00 (.00 - .07)**	**.01**	**.675 - .935**	**Met. vs. Scal.: 1.05 (2)**
Social Behavioral Engagement						
CFA	21.90 (5, 543)*	.98	.08 (.05 - .11)	.03	.502 - .777	
Configural	25.56 (10, 539)*	.98	.08 (.04 - .11)	.03	.460 - .779	
Metric	**30.73 (14, 539)***	**.98**	**.07 (.03 - .10)**	**.05**	**.475 - .786**	**Conf. vs. Met.: 5.17 (4)**
Scalar	40.71 (18, 539)*	.97	.07 (.04 - .10)	.05	.475 - .787	Met. vs. Scal.: 9.98 (4)*

Note. * $p < .05$. CI = Confidence interval. CFA = confirmatory factor analysis. Conf. = Configural. Met. = Metric. Scal. = Scalar. Preferred model in bold.

Table 4

Factorial Invariance across Gender for Academic Engagement Subscales for Cross-sectional Subsample 2

Model	Exact Fit Test $\chi^2(df, N)$	Approximate Fit Indices			Range of Standardized Loadings	Model Comparisons $\Delta\chi^2$ (df_{diff})
		CFI	*RMSEA* (90% CI)	SRMR		
Out-of-Class Behavioral Engagement						
CFA	21.12 (9, 291)*	.98	.07 (.03 - .11)	.03	.489 - .827	
Configural	37.06 (18, 287)*	.97	.09 (.05 - .13)	.04	.527 - .854	
Metric	39.78 (23, 287)*	.97	.07 (.03 - .11)	.05	.461 - .857	Conf. vs. Met.: 2.72 (5)
Scalar	**46.21 (28, 287)***	**.97**	**.07 (.03 - .10)**	**.06**	**.463 - .853**	**Met. vs. Scal.: 6.43 (5)**
In-Class Behavioral Engagement						
CFA	.883 (2, 291)	1.00	.00 (.00 - .09)	.01	.390 - .836	
Configural	1.45 (4, 287)	1.00	.00 (.00 - .07)	.02	.172 - .868	
Metric	**4.31 (7, 287)**	**1.00**	**.00 (.00 - .07)**	**.04**	**.304 - .884**	**Conf. vs. Met.: 2.86 (3)**
Scalar	16.03 (10, 287)	.97	.07 (.00 -.12)	.06	.300 - .876	Met. vs. Scal.: 11.72 (3)*
Cognitive Engagement						
CFA	0.00 (0, 291)*	1.00	.00 (.00 - .00)	.00	.655 - .913	
Configural	0.00 (0, 287)*	1.00	.00 (.00 - .00)	.00	.650 - .937	
Metric	.46 (2, 287)	1.00	.00 (.00 - .11)	.03	.652 - .933	Conf. vs. Met.: .46 (2)
Scalar	**2.45 (4, 287)**	**1.00**	**.00 (.00 - .10)**	**.04**	**.649 - .933**	**Met. vs. Scal.: 1.99 (2)**
Social Behavioral Engagement						
CFA	7.86 (3, 291)*	.99	.07 (.00 - .14)	.02	.415 - .716	
Configural	9.30 (6, 287)	.99	.06 (.00 - .14)	.03	.390 - .765	
Metric	14.89 (10, 287)	.99	.06 (.00 - .12)	.05	.376 - .748	Conf. vs. Met.: 5.59 (4)
Scalar	**17.84 (14, 287)**	**.99**	**.04 (.00 - .10)**	**.06**	**.370 - .747**	**Met. vs. Scal.: 2.95 (4)**

Note. * $p < .05$. CI = Confidence interval. CFA = confirmatory factor analysis. Conf. = Configural. Met. = Metric. Scal. = Scalar. Preferred model in bold.

but the intercepts of their indicators changed (see Table 5).

Perceived academic pressure and support from friends.

Underlying structure. EFA models with one to six factors were tested on the 14 items created for this study. The Kaiser–Guttman retention criterion and the scree plot test both suggested a four-factor solution. Three items (*pressured you to skip class*, *tried to persuade you to take shortcuts or cheat in your schooling*, *expected you to do well in school*) in the four-factor solution showed factor loadings below the recommended cut-off point and were removed. After dropping these items, a three-factor solution was accepted on the basis of the analysis of eigenvalues, scree plots, and the theoretical interpretability of the factors. This three-factor solution showed good model fit ($\chi^2(52, 272) = 122.32$, $p < .05$; RMSEA (90% CI) = .07 (.05 - .09); SRMR = .05). Table 6 shows the factor pattern matrix from the retained three-factor EFA and Cronbach's alpha for each identified factor.

The three factors in the retained solution accounted for 20.38%, 17.77%, and 21.42% of item variance, respectively. The eigenvalues of all three factors were over 1.0. Each item loaded highly on only one factor. The first factor (four items) was identified as *school-supportive pressure from friends* because its items tapped students' perceptions of their friends' expectations and encouragement for behaviors expected to help academic goals (e.g., going to class, focusing more on schoolwork). By contrast, the second factor (three items), labeled *school-obstructive pressure from friends*, consisted of indicators of friends' expectations or pressures to socialize instead of focusing on academic work (e.g., going out or socializing even if it interfered with schoolwork). The third factor, consisting of four items, tapped students' perceptions of concrete and direct support from their friends toward their academic goals (e.g.,

Table 5

Factorial Invariance across Waves 1 to 4 for Academic Engagement Subscales

Model	Exact Fit Test $\chi^2(df, N)$	Approximate Fit Indices			Range of Standardized Loadings	Model Comparisons $\Delta\chi^2$ (df_{diff})
		CFI	*RMSEA* (90% CI)	SRMR		
Out-of-Class Behavioral Engagement						
W1 CFA	30.00 (9, 543)*	.98	.07 (.04 - .09)	.03	.469 - .835	
Configural	1153.15 (228, 544)*	.86	.09 (.08 - .09)	.07	.444 - .816	
Metric	**1164.38 (243, 544)***	**.86**	**.08 (.08 - .09)**	**.08**	**.474 - .818**	**Conf. vs. Met.: 11.23 (15)**
Scalar	1386.71 (258, 544)*	.83	.09 (.09 - .09)	.08	.467 - .815	Met. vs. Scal.: 222.33 (15)*
In-Class Behavioral Engagement						
W1 CFA	2.32 (2, 543)	1.00	.02 (.00 - .09)	.01	.390 - .882	
Configural	630.87 (86, 544)*	.86	.11 (.10 - .12)	.09	.418 - .822	
Metric	**651.20 (95, 544)***	**.86**	**.10 (.10 - .11)**	**.10**	**.387 - .816**	**Conf. vs. Met.: 20.33 (9)**
Scalar	753.46 (104, 544)*	.83	.11 (.10 - .11)	.11	.397 - .816	Met. vs. Scal.: 102.26 (9)*
Cognitive Engagement						
W1 CFA	0 (0, 543)*	1.00	.00 (.00 - .00)	.00	.680 - .917	
Configural	243.76 (41, 544)*	.96	.10 (.08 - .11)	.06	.699 - .942	
Metric	**255.83 (47, 544)***	**.96**	**.09 (.08 - .10)**	**.06**	**.733 - .947**	**Conf. vs. Met.: 12.07 (6)**
Scalar	283.73 (53, 544)*	.95	.09 (.08 - .10)	.06	.730 - .946	Metric vs. Scal.: 27.90 (6)*
Social Behavioral Engagement						
W1 CFA	21.90 (5, 543)*	.98	.08 (.05 - .11)	.03	.502 - .777	
Configural	951.79 (149, 544)*	.85	.10 (.09 - .11)	.08	.471 - .812	
Metric	**962.71 (161, 544)***	**.85**	**.10 (.09 - .10)**	**.08**	**.502 - .805**	**Conf. vs. Met.: 10.92 (12)**
Scalar	1048.01 (173, 544)*	.84	.10 (.09 - .10)	.08	.512 - .806	Met. vs. Scal.: 85.30 (12)*

Note. * $p < .05$. CI = Confidence interval. W1 = Wave 1. CFA = confirmatory factor analysis.

Conf. = Configural. Met. = Metric. Scal. = Scalar. Preferred model in bold.

Table 6

Factor Loadings and Cronbach's Alpha for Final EFA Solution for Perceived Academic Pressure and Support from Friends Scale

Items	Factor Loadings			α
	1	2	3	
...encouraged you to choose non-academic activities over school work?	.052	**.665**	.109	.824
...wanted you to go out or socialize even if it interfered with your schoolwork?	.045	**.913**	.117	
...expected you to socialize with them even if you have school work to do?	.041	**.774**	.064	
...encouraged you to go to class even if you didn't feel motivated to go?	**.661**	.210	.143	.818
...encouraged you to do school work instead of doing other things?	**.749**	.064	.190	
...tried to get you to focus more on your schoolwork?	**.887**	.001	.125	
...urged you to avoid doing things that would take time away from your studies?	**.584**	.200	.058	
...turned to friends for help on school work?	.027	.145	**.793**	.840
...gotten together with friends to do school work or study?	.090	.094	**.712**	
...found your friends helpful when you were having difficulties with school work?	.024	.168	**.847**	
…asked your friends for advice about school?	.016	.121	**.640**	
...pressured you to skip class?	*.400*	*.120*	*-.101*	*Removed*
...tried to persuade you to take shortcuts or cheat in your schooling?	*.340*	*.113*	*.028*	*Removed*
...expected you to do well in school?	*.034*	*.248*	*.221*	*Removed*

Note. Numbers in bold show the highest factor loadings for each item. Factor 1 = School-supportive Pressure from Friends; Factor 2 = School-obstructive Pressure from Friends; Factor 3 = Academic Instrumental Support from Friends. Italicized items were removed from final scale. α = Cronbach's Alpha.

got help on school work, got advice about school) and was labeled *academic instrumental support from friends*. High internal consistency reliability estimates were found (see Table 6 for Cronbach's alpha coefficients) for all three factors.

Replicability of structure. Overall, the underlying factor structure identified in Subsample 1 was replicated in Subsample 2. The three-factor model showed good fit and all items loaded highly on their respective factors ($\chi^2(8, 289) = 21.90$, $p < .05$, CFI = .98, RMSEA (90% C.I.) = .04 (.02 - .06), SRMR = .04). Figure 4 depicts this first-order CFA model. At the latent level, school-obstructive pressure from friends did not significantly correlate with school-supportive pressure or academic instrumental support from friends. School-supportive pressure from friends and academic instrumental support from friends were positively significantly correlated. This indicates that school-supportive pressure and academic instrumental support from friends may represent a higher order, more general latent construct of friends' positive academic influences that is independent from friends' school-obstructive pressure. Assessing a second-order CFA model for friends' positive academic influence, however, was not possible as specification of such a model would require at least three first-order latent indicators (Kline, 2011) and only two were available. Based on these results and the theorized three factor structure of the scale, the three subscales were used separately in all subsequent analyses.

For the longitudinal sample, the general CFA models at Wave 1 for the school-supportive pressure and academic instrumental support subscales demonstrated adequate fit to the data (see Table 7). The fit of the general CFA model at Wave 1 for school-obstructive pressure subscale could not be assessed as it was just-identified.

Equivalence across gender. CFA models for all three subscales demonstrated metric (school-supportive pressure) or scalar (school-obstructive pressure, academic instrumental

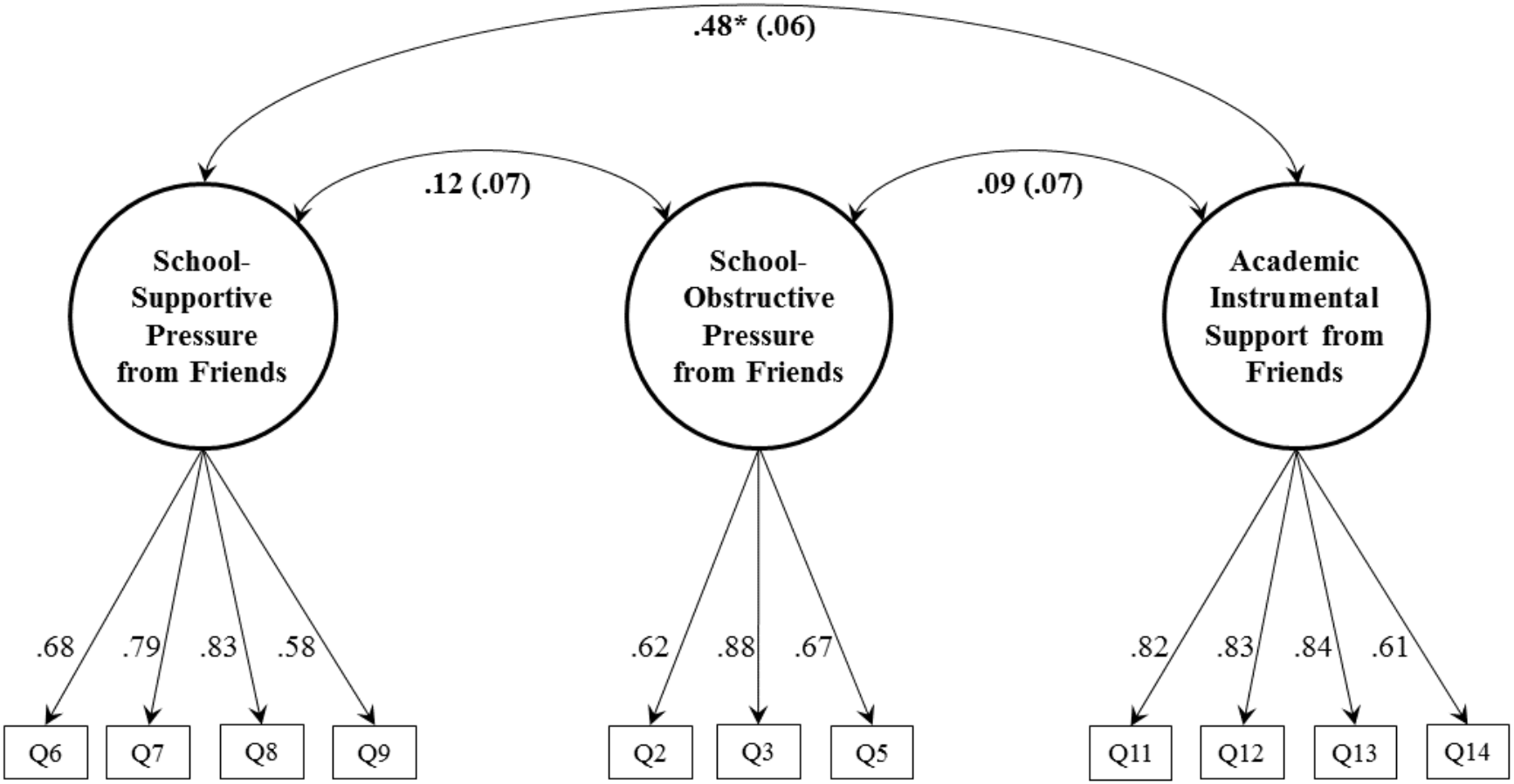

Figure 4. First-order confirmatory factor analysis model for perceived academic pressure and support from friends.

Note. Standardized coefficients presented with standard errors in brackets. * $p < .05$.

Table 7

Factorial Invariance across Gender for Perceived Academic Pressure and Support from Friends Subscales for Longitudinal Sample at Wave 1

Model	Exact Fit Test $\chi^2(df, N)$	Approximate Fit Indices			Range of Standardized Loadings	Model Comparisons $\Delta\chi^2$ (df_{diff})
		CFI	*RMSEA* (90% CI)	SRMR		
School-supportive Pressure from Friends						
CFA	10.65 (2, 541)*	.99	.09 (.04 - .15)	.02	.544 - .798	
Configural	12.44 (4, 537)*	.99	.09 (.04 - .15)	.02	.514 - .804	
Metric	**20.00 (7, 537)***	**.98**	**.08 (.04 - .13)**	**.05**	**.561 - .802**	**Conf. vs. Met.: 7.56 (3)**
Scalar	30.93 (10, 537)*	.97	.09 (.05 - .13)	.05	.560 - .803	Met. vs. Scal.: 10.93 (3)*
School-obstructive Pressure from Friends						
CFA	0 (0, 541)*	1.00	.00 (.00 - .00)	.00	.663 - .850	
Configural	0 (0, 537)*	1.00	.00 (.00 - .00)	.00	.646 - .865	
Metric	.31 (2, 537)	1.00	.00 (.00 - .07)	.01	.657 - .865	Conf. vs. Met.: .31 (2)
Scalar	**3.02 (4, 537)**	**1.00**	**.00 (.00 - .08)**	**.02**	**.659 - .866**	**Met. vs. Scal.: 2.71 (2)**
Academic Instrumental Support from Friends						
CFA	1.15 (1, 542)	1.00	.02 (.00 - .12)	.01	.645 - .931	
Configural	4.73 (2, 538)	1.00	.07 (.00 - .16)	.01	.623 - .941	
Metric	**7.93 (5, 538)**	**1.00**	**.05 (.00 - .11)**	**.03**	**.640 - .923**	**Conf. vs. Met.: 3.20 (3)**
Scalar	17.48 (8, 538)*	.99	.07 (.02 - .11)	.03	.639 - .932	Met. vs. Scal.: 9.55 (3)*

Note. * $p < .05$. CI = Confidence interval. CFA = confirmatory factor analysis. Conf. = Configural. Met. = Metric. Scal. = Scalar. Preferred model in bold.

support) factorial invariance across gender groups in Subsample 2 (see Table 8). In the longitudinal sample, subscales showed metric (perceived school-supportive pressure, academic instrumental support) or scalar (perceived school-obstructive pressure) invariance as well (see Table 7). This indicates that each subscale tapped into the same construct for both men and women in both samples.

Equivalence across time. In the longitudinal sample, the CFA models for the school-supportive pressure and academic instrumental support subscales demonstrated metric invariance and the CFA model for the school-obstructive pressure showed scalar invariance (see Table 9). Thus, the factor structure held across time for the first two subscales while both the factor structure and the intercepts of the third subscale held across time.

Descriptive Statistics

Mean scores and standard deviations for each variable used in the primary analyses are presented in Table 10. Across all waves, students generally characterized themselves as moderately engaged (between *moderately characteristic of me* and *characteristic of me*) in out-of-class behavioral engagement and cognitive engagement. Students' in-class behavioral engagement, on average, was high (close to *characteristic of me* and above) at all waves. In contrast, students characterized themselves, in general, as less engaged in terms of social behavioral engagement with mean levels across waves falling between *not really characteristic of me* and *moderately characteristic of me*.

Students reported low levels of perceived academic pressure from friends, whether school-supportive or school-obstructive, with mean levels at all waves falling between *rarely* and *sometimes*. Students reported higher levels of academic instrumental support from friends in general, with means for all waves falling between *sometimes* and *often*. On average, students'

Table 8

Factorial Invariance across Gender for Perceived Academic Pressure and Support from Friends Subscales for Cross-sectional Subsample 2

Model	Exact Fit Test $\chi^2(df, N)$	Approximate Fit Indices			Range of Standardized Loadings	Model Comparisons $\Delta\chi^2$ (df_{diff})
		CFI	*RMSEA* (90% CI)	SRMR		
School-supportive Pressure from Friends						
CFA	.393 (2, 287)	1.00	.00 (.00 - .07)	.01	.581 - .832	
Configural	2.08 (4, 283)	1.00	.00 (.00 - .09)	.01	.552 - .921	
Metric	**8.03 (7, 283)**	**1.00**	**.03 (.00 - .11)**	**.05**	**.561 - .872**	**Conf. vs. Met.: 5.95 (3)**
Scalar	16.99 (10, 283)	.98	.07 (.00 - .13)	.04	.558 - .865	Met. vs. Scal.: 8.96 (3)*
School-obstructive Pressure from Friends						
CFA	0.00 (0, 288)*	1.00	.00 (.00 - .00)	.00	.617 - .881	
Configural	0.00 (0, 284)*	1.00	.00 (.00 - .00)	.00	.570 - .860	
Metric	5.99 (2, 284)	.98	.12 (.00 - .23)	.07	.618 - .894	Conf. vs. Met.: 5.99 (2)
Scalar	**7.25 (4, 284)**	**.99**	**.08 (.00 - .16)**	**.06**	**.613 - .897**	**Met. vs. Scal.: 1.26 (2)**
Academic Instrumental Support from Friends						
CFA	1.52 (2, 288)	1.00	.00 (.00 - .11)	.01	.605 - .850	
Configural	5.11 (4, 284)	1.00	.04 (.00 - .14)	.01	.516 - .855	
Metric	12.06 (7, 284)	.99	.07 (.00 - .14)	.08	.596 - .865	Conf. vs. Met.: 6.95 (3)
Scalar	**18.78 (10, 284)***	**.98**	**.08 (.01 - .13)**	**.10**	**.589 - .862**	**Met. vs. Scal.: 6.72 (3)**

Note. * $p < .05$. CI = Confidence interval. CFA = Confirmatory factor analysis. Conf. = Configural. Met. = Metric. Scal. = Scalar. Preferred model in bold.

Table 9

Factorial Invariance across Waves 1 to 4 for Perceived Academic Pressure and Support from Friends Subscales

Model	Exact Fit Test $\chi^2(df, N)$	Approximate Fit Indices			Range of Standardized Loadings	Model Comparisons $\Delta\chi^2$ (df_{diff})
		CFI	*RMSEA* (90% CI)	SRMR		
School-supportive Pressure from Friends						
W1 CFA	10.65 (2, 541)*	.99	.09 (.04 - .15)	.02	.544 - .798	
Configural	262.58 (86, 544)*	.96	.06 (.05 - .07)	.04	.526 - .889	
Metric	**271.57 (95, 544)***	**.95**	**.06 (.05 - .07)**	**.04**	**.538 - .888**	**Conf. vs. Met.: 8.99 (9)**
Scalar	305.32 (104, 544)*	.96	.06 (.05 - .07)	.04	.539 - .888	Met. vs. Scal.: 33.75 (9)*
School-obstructive Pressure from Friends						
W1 CFA	0 (0, 541)*	1.00	.00 (.00 - .00)	.00	.663 - .850	
Configural	115.83 (39, 544)*	.98	.06 (.05 - .07)	.03	.675 - .830	
Metric	122.91 (45, 544)*	.98	.06 (.05 - .07)	.03	.698 - .841	Conf. vs. Scal.: 7.08 (6)
Scalar	**124.80 (51, 544)***	**.98**	**.05 (.04 - .06)**	**.03**	**.699 - .841**	**Scal. vs. Met.: 1.89 (6)**
Academic Instrumental Support from Friends						
W1 CFA	1.15 (1, 542)	1.00	.02 (.00 - .12)	.01	.645 - .931	
Configural	409.10 (86, 544)*	.94	.08 (.08 - .09)	.04	.649 - .879	
Metric	**420.87 (95, 544)***	**.94**	**.08 (.07 - .09)**	**.05**	**.666 - .878**	**Conf. vs. Scal.: 11.77 (9)**
Scalar	517.18 (104, 544)*	.93	.09 (.08 - .09)	.06	.649 - .877	Scal. vs. Met.: 96.31 (9)*

Note. * $p < .05$. W1 = Wave 1. CI = Confidence interval. CFA = confirmatory factor analysis. Conf. = Configural. Met. = Metric. Scal. = Scalar. Preferred model in bold.

Table 10

Psychometric Properties of Academic Engagement, Perceived Academic Pressure and Support from Friends, GPA, and Continuous Covariates (Waves 1 to 4)

Variables	*N*	Mean	SD	Range	α	Skewness	Kurtosis
Out-of-Class Behavioral Engagement							
Wave 1	543	3.70	.70	1.00 – 5.00	.82	-.29	.27
Wave 2	539	3.58	.66	1.17 – 5.00	.76	-.28	.13
Wave 3	509	3.41	.67	1.00 – 5.00	.77	-.14	.10
Wave 4	476	3.49	.71	1.00 – 5.00	.82	-.41	.42
In-Class Behavioral Engagement							
Wave 1	543	4.07	.61	2.33 – 5.00	.64	-.38	-.50
Wave 2	539	4.03	.59	1.33 – 5.00	.62	-.58	.38
Wave 3	509	3.84	.66	1.00 – 5.00	.68	-.54	.53
Wave 4	476	3.85	.74	1.00 – 5.00	.76	-.69	.55
Cognitive Engagement							
Wave 1	537	3.23	.93	1.00 – 5.00	.87	.11	-.65
Wave 2	535	3.10	.90	1.00 – 5.00	.88	.04	-.41
Wave 3	503	3.01	.92	1.00 – 5.00	.90	.23	-.47
Wave 4	469	3.14	.96	1.00 – 5.00	.92	-.07	-.33
Social Behavioral Engagement							
Wave 1	543	2.95	.79	1.00 – 5.00	.77	.10	-.09
Wave 2	539	2.70	.75	1.00 – 5.00	.74	.26	-.08
Wave 3	509	2.66	.76	1.00 – 5.00	.74	.27	-.22
Wave 4	477	2.82	.84	1.00 – 5.00	.79	.13	-.36
School-Supportive Pressure from Friends							
Wave 1	540	2.55	.967	1.00 – 5.00	.79	.05	-.73
Wave 2	540	2.60	.98	1.00 – 5.00	.81	.18	-.43
Wave 3	510	2.56	.96	1.00 – 5.00	.85	.15	-.35
Wave 4	476	2.65	1.00	1.00 – 5.00	.87	-.01	-.58

(Table 14 con't on next page.)

Table 10 continued

Variables	*N*	Mean	SD	Range	α	Skewness	Kurtosis
School-Obstructive Pressure from Friends							
Wave 1	541	2.42	.93	1.00 – 5.00	.77	.21	-.56
Wave 2	540	2.47	.90	1.00 – 5.00	.78	.15	-.47
Wave 3	510	2.31	.89	1.00 – 5.00	.84	.30	-.40
Wave 4	476	2.45	.92	1.00 – 5.00	.85	.11	-.47
Academic Instrumental Support from Friends							
Wave 1	542	3.18	.97	1.00 – 5.00	.84	-.40	-.30
Wave 2	538	3.42	.90	1.00 – 5.00	.85	-.56	.05
Wave 3	511	3.29	.91	1.00 – 5.00	.87	-.54	.05
Wave 4	478	3.36	.91	1.00 – 5.00	.87	-.45	.01
Semester GPA	543	2.94	.67	.30 – 4.00	-	-.74	.68
Continuous Covariates							
Previous GPA	542	3.68	.38	2.30 – 4.00	-	-.97	-.00
Future Orientation	539	27.03	5.42	9.00 – 40.00	.83	-.13	-.15
Academic Strain							
Wave 1	542	.67	.62	.00 – 3.50	.62	1.59	3.22
Wave 2	537	1.90	.65	.20 – 3.80	.40	.14	-.41
Wave 3	500	1.93	.64	.00 – 4.00	.41	.21	.48
Wave 4	471	1.88	.79	.00 – 4.00	.51	.17	-.13

Note. Anchor ranges: *not at all characteristic of me* (1) to *very characteristic of me* (5) for academic engagement subscales, *never* (1) to a*lmost always* (5) for perceived academic pressure and support from friends subscales, *extremely uncharacteristic* (1) to *extremely characteristic* (5) for future orientation, and *not stressful* (1) to *extremely stressful* (4) for academic strain, with zero (0) indicating that none of the academic events in the scale were experienced during the past 30 days. Dashes indicate not applicable descriptive statistic.

GPA at the end of their first semester was good, falling above a letter grade of B-. There was modest variability in the scores for academic engagement, perceived academic pressure from friends, academic instrumental support from friends, and grades. In terms of continuous covariates, students showed high entrance grades (i.e., previous GPA) with an average slightly above B+, reported moderate levels of future orientation (between *uncertain* and *somewhat characteristic*), and showed low levels of academic strain across waves, with the lowest levels occurring on average at Wave 1 (below *not stressful* due to non-occurrence of most academic events during the first month of the semester) and the average levels at all other waves falling between *not stressful* and *somewhat stressful*.

Students scored across the entire range of possible scores in all variables. Most skewness and kurtosis values fell within the -0.50 to +0.50 range, indicating that most variables had fairly symmetrical distributions and pointed toward normality (Bulmer, 1979). Only academic strain at Wave 1 was highly positively skewed and kurtosed (values above 1; Bulmer, 1979) - most participants reported not having experienced any of the academic events assessed by the scale and, therefore, received a score of zero for their academic strain related to those events.

Table 11 presents the zero-order correlations among the main variables, which were used to evaluate the relationships among peer context, academic engagement, and academic performance. All constructs demonstrated high stability across the four measurement occasions (rs = .48 – .78, $p < .001$). In general, correlations between the three perceived academic pressure and support from friends variables and the four components of academic engagement were of weak to moderate strength in the expected directions. Most school-obstructive pressure variables were significantly negatively correlated with academic engagement variables, except for in-class behavioral engagement which was mostly not significantly related to school-obstructive

Table 11

Correlations Among Perceived Academic Pressure and Support from Friends, Academic Engagement, and GPA

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Out-of-Class Behavioral Engagement																												
1. W1																												
2. W2	**.66**																											
3. W3	**.60**	**.73**																										
4. W4	**.60**	**.66**	**.71**																									
In-Class Behavioral Engagement																												
5. W1	.53	.34	.36	.36																								
6. W2	.41	.48	.49	.46	**.58**																							
7. W3	.42	.46	.58	.50	**.56**	**.73**																						
8. W4	.44	.47	.48	.65	**.51**	**.65**	**.71**																					
Cognitive Engagement																												
9. W1	.27	.19	.20	.25	.33	.22	.21	.19																				
10. W2	.17	.27	.28	.31	.23	.36	.36	.31	**.60**																			
11. W3	.22	.27	.41	.38	.25	.32	.46	.34	**.52**	**.68**																		
12. W4	.27	.30	.36	.51	.27	.36	.41	.49	**.48**	**.63**	**.69**																	
Social Behavioral Engagement																												
13. W1	.31	.21	.19	.23	.33	.21	.21	.22	.42	.25	.27	.27																
14. W2	.28	.37	.34	.34	.26	.35	.38	.34	.31	.34	.37	.35	**.64**															

(Table 11 con't on next page.)

Table 11 continued

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Social Behavioral Engagement																												
15. W3	.24	.32	.38	.37	.26	.31	.40	.35	.30	.34	.46	.41	**.60**	**.75**														
16. W4	.28	.34	.33	.44	.23	.30	.30	.41	.28	.29	.35	.44	**.59**	**.68**	**.73**													
Perceived School-Supportive Pressure from Friends																												
17. W1	-.06	-.04	-.01	-.02	-.02	-.01	-.02	-.02	.10	.11	.12	.06	.13	.12	.14	.11												
18. W2	-.01	.00	.01	-.02	-.05	.01	-.03	-.04	.11	.14	.13	.06	.11	.17	.17	.10	**.57**											
19. W3	.00	.01	.03	.01	-.04	.01	-.01	-.02	.06	.06	.09	.04	.09	.10	.18	.11	**.57**	**.73**										
20. W4	-.01	-.01	.02	.03	-.05	-.01	-.01	-.01	.05	.00	.08	.03	.09	.11	.18	.16	**.53**	**.70**	**.78**									
Perceived School-Obstructive Pressure from Friends																												
21. W1	-.13	-.08	-.10	-.12	-.18	-.18	-.19	-.20	-.10	-.14	-.09	-.15	-.06	-.07	-.05	-.04	.16	.06	.16	.15								
22. W2	-.11	-.13	-.13	-.11	-.15	-.14	-.15	-.18	-.14	-.13	-.11	-.13	-.04	-.08	-.06	-.08	.11	.10	.11	.15	**.53**							
23. W3	-.15	-.13	-.14	-.11	-.14	-.15	-.20	-.17	-.13	-.15	-.11	-.14	-.07	-.14	-.06	-.03	.09	.03	.17	.14	**.52**	**.64**						
24. W4	-.11	-.09	-.13	-.08	-.15	-.11	-.15	-.13	-.11	-.15	-.14	-.14	-.09	-.10	-.07	-.04	.05	.08	.13	.16	**.48**	**.62**	**.71**					
Academic Instrumental Support from Friends																												
25. W1	.11	.12	.12	.17	.03	.03	.06	.13	.01	.02	.09	.09	.19	.12	.13	.21	.37	.31	.33	.33	.15	.08	.14	.17				
26. W2	.12	.14	.13	.17	.09	.11	.13	.17	.03	.04	.07	.08	.15	.17	.15	.17	.26	.32	.31	.36	.11	.06	.07	.11	**.66**			
27. W3	.06	.09	.12	.15	.02	.07	.10	.15	-.05	-.02	.05	.07	.13	.13	.19	.19	.27	.38	.42	.38	.08	.03	.14	.09	**.60**	**.70**		
28. W4	.07	.11	.08	.19	.09	.12	.10	.13	.04	.07	.05	.11	.14	.18	.13	.23	.28	.35	.41	.45	.06	.02	.10	.12	**.59**	**.70**	**.75**	
Semester GPA	.27	.26	.24	.21	.20	.21	.26	.25	-.02	.01	.06	.06	.10	.09	.12	.09	-.16	-.22	-.18	-.17	-.06	-.02	.00	-.01	-.01	-.03	-.05	.00

Note. All correlations with magnitude of .09 and above are significant ($p < .05$). Stability correlations are shown in bold.

pressure. Most school-supportive pressure variables were significantly positively correlated with cognitive and in-class behavioral engagement variables. Most academic instrumental support variables were significantly positively correlated with all types of academic engagement, except cognitive, which was mostly not significantly related to academic instrumental support.

Although the correlations in Table 11 also consistently show the expected positive significant relation between students' GPA and their academic engagement, surprisingly the only significant correlations between GPA and perceived academic pressure from friends were in a negative direction. Taken together, the pattern of the correlations among the study constructs provide a good basis for conducting additional tests related to the theoretical model.

Research Question 1: Trajectories of Change across the Semester

A set of latent growth curve models (LGMs) was estimated for each type of academic engagement each and each perceived academic pressure and academic instrumental support from friends subscale to identify their respective functional forms of change over time (i.e., their best fitting latent growth models), informing the first research question of this study. A series of unconditional LGMs with increasingly higher order polynomials representing different forms of change was tested for each construct: null, random intercept, fixed linear slope, random linear slope, fixed quadratic slope, and random quadratic slope.

The null model defined the intercept factor by fixing the factor loadings of the four wave indicators to one and the variance of the intercept to zero. The random intercept model allowed the intercept factor to vary across individuals. In the fixed linear slope model, the average growth trajectory across all individuals was estimated by fixing the factor loadings of each wave toward the slope factor to represent the amount of time elapsed since baseline without allowing random effects for the slope parameter. In the random linear slope model, the variance of both the

intercept and slope growth factors were estimated. These latter two steps were repeated to test the fit of quadratic slope trajectories.

The null, random intercept, fixed linear slope, random linear slope, fixed quadratic slope, and random quadratic slope models were compared using chi-square difference tests to determine the model that best captured the observed shape of change in each construct. Once the best fitting unconditional model of change for each construct was identified, covariates (previous academic performance, gender, ethnic background, future orientation, and academic strain) were added to this retained model as controls. Non-significant paths between time-invariant covariates (i.e., gender, ethnic background, future orientation) and intercepts or slope parameters were trimmed from the models to identify the most parsimonious model for use in the next step of analysis. The time-varying covariate (academic strain) was removed from the model only if none of its' within-time covariances with the main constructs were significant.

Academic engagement.

Unconditional LGMs. The retained best fitting unconditional models of change, all of which showed good model fit, indicate that all four components of academic engagement decreased over the semester (Table 12). In-class behavioral engagement decreased following a different pattern of change over time than the other three components of academic engagement. For in-class behavioral engagement, students demonstrated significant linear decreases over the semester. With respect to out-of-class behavioral engagement, cognitive engagement, and social behavioral engagement, students experienced quadratic changes over time. That is, students experienced faster decreases in the first half of the semester followed by slower changes later on and a slight uptake by the end of the semester. There was significant variability across students in initial levels of engagement for all four components and in the linear slope for all but out-of-

Table 12

Retained Unconditional Latent Growth Curve Models for Academic Engagement Subscales

Models	Intercept		Linear Slope		Quadratic Slope		Model Fit Indices			
	Est.	***SE***	**Est.**	***SE***	**Est.**	***SE***	**χ^2(*df*, N)**	**CFI**	**RMSEA (90% CI)**	**SRMR**
Out-of-Class Behavioral Engagement							34.41 (5, 544)*	.97	.10 (.07-.14)	.06
Fixed Effects	3.72*	.03	-.23*	.03	.05*	.01				
Random Effects	.31*	.02	-		.001*	.00				
In-Class Behavioral Engagement							24.19 (5, 544)*	.98	.08 (.05-.12)	.05
Fixed Effects	4.10*	.02	-.11*	.01	-					
Random Effects	.19*	.02	.02*	.01	-					
Cognitive Engagement							9.75 (4, 544)*	.99	.05 (.01-.09)	.04
Fixed Effects	3.24*	.04	-.26*	.05	.08*	.02				
Random Effects	.53*	.05	.04*	.01	-					
Social Behavioral Engagement							7.85 (5, 544)	1.00	.03 (.00-.07)	.02
Fixed Effects	2.96*	.03	-.41*	.04	.13*	.01				
Random Effects	.39*	.03	.02*	.00	-					

Note. * $p < .05$. Unstandardized coefficients reported. Dashes indicate not applicable as parameter estimated with variance fixed at zero.

class behavioral engagement. There was significant interindividual variability in the quadratic parameter for out-of-class behavioral engagement. The intercept and linear slope for in-class behavioral engagement covaried significantly (B = .02, *SE* = .01, $p < .05$); students with higher initial levels of engagement showed less loss of engagement across the semester.

Conditional LGMs. Table 13 shows the effects of time-invariant covariates in the trimmed conditional model for each component of academic engagement. Students with higher entrance grades demonstrated higher initial levels of out-of-class behavioral engagement and in-class behavioral engagement. Women demonstrated higher initial levels of in-class behavioral engagement but lower initial levels of social behavioral engagement compared to men. In addition, women experienced steeper losses in out-of-class behavioral engagement across the semester compared to men.

Ethnic minority students reported lower initial levels of in-class behavioral engagement than Caucasian students. At the same time, ethnic minority students demonstrated less loss of social behavioral engagement across the semester compared to Caucasian students. Students who reported higher levels of future orientation also reported higher initial levels of all subscales of academic engagement. Academic strain covaried significantly only with out-of-class behavioral engagement: students who reported higher levels of academic strain at Waves 1 and 4 also reported lower levels of out-of-class behavioral engagement at these waves (Wave 1: B = -.02, *SE* = .01, $p < .05$; Wave 4: B = -.02, *SE* = .01, $p < .05$). Figure 5 depicts the final conditional trajectories of change for all academic engagement subscales.

Perceived academic pressure and support from friends.

Unconditional LGMs. As shown in Table 14, the best fitting unconditional model of change for school-supportive pressure was the random linear model, while for school-obstructive

Table 13

Time-Invariant Covariates of the Trajectories of Academic Engagement

Models	Intercept		Linear Slope		Quadratic Slope		Model Fit Indices			
	Est.	*SE*	Est.	*SE*	Est.	*SE*	χ^2(*df*, N)	CFI	RMSEA (90% CI)	SRMR
Out-of-Class Behavioral Engagement[a]							145.12 (39, 533)*	.94	.07 (.06-.08)	.07
Fixed Effects	2.19*	.25	-.24*	.03	.04*	.01				
Previous GPA	.15*	.07	-		-					
Gender	-		.05**	.02	-					
Future Or.	.04*	.01	-		-					
In-Class Behavior Engagement							34.29 (17, 530)*	.98	.04 (.02-.07)	.03
Fixed Effects	2.86*	.22	-.11*	.01	n/a					
Previous GPA	.19*	.06	-		n/a					
Gender	-.09*	.05	-		n/a					
Ethnic Backg.	-.14*	.04	-		n/a					
Future Or.	.03*	.00	-		n/a					
Cognitive Engagement							11.81 (7, 539)	1.00	.04 (.00-.07)	.03
Fixed Effects	2.50*	.17	-.26*	.05	.08*	.02				
Future Or.	.03*	.01	-		-					

(Table 13 con't on next page.)

Table 13 continued

Models	Intercept		Linear Slope		Quadratic Slope		Model Fit Indices			
	Est.	*SE*	Est.	*SE*	Est.	*SE*	χ^2(*df*, N)	CFI	RMSEA (90% CI)	SRMR
Social Behavioral Engagement							14.68 (14, 532)	1.00	.01 (.00-.04)	.02
Fixed Effects	2.25*	.15	-.44*	.04	.13*	.01				
Gender	.16*	.06	-		-					
Ethnicity	-		.06*	.02	-					
Future Or.	.02*	.01	-		-					

Note. Unstandardized coefficients reported. [a]Model includes academic strain as a time-varying covariate. Ethnic Backg. = Ethnic Background. Future Or. = Future Orientation. * $p < .05$. Dashes indicate non-significant paths that were removed to simplify each model. n/a = not applicable.

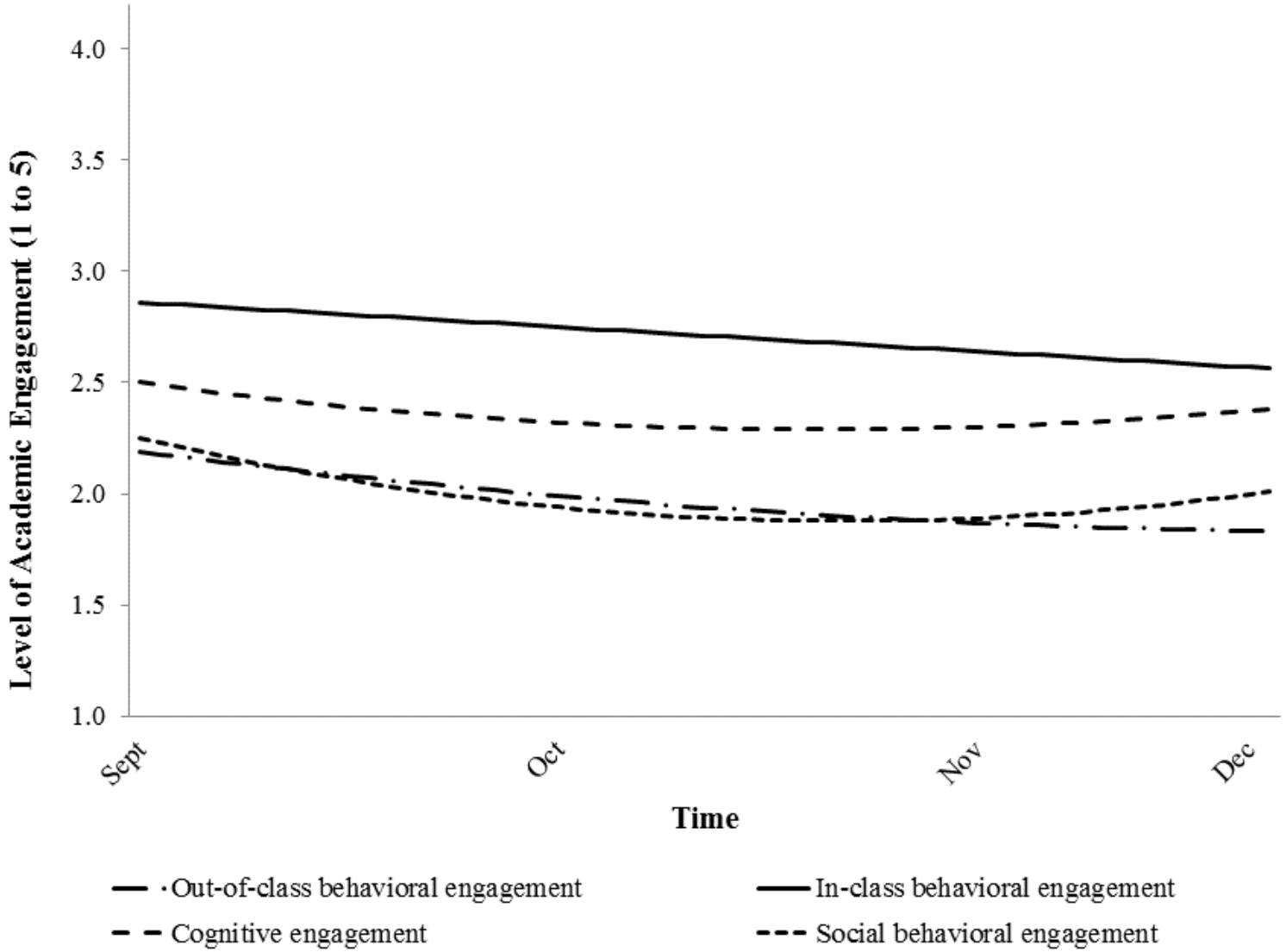

Figure 5. Final conditional trajectories of change for academic engagement subscales.

Table 14

Retained Unconditional Latent Growth Curve Models for Perceived Academic Pressure and Support from Friends Subscales

	Intercept		Linear Slope		Quadratic Slope		Model Fit Indices			
Models	**Est.**	***SE***	**Est.**	***SE***	**Est.**	***SE***	**χ^2(*df*, N)**	**CFI**	**RMSEA (90% CI)**	**SRMR**
School-Supportive Pressure from Friends							14.67 (5, 544)	.99	.06 (.03-.10)	.05
Fixed Effects	2.54*	.04	.03*	.02	n/a					
Random Effects	.54*	.05	.03*	.01	n/a					
School-Obstructive Pressure from Friends							27.89 (4, 544)	.97	.10 (.07-.13)	.03
Fixed Effects	2.45*	.04	-.10*	.05	.03*	.01				
Random Effects	.46*	.05	.03*	.01	-					
Academic Instrumental Support from Friends							31.29 (4, 544)	.98	.09 (.08-.05)	.03
Fixed Effects	3.21*	.04	.20*	.04	-.06*	.02				
Random Effects	.59*	.05	.03*	.01	-					

Note. Unstandardized coefficients reported. * $p < .05$. Dashes indicate not applicable as parameter estimated with variance fixed at zero.

pressure and academic instrumental support it was the fixed quadratic slope model. All retained models showed good model fit. Perceived school-supportive pressure increased steadily across the semester. Perceived school-obstructive pressure decreased during the first half of the semester, at which point it started to increase slightly. Academic instrumental support increased early on in the semester, started decreasing mid-semester, and continued to decrease from then on. There was significant variability across students in initial levels and in the linear slopes of both types of perceived academic pressure and for academic instrumental support. There were no significant covariations between the intercept and slope parameters in any of the LGMs.

Conditional LGMs. Table 15 shows the effects of time-invariant covariates in the trimmed conditional model for both types of perceived academic pressure from friends and for academic instrumental support from friends. Students with higher entrance grades reported lower initial levels of perceived school-supportive pressure. Women reported higher initial levels of perceived school-supportive pressure compared to men. Although initial levels of perceived school-obstructive pressure did not differ between men and women, men and women demonstrated different trajectories of change in school-obstructive pressure. While women showed the average decreases during the first part of the semester followed by a partial rebound, men showed slight increases in perceived school-obstructive pressure early on in the semester followed by slight decreases after that.

Ethnic minority students reported higher levels of perceived school-supportive pressure and lower levels of school-obstructive pressure from friends than Caucasian students. There were no significant effects of any of the time-invariant covariates on academic instrumental support from friends. Figure 6 depicts the final conditional trajectories of change for the two perceived academic pressure subscales and the academic instrumental support subscale.

Table 15

Time-Invariant Covariates of the Trajectories of Perceived Academic Pressure and Support from Friends

Models	Intercept		Linear Slope		Quadratic Slope		Model Fit Indices			
	Est.	***SE***	**Est.**	***SE***	**Est.**	***SE***	**χ^2(*df*, N)**	**CFI**	**RMSEA (90% CI)**	**SRMR**
Perceived School-Supportive Pressure from Friends[a]							171.68 (50, 535)*	.93	.06 (.06-.08)	.07
Fixed Effects	3.66*	.35	.04*	.02	n/a					
Previous GPA	-.32*	.09	-		n/a					
Gender	-.17*	.08	-		n/a					
Ethnic Background	.19*	.07	-		n/a					
Perceived School-Obstructive Pressure from Friends[a]							207.25 (51, 532)*	.90	.07 (.07-.09)	.07
Fixed Effects	2.53*	.05	-.15*	.06	.05*	.02				
Gender	-		.20*	.09	-.06*	.03				
Ethnic Background	-.15*	.07	-		-					
Academic Instrumental Support from Friends[a]							70.48 (17, 544)*	.97	.07 (.06-.10)	.07
Fixed Effects	3.21*	.04	.20*	.04	-.06*	.02				

Note. Unstandardized coefficients reported. [a] Model includes academic strain as a time-varying covariate. Future Or. = Future Orientation. * $p < .05$. Dashes indicate non-significant paths that were removed to simplify each model. n/a = not applicable.

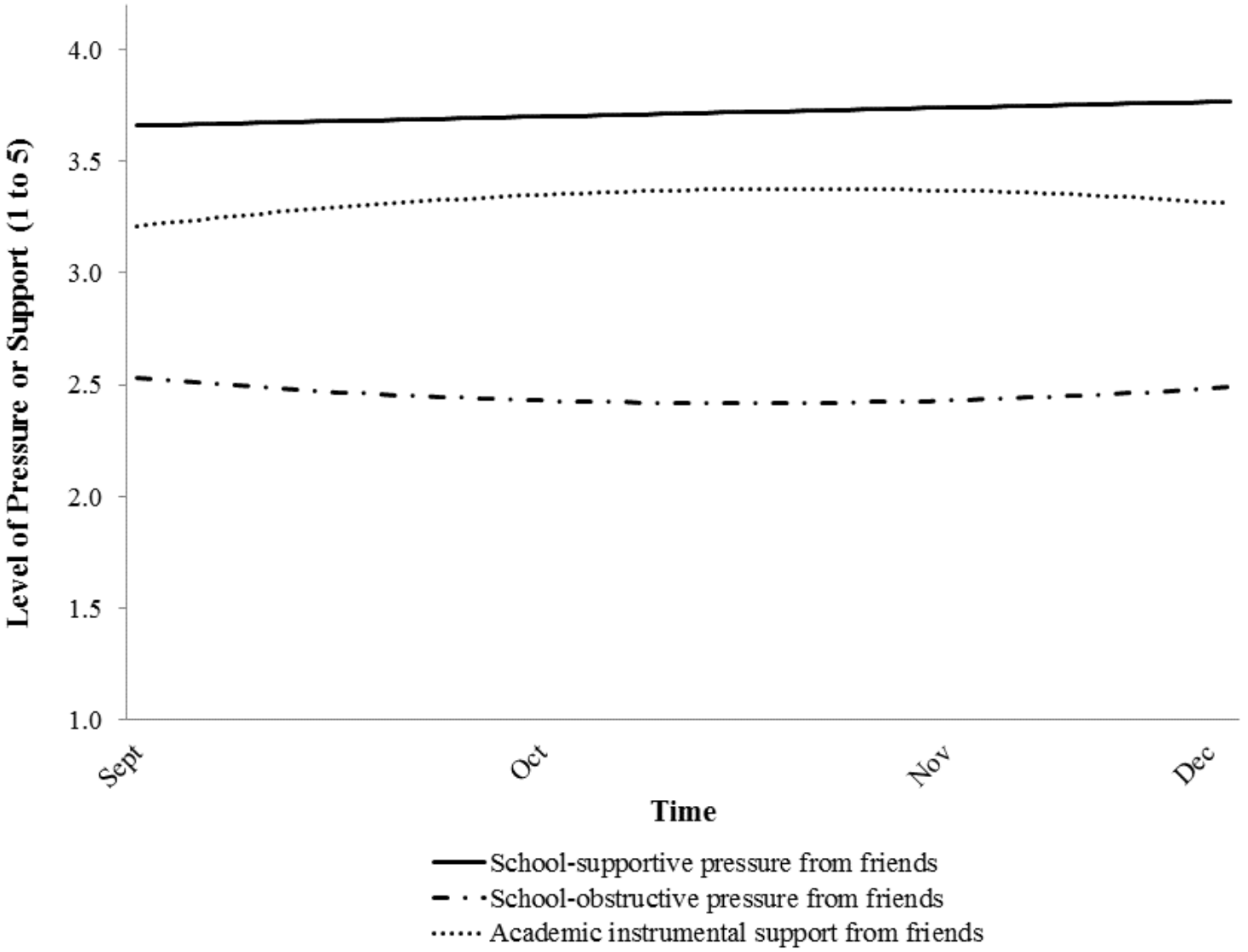

Figure 6. Final conditional trajectories of change for perceived academic pressure and support from friends subscales.

Last, academic strain covaried significantly with all three friendship variables only at Wave 1: students who reported higher levels of academic strain at the beginning of the semester also reported higher levels of perceived school-supportive pressure (B = .05, *SE* = .02, $p < .05$), perceived school-obstructive pressure (B = .06, *SE* = .02, $p < .05$), and academic instrumental support (B = .05, *SE* = .02, $p < .05$) from friends during this time. Academic strain and academic instrumental support also covaried significantly at Wave 2 (B = .04, *SE* = .01, $p < .05$).

Research Question 2: Parallel Process LGMs

The question of how initial levels and change over time in students' academic engagement are associated with initial levels and change over time in perceived academic pressure and support from friends was addressed using parallel process LGMs. The trimmed conditional growth models for each friendship variable and each academic engagement component were combined into parallel process models (12 models in total). In these models, the slope factors of each process were regressed onto the intercept factor of the other process. In addition, covariances were estimated between the intercept factors of both processes and between the slope factors of both processes (see Figure 2). These models also accounted for the covariance between intercept and growth factors within each process. Table 16 summarizes the model fit indices for the 12 resulting models.

School-supportive pressure and students' academic engagement. The four covariance parallel process LGMs combining school-supportive pressure from friends with each of the four components of academic engagement all showed good model fit (Table 16). Significant positive covariances arose between the intercepts of school-supportive pressure and cognitive engagement (B = .10, *SE* = .04, $p < .05$) as well as between the intercepts (B = .11, *SE* = .03, $p < .05$) and between the slopes (B = .01, *SE* = .00, $p < .05$) of school-supportive pressure and social

Table 16

Overall Model Fit for Parallel Process LGMs connecting Academic Engagement to Perceived Academic Pressure and Support from Friends

Models	**Models' Fit Indicators**			
	χ^2(*df, N*)	**CFI**	**RMSEA (90% CI)**	**SRMR**
Perceived School-Supportive Pressure from Friends				
Out-of-Class Behavioral Engagement	241.32 (87, 530)*	.95	.06 (.05 - .07)	.06
In-Class Behavioral Engagement	244.35 (98, 530)*	.95	.05 (.05 - .06)	.06
Cognitive Engagement	216.34 (97, 530)*	.95	.05 (.04 - .06)	.06
Social Behavioral Engagement	245.91 (97, 530)*	.95	.05 (.05 - .06)	.06
Perceived School-Obstructive Pressure from Friends				
Out-of-Class Behavioral Engagement	268.01 (86, 530)*	.93	.06 (.06 - .07)	.06
In-Class Behavioral Engagement	268.51 (97, 530)*	.93	.06 (.05 - .07)	.07
Cognitive Engagement	241.98 (86, 532)*	.93	.06 (.05 - .07)	.07
Social Behavioral Engagement	234.07 (81, 532)*	.94	.06 (.05 - .07)	.06
Academic Instrumental Support from Friends				
Out-of-Class Behavioral Engagement	236.02 (77, 533)*	.95	.06 (.05 - .07)	.06
In-Class Behavioral Engagement	265.57 (96, 530)*	.94	.06 (.05 - .07)	.07
Cognitive Engagement	135.74 (62, 539)*	.97	.05 (.04 - .06)	.05
Social Behavioral Engagement	272.62 (87, 532)*	.94	.06 (.06 - .07)	.07

Note. All models included control variables for the academic engagement components and the friendship variables. * $p < .05$.

behavioral engagement. This indicates that students who reported higher levels of school-supportive pressure from friends at the beginning of the semester also demonstrated higher levels of cognitive and social behavioral engagement at the beginning of the semester. In addition, students who experienced higher increases in school-supportive pressure from friends across the semester also experienced less steep losses in social behavioral engagement across the same time period. There were no significant regression paths in these models. Neither the intercept nor slopes for school-supportive pressure were significantly associated with the intercepts or slopes for out-of-class behavioral engagement and in-class behavioral engagement.

School-obstructive pressure and academic engagement. The four parallel process LGMs combining school-obstructive pressure from friends with each of the components of academic engagement showed adequate to good model fit (Table 16).

Significant covariances between latent factors across processes arose in three of the models. The intercept of school-obstructive pressure negatively covaried with the intercept of out-of-class behavioral engagement (B = -.05, *SE* = .02, $p < .05$), in-class behavioral engagement (B = -.09, *SE* = .02, $p < .05$), and cognitive engagement (B = -.09, *SE* = .03, $p < .05$). Students who reported higher levels of school-obstructive pressure from friends at the beginning of the semester showed lower levels of out-of-class and in class behavioral engagement as well as cognitive engagement at the beginning of the semester. There were no significant regression paths in these models. Neither the intercept nor slopes for school-obstructive pressure were significantly associated with the intercept or slopes for social behavioral engagement.

Academic instrumental support and academic engagement. The four covariance parallel process LGMs combining academic instrumental support from friends with each of the academic engagement components showed adequate to good model fit (Table 16). The intercept

of academic instrumental support positively covaried with the intercepts of out-of-class (B = .07, *SE* = .03, $p < .05$) and social (B = .13, *SE* = .03, $p < .05$) behavioral engagement. In addition, the linear slopes of academic instrumental support and social behavioral engagement covaried positively (B = .01, *SE* = .00, $p < .05$). Students who reported higher levels of academic instrumental support from friends at the beginning of the semester showed higher levels of out-of-class and social behavioral engagement at the beginning of the semester. In addition, students who experience more increases in academic instrumental support across the semester experienced less loss of social behavioral engagement across the same period. There were no significant regression paths in these models. Neither the intercept nor slopes for academic instrumental support were significantly associated with the intercepts or slopes for in-class or social behavioral engagement.

Research Question 3: Grades as an Outcome

Academic engagement and perceived academic pressure and support from friends together as a system, including their change over time, were assessed as predictors of students' academic performance. As an intermediate step prior to assessing academic engagement and friendship variables together, however, students' semester GPA (at the end of the Fall semester 2013) was added as a time-invariant outcome to the best fitting conditional LGM previously identified (see Tables 17 and 19) for each academic engagement component (in-class behavioral, out-of-class behavioral, cognitive, and social behavioral) and each type of perceived academic pressure and support from friends (school-supportive pressure, school-obstructive pressure, and academic instrumental support). In these models, current GPA was regressed onto the intercept and slope parameters and previous (high school) GPA, gender, ethnic background, and future orientation. Previous GPA positively predicted students' fall semester 2013 GPA in all models (B = .81 to

.90, *SE* = .07, $p < .05$) and future orientation positively predicted their GPA in the models for cognitive engagement, friends' school-supportive pressure, friends' school-obstructive pressure, and friends' academic instrumental support (B = .01, *SE* = .01, $p < .05$ in all cases). As such, previous GPA and future orientation were retained as controls for semester GPA.

Intermediate analysis. Table 17 shows the effects of the intercept and slope parameters in the trimmed conditional growth model on students' semester GPA for each component of academic engagement and each type of perceived academic pressure and support from friends. All models showed adequate to good model fit. For academic engagement, students who demonstrated higher initial levels of out-of-class behavioral engagement, in-class behavioral engagement, and social behavioral engagement earned higher grades at the end of the semester compared to students who showed lower initial levels of these components of academic engagement. Changes across the semester for these three components of academic engagement did not predict students' final GPA. Neither the intercept nor the slope parameters for cognitive engagement predicted students' final GPA. For perceived academic pressure and support from friends, only one subscale predicted students' final GPA: students who reported higher initial levels of school-supportive pressure earned lower grades at the end of the semester than those who reported lower initial levels of school-supportive pressure.

Parallel process LGMs with grades as outcome. Following the estimation of the intermediate models, the parallel process LGMs in which associations between academic engagement components and types of perceived academic pressure and support from friends arose as significant (seven models in total) were estimated with GPA as a time-invariant outcome of both processes (intercept and slope parameters). A general form of this model is presented in Figure 2. Model fits for these seven models are shown in Table 18.

Table 17

GPA as Outcome of the Trajectories of Academic Engagement and Perceived Academic Pressure and Support from Friends

Models	Intercept		Linear Slope		Quadratic Slope		Model Fit Indices			
	Est.	*SE*	Est.	*SE*	Est.	*SE*	χ^2(*df*, N)	CFI	RMSEA (90% CI)	SRMR
Out-of-Class Behavioral Engagement							156.61 (46, 533)*	.94	.07 (.06-.08)	.07
Fixed Effects	2.19*	.25	-.24*	.03	.04*	.01				
GPA	.30*	.05	.60	1.01	-.81	1.44				
In-Class Behavioral Engagement							38.66 (22, 530)*	.99	.04 (.02-.06)	.03
Fixed Effects	2.86*	.22	.02*	.01						
GPA	.22*	.09	.51	.41						
Cognitive Engagement							17.36 (13, 537)	1.00	.03 (.00-.05)	.03
Fixed Effects	2.51*	.17	-.26*	.05	.08*	.02				
GPA	.00	.04	.19	.21	-					
Social Behavioral Engagement							24.10 (23, 530)	1.00	.01 (.00-.04)	.02
Fixed Effects	2.24*	.15	-.45*	.04	.13*	.01				
GPA	.14*	.05	-.38	.44	-					
School-Supportive Pressure from Friends							142.64 (55, 530)*	.95	.06 (.04-.07)	.07
Fixed Effects	3.65*	.35	.04*	.02	n/a					
GPA	-.16*	.05	.10	.28	n/a					

(Table 17 con't on next page.)

Table 17 continued

Models	Intercept		Linear Slope		Quadratic Slope		Model Fit Indices			
	Est.	*SE*	Est.	*SE*	Est.	*SE*	χ^2(*df*, N)	CFI	RMSEA (90% CI)	SRMR
Perceived School-Obstructive Pressure from Friends							170.85 (53, 530)*	.93	.07 (.05-.08)	.07
Fixed Effects	2.52*	.05	-.15*	.06	.05*	.02				
GPA	-.05	.05	.28	.26	.57	1.18				
Academic Instrumental Support from Friends							95.28 (39, 537)*	.97	.05 (.04-.07)	.06
Fixed Effects	3.22*	.04	.20*	.04	-.06*	.02				
GPA	-.03	.04	.19	.31	-					

Note. Unstandardized coefficients reported. All models included control variables previously identified for intercepts and slope parameters as well as for first-semester GPA. * $p < .05$.

Table 18

Overall Model Fit for Parallel Process LGMs Predicting First-Semester GPA

Models	**Models' Fit Indicators**			
	χ^2(*df*, N)	**CFI**	**RMSEA (90% CI)**	**SRMR**
School-Supportive Pressure from Friends				
Cognitive Engagement	239.98 (109, 530)*	.95	.05 (.04 - .06)	.06
Social Behavioral Engagement	262.30 (107, 530)*	.95	.05 (.04 - .06)	.06
School-Obstructive Pressure from Friends				
Out-of-Class Behavioral Engagement	284.88 (97, 530)*	.93	.06 (.05 - .07)	.06
In-Class Behavioral Engagement	280.82 (107, 530)*	.97	.06 (.05 - .06)	.06
Cognitive Engagement	262.06 (108, 530)*	.94	.05 (.04 - .06)	.06
Academic Instrumental Support from Friends				
Out-of-Class Behavioral Engagement	252.62 (87, 533)*	.95	.06 (.05 - .07)	.06
Social Behavioral Engagement	298.20 (110, 530)*	.94	.06 (.05 - .07)	.06

Note. All models included control variables for the academic engagement component, the friendship variable, and students' first-semester GPA. * $p < .05$.

School-supportive pressure and academic engagement. Two components of academic engagement showed significant associations with school-supportive pressure from friends in the parallel process LGM analysis: cognitive engagement and social behavioral engagement. These parallel process models showed adequate model fit when GPA was added as an outcome of the two processes in each model. For school-supportive pressure and cognitive engagement, the results from the individual LGMs were replicated. Initial levels of school-supportive pressure negatively predicted students' semester GPA (B = -.14, *SE* = .04, $p < .05$). Cognitive engagement did not predict GPA. For school-supportive pressure and social behavioral engagement, the results from the individual LGMs were also replicated. Students' semester GPA was predicted by initial levels of both school-supportive pressure from friends (B = -.16, *SE* = .04, $p < .05$) and social behavioral engagement (B = .14, *SE* = .04, $p < .05$).

School-obstructive pressure and academic engagement. Three components of academic engagement showed significant associations with school-obstructive pressure in the parallel process LGMs: out-of-class and in-class behavioral engagement as well as cognitive engagement. These models showed adequate model fit when GPA was added as an outcome of the two processes in each model. For school-obstructive pressure and out-of-class behavioral engagement, the results from the individual LGMs were replicated. Initial levels of students' out-of-class behavioral engagement positively predicted students' semester GPA (B = .32, *SE* = .09, $p < .05$). School-obstructive pressure did not predict GPA.

For school-obstructive pressure and in-class behavioral engagement, the results from the individual LGMs were also replicated. Students' semester GPA was predicted by initial levels of in-class behavioral engagement (B = .24, *SE* = .07, $p < .05$). One additional path arose as significant: the slope of in-class behavioral engagement positively predicted semester GPA (B =

.48, *SE* = .24, $p < .05$) such that students who experienced less loss in engagement across the semester received higher a GPA at the end of the semester. None of the latent components of the parallel process model pairing school-obstructive pressure from friends and cognitive engagement predicted students' semester GPA.

Academic instrumental support and academic engagement. Two components of academic engagement showed significant associations with academic instrumental support from friends in the parallel process LGMs: out-of-class and social behavioral engagements. These parallel process models showed adequate model fit when GPA was added as an outcome of the two processes in each model. For academic instrumental support and out-of-class behavioral engagement, the results from the individual LGMs were replicated. Initial levels of out-of-class behavioral engagement positively predicted students' semester GPA (B =.35, *SE* = .10, $p < .05$). Academic instrumental support did not predict GPA. For academic instrumental support and social behavioral engagement, the results from the individual LGMs were also replicated. Students' semester GPA was predicted by initial levels of social behavioral engagement (B = .15, *SE* = .06, $p < .05$) and academic instrumental support did not predict GPA.

Collectively, the analysis predicting students' semester GPA shows that initial levels of academic behavioral engagement (out-of-class, in-class, and social) consistently predicted students' semester GPA. Students who started the semester more highly engaged received better grades at the end of the semester compared to students who started the semester less behaviorally engaged. There was also some evidence that students who experienced less loss in engagement (in-class behavioral) across the semester received better grades at the end of the semester compared to students who experienced steeper losses in engagement. Of the three perceived academic pressure and support from friends variables, only school-supportive pressure predicted

semester GPA. Students who reported higher school-supportive pressure from friends at the beginning of the semester received lower grades at the end of the semester compared to students who reported lower perceived school-supportive pressure at the beginning of the semester. Figure 6 presents the general pattern of results regarding the associations between perceived academic pressure and academic instrumental support from friends, students' academic engagement components, and students' semester GPA. Table 19 summarizes the results of the main analysis by research question.

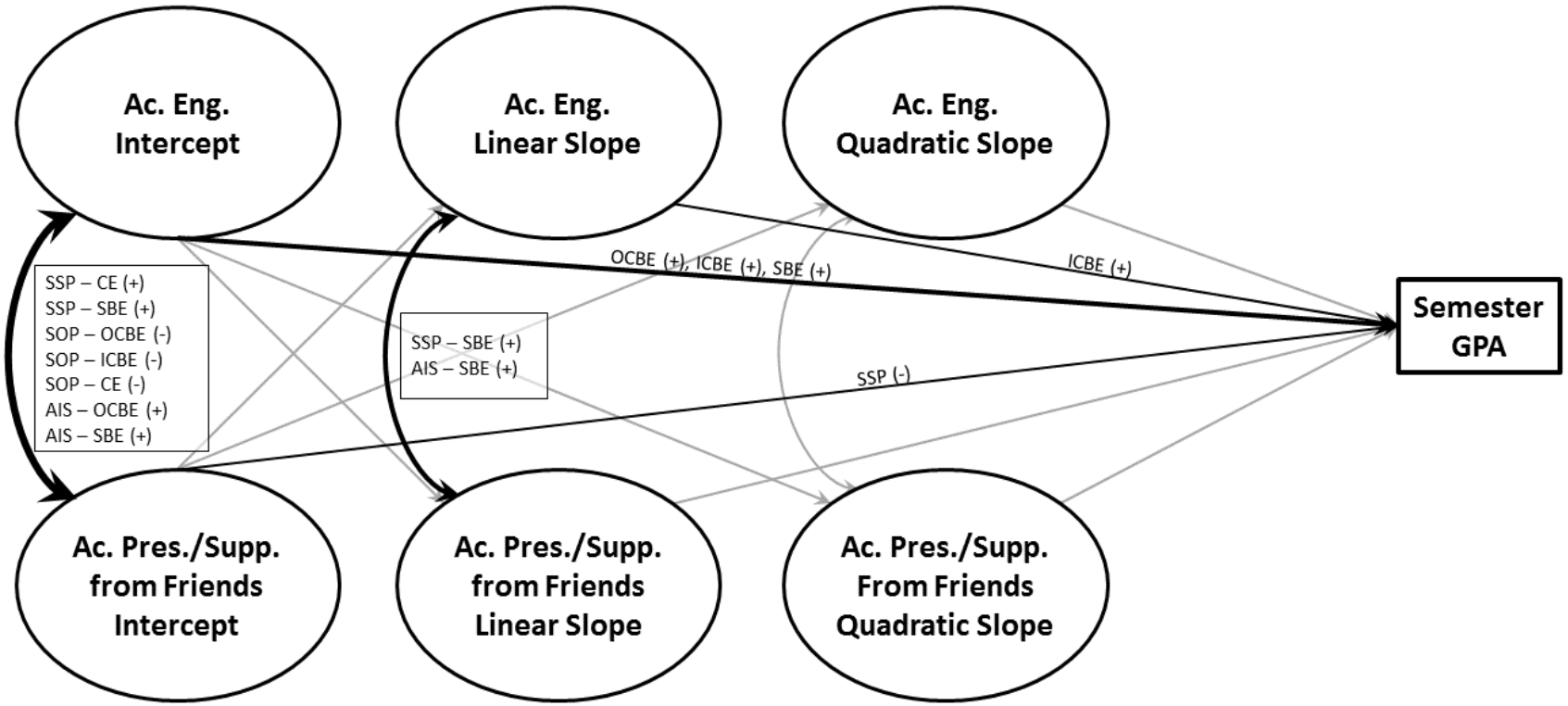

Figure 7. Parallel process model summarizing the results from analyses on the associations among perceived academic pressure and support from friends, students' academic engagement, and students' semester GPA.

Note. Ac. Eng. = Academic Engagement. Ac. Pres./Supp. = Academic Pressure and Support. OCBE = Out-of-class Behavioral Engagement. ICBE = In-class Behavioral Engagement. SBE = Social Behavioral Engagement. CE = Cognitive Engagement. SSP = School-supportive pressure. SOP = School-obstructive pressure. AIS = Academic Instrumental Support. Greyed lines represent non-significant associations. Black lines represent significant associations. Thicker lines represent associations that arose as significant more frequently across all analyses.

Table 19

Summary of Main Results by Research Question

Type of Modelling	Variables Modelled	Number of Models tested	Overall results	Significant paths across processes
Research Question 1: Changes in academic engagement and perceived academic pressure and support from friends across university students' first semester at university?				
LGMs	All academic engagement variables modelled separately (OCBE, ICBE, CE, & SBE)	32 (6 nested unconditional models & 2 conditional models [full and trimmed] per variable)	OCBE, CE, & SBE: Quadratic change over time model as best fitting model (U-shaped) ICBE: Linear change over time model as best fitting model (negative slope)	-
LGMs	All friendship variables (SSP, SOP, & AIS) modelled separately	27 (7 nested unconditional models & 2 conditional models [full and trimmed] per variable)	SSP: Linear change over time as best fitting model (positive slope) SOP & AIS: Quadratic change over time model as best fitting model (U-shaped and reversed U-shape respectively)	-
Research Question 2: Associations across time between academic engagement and perceived academic pressure and support from friends?				
Parallel Process LGMs	All academic engagement variables and friendship variables	12 (one for each combination of an academic engagement variable with a friendship variable)	Seven models had significant associations across processes:	
			SSP & CE	i ↔ i (+)
			SSP & SBE	i ↔ i (+), s ↔ s (+)
			SOP & OCBE	i ↔ i (−)
			SOP & ICBE	i ↔ i (−)
			SOP & CE	i ↔ i (−)
			AIS & OCBE	i ↔ i (+)
			AIS & SBE	i ↔ i (+), s ↔ s (+)

(Table 19 con't on next page.)

Table 19 continued

Type of Modelling	Variables Modelled	Number of Models tested	Overall results	Significant paths across processes
Research Question 3: First-semester GPA as outcome of initial levels and change over time in students' academic engagement and perceived academic pressure and support from friends?				
LGMs	All academic engagement variables and friendship variables modelled separately with grades as outcome	14 (two per variable, one with grades regresses into all control variables, and one with control variables for grades trimmed)	LGMs for three academic engagement variables and one friendship variable significantly predicted grades:	
			OCBE	
			ICBE	$i \rightarrow$ GPA (+)
			SBE	$i \rightarrow$ GPA (+)
			SSP	$i \rightarrow$ GPA (+)
				$i \rightarrow$ GPA (−)
Parallel Process LGMs	All academic engagement variables, friendship variables, and grade as outcome of both processes.	7 (parallel process LGMs previously identified as having significant associations across processes)	Results from LGMs with grades as outcome replicated and one other regression path arose as significant:	
			SSP & CE	$i_{S.S.P.} \rightarrow$ GPA (−)
			SSP & SBE	$i_{S.S.P.} \rightarrow$ GPA (−), $i_{Soc.\ Beh.\ Eng.} \rightarrow$ GPA (+)
			SOP & OCBE	$i_{O.C.\ Beh.\ Eng.} \rightarrow$ GPA (+)
			SOP & ICBE	$i_{I.C.\ Beh.\ Eng.} \rightarrow$ GPA (+), $s_{I.C.\ Beh.\ Eng.} \rightarrow$ GPA (+)
			SOP & CE	none
			AIS & OCBE	$i_{O.C.\ Beh.\ Eng.} \rightarrow$ GPA (+)
			AIS & SBE	$i_{Soc.\ Beh.\ Eng.} \rightarrow$ GPA (+)

Note. OCBE = Out-of-class Behavioral Engagement. ICBE = In-class Behavioral Engagement. SBE = Social Behavioral Engagement. CE = Cognitive Engagement. SSP = School-supportive pressure. SOP = School-obstructive pressure. AIS = Academic Instrumental Support. i = Intercept. s = linear slope. (+) = positive association or regression. (−) = negative association or regression. Dashes indicate not applicable.

CHAPTER IV

Discussion

One in six Canadian PSE students fails to complete their university studies, with the risk of dropping out being highest early in their studies (Shaienks et al., 2008). Given the accumulating evidence that citizens who attain a PSE degree are more actively engaged in society, earn higher incomes, and contribute more to productivity and national economic performance than those who do not earn a PSE degree (Gidengil et al., 2003; Hall et al., 2001; Perna, 2003), curtailing PSE dropout rates is of value not only to PSE institutions, but society at large as well. Identifying key factors and processes involved in academic performance in PSE is a first step toward this goal. Governmental resources within Canada have focused heavily on identifying and removing obstacles to PSE completion that are related to financial difficulties (Carmichael & Finnie, 2008; Day, 2008; Mueller, 2008). Research on PSE drop-out and persistence has concentrated on institution-level and classroom-level characteristics (e.g., teaching practices, student diversity, access to academic support services) as well as students' demographic characteristics and pre-PSE experiences (e.g., socioeconomic status, whether first generation of PSE attendance, high school grades; Westrick, Le, Robbins, Radunzel, & Schmidt, 2015). There has been less emphasis on addressing and understanding student-driven interactions and experiences with their academics and the role of these in PSE academic performance. Yet, recent research indicates that up to 45% of dropout in early PSE may be attributed to students' poor first semester performance, even when this performance is not low enough to place students at risk of failing out of school (Stinebrickner & Stinebrickner, 2012, 2014).

Using Skinner's self-systems motivational model and following a life-span developmental perspective, the present study investigated how academic engagement as well as perceived

academic pressure and support from friends contributed to first year university students' academic performance measured by GPA. Overall, results attested to university students experiencing changes across the semester in their academic engagement and perceived academic pressure and support from friends, to associations between these two sets of experiences at the beginning of the semester, and to academic engagement early in the semester in particular possibly impacting students' academic performance. The remainder of this discussion places key findings in the larger context of relevant prior empirical work as well as relevant theory, addresses the implications of these findings for our understanding of the processes that contribute to academic performance in the early stages of PSE as well as for the direction of future research, and acknowledges the limitations and strengths of the evidence.

Key Findings

Losses and rebounds in engagement across the first PSE semester. The first research question asked how university students' academic engagement changed throughout their first semester in PSE. Although no other study has documented academic engagement trajectories across any period of PSE, longitudinal studies focusing on elementary and secondary school, both across semesters and grade levels, most often identify linear trajectories of change with continuous loss of engagement across time (Fredrick et al., 2004; Maulana et al., 2012; Peetsma & van der Veen, 2011). In this study, LGM analysis showed that one academic engagement component, in-class behavioral engagement, followed the predicted pattern of linear decrease across the semester, while out-of-class behavioral engagement, social behavioral engagement, and cognitive engagement did not. For the latter three, quadratic trends showed that students, on average, lost engagement during the first half of the semester but either regained most of it during the second half of the semester (cognitive and social behavioral engagement) or slowed

down in their rate of loss during the second half and started to show some gains near the end of the semester (out-of-class behavioral engagement).

There are methodological, developmental, and contextual factors that can be considered to understand the discrepancy between previous findings of linear loss of engagement and those in this study of non-linear patterns of change in engagement. Time interval under investigation is one such methodological difference between the present study and the bulk of previous studies on academic engagement. According to Skinner and colleagues (2009), given that students' academic engagement is highly dependent on contextual factors such as the academic work they are to engage with and their relationships with teachers and other relevant social partners, a clear picture of change in students' engagement requires repeated measures across short time intervals. Yet, most longitudinal studies of academic engagement have focused on changes in engagement across academic terms (semesters or years) instead of changes across time within an academic term, as was done for the present study. As such, although studies of academic engagement across terms and years provide a general picture of students' academic engagement across time, nuances regarding the form of the trajectories of change may be lost in these studies.

Perhaps the rebounds in engagement following initial losses at the beginning of the semester detected in the current study existed in others but were not caught by the measurement intervals. This limitation of previous studies is also compounded by the fact that many of the longitudinal studies based their analysis on three waves of data, preventing exploration of non-linear trajectories of change. As an exception, Maulana and colleagues (2012), who assessed Dutch and Indonesian high school students' engagement monthly across a 10-month period, found that students' loss of engagement occurred faster earlier on in the academic period and stabilized toward the end. This quadratic form of change in academic engagement is similar to

the findings of the present study, particularly for out-of-class behavioral engagement. More frequent assessments may be therefore a more appropriate methodology for identifying change over time in students' academic engagement. Although the present study represents a step forward, more intense short-term longitudinal studies such as burst studies (Nesselroade, 1991) are needed to further investigate academic engagement across time.

Another possibility is that academic engagement during PSE changes over time following a different pattern compared to engagement trajectories across elementary and secondary schooling. Perhaps loss of engagement across elementary and secondary schooling occurs more linearly while in PSE there is more ebbing and flowing in engagement. These differences may reflect the fact that PSE students have entered a new phase of development – changes in academic engagement may be different during late adolescence than during childhood and early adolescence. The differences could also be due to dissimilarities in the academic context of PSE compared to elementary and secondary schooling. It is also possible that developmental stage and academic context together account for the differences in trajectory of change in academic engagement across levels of education.

Indeed, Wang and Eccles (2012) propose that students' loss of engagement in high school may be due to the school environment not meeting socio-emotional needs that are developmentally salient during adolescence. For example, there is evidence that the traditional curricula taught in North American middle and secondary schools does not appropriately incorporate health and social issues that become central to students as they deal with the identity exploration associated with adolescence (Juvonen et al., 2004). For adolescents then, much academic work lacks personal meaning and does not meet adolescents' emotional needs, potentially leading to declines in motivation (Jackson & Davis, 2000). Following Stage-

Environment Fit Theory (Eccles & Roeser, 2009), this lack of fit between the student and the academic context may lead to declines in general interest and participation in academics. Similar arguments have been made to explain the general steep declines in motivation students experience in the area of academics starting in adolescence: boredom within the classroom and disillusionment with the focus on grades (versus learning or skill) are proposed as likely causes (Burkett, 2002; Pope, 2002).

Demetriou and Powell (2014) argue that it is possible that this stage-environment mismatch is also present in PSE, resulting in less optimal developmental outcomes, including students continuing to disengage from their academics even as they pursue them. For instance, a developmentally salient task for traditional-age college students is achievement of a sense of competence. PSE students require opportunities to participate in skill training and reinforcement for physical, psychological, cultural, and social skills as much as academic skills, yet by and large there is a lack of resources within the PSE environment for this type of skill building. This disconnect between PSE students' developmental needs and the PSE environment may discourage students and lead to loss of engagement.

However, results in the present study do not support this proposition. Although students experience loss of engagement in the first part of their first semester, they regain much of their engagement in the latter part of the semester. Stage-environment mismatch as proposed by Wang and Eccles (2012) would lead to continuous loss of engagement, without rebounds, as long as the environment fails to provide developmentally-appropriate support. It is unlikely that the PSE environment changes dramatically from the first to the second half of university students' first semester – from so ill-fitting as to drive students to lose engagement, to developmentally supportive enough to encourage gains in engagement. In addition, although most first year

students in the study followed the pattern of engagement loss during the first half of the semester, across the four types of engagement, up to seven percent did not. They either remained stably engaged or gained some engagement across the entire semester.

Given that stage-environment mismatch is an unlikely explanation for students' loss-followed-by-gains pattern of change in engagement during their first semester at PSE, other factors must be considered. Changes in PSE students' contexts across the semester may play a role in the pattern of change for their academic engagement. For instance, in terms of academic work, it is possible that the amount and type of work that students face at different points during the semester allow for or require different levels of engagement. Having more academic demands and feeling higher levels of time pressure for tackling school work have been linked to less behavioral engagement in first-year college students (getting school work done; Alarcon, Edwards, & Menke, 2011). Additionally, motivational research has consistently found that certain academic activities lead to more emotional and behavioral engagement compared to other activities. For instance, a study looking at the link between academic engagement and classroom time usage during high school found that students in classes where more time was spent in application of learned material (students' work time) and revision of material were more behaviorally and emotionally engaged compared to students in classes where more time was spent introducing new content (Maulana et al., 2012).

In terms of PSE, it is possible that students start the semester in general with low academic demands (no accumulated homework or time consuming assignments yet) and with a focus on revising previously learnt material (as instructors try to establish a common knowledge foundation before embarking on new material), both of which are linked to higher engagement. Quickly, the focus in traditional PSE courses switches to covering mostly newly assigned

material (Becker, 1997) and academic demands increase as students juggle tests and assignments from multiple courses, leading to decreases in engagement.

As the semester progresses, students may develop a rhythm to dealing with their academic work and start to feel less pressed academically. In addition, as midterms loom, students may focus more on reviewing material and application work outside the classroom as they prepare for examinations and work on completing major, summative term assignments. Together, this may explain the uptake in social behavioral engagement (asking questions, working with other students), and cognitive engagement (applying material to novel situations) that this study found starting mid-semester and continuing to the end of the term. It is important to note that, against expectations, academic strain, which was the time-varying control meant to represent how much academic work and related stress students were experiencing, was not consistently associated with students' concurrent academic engagement – irrespective of type of academic engagement. Although this suggests that, for the most part, how engaged students felt at a given point of the semester was not linked to how stressed they felt about the amount of academic work they had at that time, it is possible that other types of academically-related stresses not measured by this scale (e.g., stress about balancing academic and non-academic life) were present and associated with students' levels of academic engagement.

Beyond the general academic context of PSE, it is important to consider the context and experiences specific to students' first semester at PSE. For most first year students, the transition into PSE co-occurs with the beginning of their transition to adulthood. As such, during this period most PSE students experience changes and instability across a wide range of life domains, including their social circles, home life, and academic context (Bukowski, Buhrmester, & Underwood, 2011; Masten et al., 2004). From a developmental perspective, these contextual

changes and instabilities are expected to provide individuals with opportunities and challenges leading to behavioral and psychological changes (Baltes, 1987). Students' work orientation and intimacy, for instance, seem to change across their years at university, with more intense change taking place the first two years at PSE compared to the next two (Vargas Lascano, Galambos & Hoglund, 2014). It is likely that the pattern of change in academic engagement identified in this study is linked not only to changes in students' academic context but also to changes within the person (i.e., developmental tasks and competencies that need to be accomplished).

First year students starting their first semester highly engaged with their academics makes sense as the purpose of their presence in PSE is primarily academics and they are aware of this. As the semester progresses and students feel more settled into their new academic context, they may re-distribute their efforts to focus more on other parts of their transition such as new friendships and new romantic relationships. As the semester comes to an end, completion of major work and preparation for final examinations are likely to take center stage, requiring students to increase their engagement with their academics once more. Further longitudinal studies of PSE students' academic engagement are necessary, not only to assess the replicability of the trajectories identified in the present study, but also to investigate whether this ebb and flow of engagement across the semester is present during later semesters or whether this pattern is more unique to the first few months of the transition to PSE.

Gains and losses in perceived academic pressure and support from friends. The first research question also asked how university students' perceived academic pressure and support from friends changed across their first semester. Given the fluctuating nature of individuals' social context during the transition to adulthood (Masten et al., 2004), students' school-supportive pressure, school-obstructive pressure, and academic instrumental support from friends

during PSE were predicted to change across time, though no specific pattern of change was anticipated. As predicted, on average, students experienced changes in all three of these variables. Specifically, LGM results showed that students sensed increasing school-supportive pressure across the entire semester and increasing instrumental support early on in the semester followed by a decrease from then onwards. Still, by the end of the semester, students' instrumental support from friends was higher compared to the start of the semester. For school-obstructive pressure, students sensed a decrease from their friends early on in the semester, followed by some increase from the middle of the semester onwards. This rebound, however, was only partial, with final levels of school-obstructive pressure still lower than those at the beginning of the semester.

Although there appears to be no research examining change in perceived academic pressure and support from friends in PSE, a little research has examined linear changes in peer influences in the area of school and academics across late adolescence. According to this research, conformity to friends (Clasen & Brown, 1985) as well as behaviorally measured influence from friends (Hallinan & Williams, 1990), generally increase across late adolescence. Present findings support this linear change for school-supportive pressure but show a more complex pattern when other types of perceived peer behaviors are examined. Changes such as these may be particularly expected during periods of transition such as the transition into PSE. At the beginning of PSE, as new academic challenges appear and new friendships are developed within the PSE setting, first year students may feel more supported and pressed by friends to be academically focused. Thus, it makes sense that, as students and their friends focus on their academics during this period, students may receive or feel they receive less pressure from friends to socialize over doing school work.

As the semester progresses and students adjust to their new academic context, they and their friends may shift more of their focus toward their social context, leading to increases in how much school-obstructive pressure they receive or feel they receive from one another. At the same time, later in the semester major academic work likely becomes due and final examinations near. Perhaps friends, whose own academic work is also impending while trying to be socially active, no longer have the resources to try and help alleviate stress with instrumental supporting for academic work (academic instrumental support). For instance, as students face imminent deadlines they may study more on their own rather than finding the time to coordinate study sessions with friends. However, school-supportive pressure can still be on the rise because it requires fewer resources from friends. For instance, after handing in a major assignment or writing an examination friends may still encourage each other in passing.

Whether the observed changes represent perceptual changes, changes in friends' behaviors, or changes in students' support-seeking behaviors with friends, it is interesting to note that school-obstructive pressure, which was conceptualized originally in this study as a negative peer influence, showed the lowest levels of the three types of pressure and support from friends examined in this study, followed by school-supportive pressure, which was conceptualized as a positive peer influence. Academic instrumental support showed the highest average levels of these three variables across the entire semester. These level differences among school-obstructive pressure, school-supportive pressure, and academic instrumental support together with their trajectories of change point to the possibility of differences in their associations with students' academic engagement and academic performance, which I turn to next.

Academic engagement and perceived academic pressure and support linked at the beginning of first semester. The second research question asked how students' academic

engagement was associated with perceived academic pressure and support from friends initially and over time, with engagement expected to covary positively with school-supportive pressure and academic instrumental support from friends and negatively with school-obstructive pressure from friends. Results from parallel process LGMs partially followed these expectations. Initial levels of (intercepts for) academic engagement were linked to initial levels of perceived academic pressures and support from friends in expected directions in seven of the 12 models. Against expectations, initial levels of academic engagement did not predict change in any of the three perceived academic pressure and support from friends variables, nor did initial levels of these latter variables predict change over time in any of the components of academic engagement. Finally, and also against expectations, change over time in academic engagement was, by and large, not related to change over time in perceived academic pressure and support from friends (only two slope-slope covariations).

At the beginning of the semester, students who perceived friends as applying more school-supportive pressure and less school-obstructive pressure, as well as providing more academic instrumental support reported higher levels cognitive and social behavioral engagement; out-of-class and in-class behavioral engagement as well as cognitive engagement, and out-of-class and social behavioral engagement respectively (seven significant associations in total). Given that the significant associations were evident in the first few weeks of university, and that neither academic engagement nor perceived academic pressure and support from friends predicted over-time change in the other, it is doubtful that selection (of friends based on academic engagement) or socialization (of engagement based on friendships) during PSE explain how the engagement and friends variables came to be connected in the first few weeks of university. If selection or socialization are involved in the associations of academic engagement with perceived academic

pressure and support from friends then these processes are occurring during PSE students' earlier schooling. Thus, the associations at the beginning of students' PSE may represent a system already in motion, necessitating examination of students' academic engagement and friendships pre-PSE to draw conclusions regarding directional associations between these constructs.

There is another possible reason for the links between academic engagement and perceived academic pressure and support from friends at the beginning of the first PSE semester. The observed associations are perhaps driven by separate associations of students' academic engagement and their perceived academic pressure and support from friends with another variable or set of variables (i.e., "third" variable). This raises the question of what this third variable might be – particularly given that the present study controlled for previous academic performance, gender, ethnic background, future orientation, and academic strain. According to the self-systems motivational model, the *self* component, which involves the attitudes, values, and beliefs about oneself and one's activities, connects aspects of students' social context (e.g., relationships with friends) to students' academic engagement (Skinner et al., 2009). Self-systems then may be the "third" variable at play. For instance, according to Weiner's (1985) attributional theory, students' causal beliefs – which are perceptions about the roots of one's successes and failures and therefore part of the *self* in the self-systems motivational model, alter students' achievement related action such as academic engagement and affect their performance outcome.

Indeed, students performing poorly in college who see themselves as having low academic abilities increase their engagement and improve their performance if their causal beliefs are shifted toward seeing their past failures as due to a lack of effort (Perry, Hechter, Menec, & Weinberg, 1993; Pintrich & Schunk, 2002). Students' causal beliefs may also alter how much influence students feel their friends have over them, thus at least partially determining students'

perceived academic pressure and support from friends. Students who perceive their actions and outcomes as caused by environmental forces rather than originating from themselves or internal causes may be more likely to read the behaviors of their friends as aimed at changing their own behaviors. These students, when faced with lower academic performance than expected (which is a common occurrence when students start their PSE; Finnie & Martinello, 2010), may see their performance as produced by external forces and out of their own control and therefore see less worth in engaging academically, leading to lower academic engagement.

The importance of the *self* component for both students' academic engagement and social context may be particularly high during students' first semester of PSE. According to Skinner and Pitzer (2012), the *self* component of the motivational system involves durable appraisals of different aspects of the self and of schooling, making them perhaps more stable during periods of transition when compared to changing contexts. The transition to adulthood and the transition to PSE are particularly marked by widespread instability in students' lives as their social, academic, and potentially even living contexts change. The novelty and reduced predictability of these contexts may lead students to rely more heavily on their perceptions about who they are to guide their actions, including academic engagement and the selection of friends, than they would during periods of stability in the relevant contexts.

The incongruence between the present findings and those of research on younger students' academic engagement and peer relations, which supports the argument that peer relations matter for academic engagement, also requires attention. One possibility is that friends are not the most influential peers when it comes to PSE students' academic engagement. Students likely spend more school time with classmates and study partners, which can also be friends, than non-classmate friends. Given that classmates have first-hand information of the course work students

face, at least for shared courses, they are likely also in a better position to influence how students engage with that school work. Supporting this possibility, there is some evidence that university students' academic performance is positively associated with the academic performance of classmates and study partners who are also their friends while not associated with the academic performance of non-classmate friends or non-friend classmates (Polding, Valeeva, & Yudkevich, 2016).

It is also possible that the associations between students' academic engagement and social context weaken across students' academic life. That is, although students' academic engagement and friendship contexts may have influenced one another during their elementary and secondary education, these two experiences may not be as meaningfully associated to one another by the time students start PSE. Indeed, Fredrick and colleagues (2004) raise the question of whether, as students develop and gain better understanding about themselves and their academic environment, their academic engagement becomes more stable and context independent. That is, perhaps by the time students start their PSE, they have developed a personal sense of how engaged they want to or need to be with their academics and, therefore, will employ certain levels of engagement with their academics regardless of their school-related experiences with friends.

The two significant longitudinal associations in the current study (i.e., at times in the semester when students were more socially behaviorally engaged in their academic work, they also reported higher school support and academic instrumental support from friends) must be interpreted with caution given the number of longitudinal associations tested. As with the covariances among initial levels of engagement and perceived academic pressure and support from friends, it is possible that a third variable explains the covariances between changes in

academic engagement and changes in perceived academic pressure and support from friends, namely, variables within the *self* component of self-systems motivational model. For instance, it is possible that highly sociable students (i.e., high in extraversion) maintain their social behavioral engagement more across the semester and continue to select more school-supportive friends across the semester or elicit more support from friends as schoolwork accumulates across the semester, thus leading to the increases in social behavioral engagement, perceived school-supportive pressure and academic instrumental support from friends. By incorporating relevant aspects of students' *self* in these investigations, future research can inform us about the relative importance of these person-level constructs versus contextual factors during periods of transition such as students' first semester at PSE (Pascarella & Terenzini, 2005).

Behavioral engagement at the start of university matters for academic performance. Parallel process LGMs addressed the third research question, namely, how initial levels and changes across the semester in academic engagement and perceived academic pressure and support from friends affected students' first-semester GPA. According to the self-systems motivational model, social context (i.e., perceived academic pressure and support from friends) and action (i.e., academic engagement) are two components of the motivational process that, together, bring about outcomes such as academic performance (Skinner et al., 2009). Modeling perceived academic pressure and friendship support processes together with academic engagement processes as predictors of GPA allowed examination of students' social context and actions jointly as a system of influence for students' academic performance.

Predictions were partially met. It was expected that higher scores on all four components of students' academic engagement at the start of university would predict higher first-semester GPA. With the exception of cognitive engagement, this hypothesis was supported. It was also

expected that higher school-supportive pressure and academic instrumental support from friends at the beginning of the semester would predict students' higher first-semester GPA, while higher school-obstructive pressure from friends at the start of university would predict lower GPA. Only school-supportive pressure from friends predicted students' first-semester GPA, and the direction of this association was counter to the hypothesis. Higher levels of school-supportive pressure from friends at the beginning of the semester predicted lower semester-end GPA.

Change over time in students' academic engagement, perceived academic pressure, and academic instrumental support from friends were expected to predict GPA such that higher GPA would be predicted by gains in all four types of engagement, in school-supportive pressure from friends, and in academic instrumental support from friends, and losses in school-obstructive pressure from friends. Against expectations, changes in students' academic engagement across the semester did not predict their first-semester GPA, regardless of engagement component. Similarly against expectations, changes in students' perceived academic pressure and academic instrumental support from friends did not predict semester GPA.

On the whole, these findings suggest that, when considering PSE students' academic engagement as well as academic pressure and support from friends, students' academic engagement at the start of university matters more for their academic performance in their first semester than do perceived pressure and support friends or fluctuations in their academic engagement across the semester. Given that the new educational context is unlikely to meaningfully shape students' academic engagement within the first weeks of university start, their engagement at the start of university likely represents the academic habits they developed during their elementary and secondary education. For instance, most students who throughout their elementary and secondary schooling developed the habit of keeping up with their assigned

readings and homework consistently would likely continue to do so as they start PSE while most students who develop a habit of delaying completion of schoolwork and binge studying would likely continue to do so as they start PSE.

It is worthwhile noting that most engagement trajectories did not predict students' GPA. Although there is evidence that students experience change in their academic engagement across their first semester, on average, results indicated mild, though significant, changes in all four components of academic engagement – in-class behavioral, out-of-class behavioral, social behavioral, and cognitive engagement. Given that initial levels of engagement likely reflect 12 years of previous academic engagement experiences, the impact of slight changes in engagement across the semester on students' academic performance would be small compared to the impact of how engaged students are as they start university. After all, highly academically engaged students would continue to be highly engaged after a slight loss of engagement and students who start with low engagement would continue to have low engagement levels even after a slight increase across the semester. Future research may benefit from a person-centered approach such as growth mixture modeling, cluster analysis, or latent profile analysis that seeks to identify groups of students who share a particular engagement profile.

Although average trajectories showed a slight change in engagement across PSE students' first semester at university, there was significant variability among students' trajectories of change for all four components of engagement. That is, some students lost more engagement than others across the first part of the semester and regained more engagement during later times. It is possible that certain sub-populations of first year PSE students have different trajectories of change in their academic engagement across their first semester. Although beyond the analyses of the current study, it is possible, for instance, that first generation PSE students and students

with disabilities experience meaningfully different transitions to PSE compared to "traditional" PSE students (i.e., "able-bodied" off-spring of parents with post-secondary education), encountering higher levels of academic and social stress, and more instrumental barriers (e.g., less knowledge about administrative procedures in PSE and about available support services; Saenz et al., 2007; Wehmeyer, 1996). Students from these groups may experience more marked changes in their academic engagement across their first semester at PSE, which may be more impactful for their academic performance compared to the more general first year PSE student population. Future research may want to purposefully sample specific groups of first-year students and examine trends in their engagement.

Cognitive engagement is the only aspect of academic engagement that did not predict PSE students' first-semester GPA either in terms of initial levels or change over time. One possible implication of this is that, at least during the transition to PSE, students' academic behaviors such as keeping up with their readings and taking good notes during class, which are part of behavioral engagement, are more central to academic performance than whether or not students connect their newly acquired knowledge to past knowledge or to their personal experiences, which would be part of cognitive engagement. After all, as commendable and supportive of learning as it may be for students to put effort into connecting information they learn across the semester or across courses (cognitive engagement), completing marked assignments and studying regularly (behavioral engagement) are what will more likely count toward their grades. Although it is possible that cognitive engagement becomes more relevant for PSE students' academic performance after first semester, it is also possible that cognitive engagement simply does not play a direct role for academic performance in students' motivational system. Lerner and Li (2009), for example, point to the possibility that behavioral, cognitive, and emotional

engagement play different roles within the motivational system, with the latter two serving to support students' efforts toward doing what is necessary to succeed academically; that is, engage behaviorally. Further examination of the dynamics among different academic engagement components is necessary in future research to better understand their relative roles for academic performance as well as their place in students' motivational system in general.

Overall, there was no evidence that perceived academic pressure and support from friends mattered for students' academic performance. This was the case whether these processes were modelled as predictors of GPA by themselves or in a system with academic engagement processes. It is possible that the distinct behaviors enacted by friends (or perceived by students as being enacted by their friends) are not, as Prinstein and Dodge (2008) proposed, what matters about the friendship, at least in the area of academics. It is possible that, instead, the associations between better quality friendships (e.g., high intimacy, low conflict; Brown & Larson, 2009) and higher grades found in previous research are driven by the resources friendships provide the student or take away from the student in terms of time, cognitive, and/or emotional capital. For instance, whether or not perceived school-obstructive pressure from friends makes a difference for students' GPA may depend on whether or not dealing with this pressure uses students' time and energy that they would otherwise have put into, for instance, studying.

The one association that arose between social context and academic performance was not expected. Students who felt more school-supportive pressure from friends at the beginning of the semester received lower first-semester GPAs compared to those who felt less school-supportive pressure from friends. Although it is possible that this was a chance finding, it is also possible that it could be replicated and validated in future research. Assuming its validity, the social support literature may help with an interpretation. Social support research indicates that

perceiving one has social support available during times of stress is associated with better adjustment such as lower depression and anxiety (Cohen, 2004). However, actually receiving social support during times of stress is associated with no improvement or even poorer adjustment when compared to not having received support at all (Barrera, 1986; Bolger, Zuckerman, & Kessler, 2000; Cohen, 2004). There are two potential mechanisms for these negative associations between receiving support and adjustment during stressful times.

First, Barrera (1986) found that the negative effect of receiving support on undergraduate students' mental health was substantially reduced when individual differences in the severity of stress was taken into account. This indicates that pre-existing differences in individuals' stress levels may drive some of the negative connection between receiving support and adjustment. In the present case, it is possible that higher perceived school-supportive pressure from friends is an indicator of students experiencing higher academic stress at university start, and it is this increased stress and the potential causes of stress that bring about lower academic performance by the end of first semester. For example, students who seek or have school-supportive friends may be less capable academically and have good reason to be stressed. Indeed, in the present study, students who perceived their friends as exerting more school-supportive pressure at the beginning of the semester reported experiencing more concurrent academic strain compared to students who perceived their friends as exerting less pressure. If this is the case, then perceived school-supportive pressure from friends, whether accurate or not, may not be enough to counteract the effects of academically-related stress on academic performance.

Second, receiving support during times of heightened stress may be detrimental to individuals' adjustment even after controlling for pre-existing differences in stress levels. Fisher and colleagues (1982) argued that receiving support during times of stress makes it more salient

to the recipients of the support that they are having difficulties coping and therefore adds to the individual's stress, leading to worse outcomes. Bolger and colleagues (2000) found this to be the case in romantic partnerships, with support provision by one's partner one day during times of stress leading to higher anxiety and depression the next day on the partner receiving the support. Perceived school-supportive pressure from friends could represent visible support transactions. In this case, if students' perceptions of receiving school-supportive pressure from friends during periods of heightened academic strain are accurate, whether because friends react to students' stress or students choose more school-supportive friends during periods of stress, higher perceived school-supportive pressure from friends may in and of itself hinder students' academic performance. Students already dealing with higher academic stress may become further stressed by their situation being made salient to them by their friends' behaviors toward them, therefore negatively impacting students' academic performance.

Further research is clearly needed to clarify whether school-supportive pressure from friends is damaging to students' academic performance or whether the negative association between these two constructs can be better explained by individual differences in stress severity. In addition, further research is needed to clarify whether students' experiences of academic pressure from friends are selection or socialization driven. That is, whether friends are pressuring students in response to the students' stress, stressed students select friends whom they perceive as more supportive, or students volitionally draw supportive behavior out of their existing friends when under stress.

A Note on Measurements

Perceived academic pressure and support from friends. Given that scales were developed to measure perceived academic pressure and support from friends and that extensive

analysis was done on the academic engagement scales, these scales merit discussion. A meaningful contribution of this study is a newly available and validated tool, the Perceived Academic Pressure and Support from Friends (PAPS-F) for measuring PSE students' perceptions of their friends' efforts to influence their academic behaviors. Although these perceptions may not be accurate of students' actual behaviors, what students perceive their friends doing, thinking, or believing may be more influential to students' own behaviors than what the friends actually do, think, or believe (Regnerus, 2002; Valente, Fujimoto, Soto, Ritt-Olson, & Unger, 2013). Three sets of findings inform us about the construct of academic pressure from friends in PSE.

First, results from the exploratory factor analyses in a cross-sectional sample and the confirmatory factor analyses in another cross-sectional sample and the longitudinal sample indicate that the PAPS-F items came together into the three theorized distinct dimensions – school-supportive pressure, school-obstructive pressure, and academic instrumental support. The distinctiveness of the three identified dimensions is further supported by their differences in shapes of trajectory across the semester identified in the LGM analysis. School-supportive pressure showed a linear trajectory while school-obstructive pressure and academic instrumental support both showed quadratic trajectories. Additional support comes from the fact that the three dimensions of perceived academic pressure from friends related differentially to the four dimensions of academic engagement in the parallel process LGMs. That is, school-supportive pressure was associated with cognitive engagement and social behavioral engagement while school-obstructive pressure was linked with out-of-class and in-class behavioral engagement as well as cognitive engagement; academic instrumental support was linked to out-of-class and social behavioral engagement.

Second, results from the multiple-group confirmatory factor analyses conducted in one of the cross-sectional samples and in the longitudinal sample indicated that the factor structure of the PAPS-F was invariant across groups. There was invariant factor structure by gender in both samples and by time (waves of data) across the semester in the longitudinal sample. This is important because it suggests that all three subscales could be used with both women and men and for at least short-term longitudinal research.

Third, the three subscales of the PAPS-F have internal consistency and evidence of validity. Internal consistency of each of the three subscales, calculated as Cronbach's alpha, ranged from .77 to .87. The validity of the PAPS-F is evidenced by the directionality of associations between its three subscales and the components of students' academic engagement matching expectations. School-supportive pressure and academic instrumental support were positively associated with academic engagement components (i.e., out-of-class behavioral engagement, social behavioral engagement, cognitive engagement) while school-obstructive pressure was negatively associated with components of academic engagement (i.e., out-of-class behavioral engagement, in-class behavioral engagement, cognitive engagement). The next step on validating this new measure will be to assess how the subscales relate with other relevant variables such as friendship quality and whether the directionality of associations is theoretically consistent.

Academic engagement. The modified Student Course Engagement Questionnaire (SCEQ; Handelsman et al., 2005) also showed good internal consistency and validity. The factor structure of the modified SCEQ was invariant across groups (gender and time) and had good internal consistency, with Cronbach's alpha ranging from .62 to .92. Fredrick and Skinner proposed three general dimensions to academic engagement: emotional, cognitive, and

behavioral engagement, and also acknowledged the possibility of other dimensions (Fredrick et al., 2009; Skinner et al., 2009). Results of the exploratory factor analysis conducted in one of the cross-sectional samples and of the confirmatory factor analysis in another cross-sectional sample and in the longitudinal sample suggest that at the PSE level there are at least four distinct dimensions of academic engagement. As proposed by Fredrick and colleagues, the modified SCEQ showed a cognitive dimension to academic engagement, focusing on the amount of mental effort students make when dealing with their academic work. Behavioral engagement was also identified in the present study, not as one dimension of engagement but as multiple behavioral dimensions of engagement (in-class, out-of-class, and social). Multiple dimensions to behavioral engagement may indicate that academic work, at least in PSE, is in general more differentiated compared to earlier educational levels. Learning inside and outside the PSE classroom may require different behavioral approaches, both of which may be done without much involvement with other learning partners such as classmates and instructors. The in-class behavioral engagement, out-of-class behavioral engagement, and social behavioral engagement components identified here may mirror these differences. Emotional engagement did not emerge from the SCEQ as a separate component of academic engagement.

Overall, findings indicate that, even after controlling for previous academic performance, first-year PSE students who are more behaviorally engaged at the beginning of their first semester received better grades at the end of the semester. This was the case for all three types of behavioral engagement (in-class, out-of-class, and social) but not for cognitive engagement. The positive link between behavioral academic engagement and students' academic performance lends support to the validity of this modified scale. The fact that this association was not present for the cognitive engagement subscale underscores the importance of conceptualizing academic

engagement as a multidimensional construct and empirically investigating multiple components of engagement concurrently but separately to better understand their separate influences and roles in the motivational process of students.

Limitations and Strengths

The present study informs us about developmental change in PSE students' academic engagement and perceived academic pressure and support from friends as well as their roles in students' academic performance. There are, however, three main limitations associated with this study. First, although the longitudinal sample in the present study did not differ from the larger cross-sectional sample (completed by over 85% of all first year psychology students) on age, ethnic distribution, or levels of academic engagement and perceived academic pressure and support from friends at the beginning of the semester, women were overrepresented in the longitudinal dataset compared to the cross-sectional sample. This may have biased the results to be more representative of the experiences of women PSE students than men PSE students. In addition, the longitudinal convenience sample is likely biased as it consisted of research pool students who actively sought to fulfill their research participation requirements early in the semester. As a group, these students may be more academically engaged compared to those who participated in studies to fulfill their research credits later in the semester. If so, the present results may be more representative of the experiences of more highly engaged PSE students than less engaged PSE students in general. In addition, if very highly engaged students are overrepresented in the sample, a ceiling effect may have occurred. Students who started the semester very highly engaged would have less room to increase their engagement across the semester, in which case maintaining engagement levels (no change over time) may be associated with better GPA. Maintaining engagement levels across time may not have the same relation

with GPA for students with lower initial levels of engagement. These converse associations between different engagement trajectories and GPA would not be identifiable using the analytic approach of the present study.

Second, most constructs in this study were measured using self-reports. Given that the purpose of the study was to assess PSE students' perceptions, feelings, and thoughts about their academic and social experiences, this measurement strategy was appropriate and indeed necessary. However, because self-reports can introduce measurement errors due to reporter bias, these should be complemented by other measurement strategies. For instance, when reporting how characteristic it was of students to stay up on their readings over the past three weeks, social desirability and idealistic thinking may have influenced their recall and therefore their reported estimates. Further research would benefit from data collection methods that reduce the change of recall issues, such as daily diaries that require recall of experiences within the last 24 hours only and questions focused on behavioral counts (e.g., *how often do you keep up with your readings*) over self assessments (e.g., *how characteristic of you is it to stay up with your readings*). Another possible way to reduce measurement error due to reporter bias is to use multiple informants. Although teacher reports have been used in research looking at academic engagement in younger students, at the PSE level, course instructors rarely track work completion except for graded work, and class sizes likely limit how much attention instructors can pay to each student's engagement during class time. Future research on PSE students' academic pressure and support from friends may benefit from directly surveying students' friends to corroborate students' reports of their support and pressure behaviors.

Third, students were asked to report their engagement across all their concurrent courses. However, students' academic engagement across the semester could differ from course to course.

According to Fredricks and colleagues (2004), measuring engagement across courses is more representative of a view of engagement as a person-level characteristic than is measuring engagement separately for each class of course and provides less sensitivity to the potential effects of context on engagement. It is possible, therefore, that asking students to report their engagement for each course would have revealed more associations between students' engagement and their friends' pressure and support. As the present study focused on friends, who are social partners independent of the classroom environment, it is unlikely that separating engagement by class or course would have made a big difference for the research questions at hand. Nevertheless, future research may benefit from measuring engagement within each course separately. It is possible that averaging these separate reports to create a global engagement measure would provide a more accurate metric of students' engagement across an academic period than asking students to provide a global report themselves.

Despite these limitations, the strengths of this study provide good reasons to feel confidence in the validity of the findings. One strength lies in the measures of the main constructs in the study – academic engagement and pressures and support from friends, which were validated in independent samples and showed stable underlying construct structure and proper invariance. In terms of academic engagement, the scale identified different components, allowing for investigation of change over time in each component and associations of those components with perceived pressure and support from friends. This is necessary to better understand distinctions among types of engagement (Fredricks et al., 2004). In addition, a common problem in studies of academic engagement is that measures of engagement include questions about social relationships within the classroom, which confounds students' engagement with their social context (Fredricks et al., 2004). In the present study, the academic

engagement scale did not include questions about the social relationships of students and even separated students' academic behaviors involving others (social behavioral engagement) from other aspects of students' academic engagement, which ensured that the measures of academic engagement were not confounded with the measure of students' social context (PAPS-F).

With respect to pressure and support from friends, the measure developed for this study (PAPS-F) is one of only a few focused on PSE students' experiences with friends. Availability of this measure could contribute to further knowledge about the PSE experience. In addition, the items on this scale sampled distinct behaviors that students may perceive their friends as enacting that may affect students' behaviors, attitudes, and beliefs specifically in the area of academics. Investigating this type of specific experience students have with their friends could provide clear information about *how* friendships impact development and motivation (Prinstein & Dodge, 2008) and how student characteristics like engagement affect perceptions of friendships. For example, in this case, it was not only the academic activities PSE students did with their friends such as study together and ask questions when having difficulties (i.e. instrumental support) that were linked to students' academic engagement, but also how encouraging students perceived their friends to be toward their academic efforts (i.e., perceived school-supportive pressure).

Another strength of this study is the use of longitudinal data, which has been rare in investigations of engagement during PSE, yet it is necessary to determine how components of engagement develop. The use of four waves of data allowed for testing for non-linear rates of change in both academic engagement and perceived academic pressure and support from friends. In many longitudinal studies only the simplest growth trajectory—a straight line—is tested due to convenience (only three waves of data available) rather than for substantive reasons (Willet, 2001). Indeed, non-linear patterns of change were identified for most components of academic

engagement as well as perceived school-obstructive pressure and academic instrumental support from friends. Identifying the forms of change over time is a necessary first step to investigating other important developmental questions regarding academic engagement (Fredricks et al., 2004; Skinner et al., 2009). For example, further research is needed to ascertain whether there are groupings of students that differ in developmental trajectories across academic engagement components, which might contribute to academic performance.

Longitudinal investigations are also important for examining temporal relationships and directionality of associations, which allows assessment of theoretical models such as the self-systems motivational model. Using longitudinal data in the current study allowed investigation of the directionality of associations between PSE students' academic engagement and perceived academic pressure and support from friends. According to the self-systems motivational model, these two aspects of students' motivational system are expected to influence one another. Yet, there were no significant directional associations between any of the components of academic engagement and pressure and support from friends constructs. This may indicate that the within-time (i.e., initial) associations between PSE students' engagement and the constructs related to friends are driven by third variables such as students' self-perceptions and personal characteristics. More longitudinal research is needed to investigate whether PSE students' earlier self-perceptions predict their later academic engagement and perceptions of pressure and support from friends, which would provide support for the influential role of the former on the latter.

Conclusion

PSE students experience changes in their academic engagement and perceptions of academic pressure and support from friends across their first semester, but these changes were not related to one another nor to their grades. PSE students' behavioral academic engagement

levels as they start their university studies, however, matter for their grades. Overall, the results of the present study point to what students bring with them to university as most important for their academic performance, at least in their first semester. Given that most students starting their PSE are concurrently starting their transition to adulthood, they likely experience much change and instability across multiple domains of their lives (Arnett, 2001; Masten et al., 2004), including their academic life. As such, they may rely more on their *self* components such as personality characteristics and self-perceptions, which are slower changing and therefore more stable than their social and academic contexts during this period of fluctuation, to guide their actions, including their academic engagement. Two important implications arise from the results of this study; research accounting for PSE students' context, *self* components, and motivated action simultaneously is needed, and students, teachers, and educational policy setters must consider preparation to behaviorally handle academic work at PSE well before students start this phase of their educational life.

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