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Peer Group Influence on the Antecedents of Academic Coping over the First Year of Middle School

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Peer Group Influence

on the Antecedents of Academic Coping

over the First Year of Middle School

by

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Abstract

The motivational model of academic coping provides a framework for investigating the motivational antecedents and social contextual influences on ways of coping with academic adversity during the transition to middle school. Two studies were conducted to investigate the roles of three motivational antecedent variables of academic coping: perceived control, autonomous motivation, and catastrophizing. Study 1 investigated relationships between the motivational variables and academic coping across the first year of middle school. Study 2 investigated peer group influences on the motivational variables and on academic coping. Data from an entire cohort of 366 sixth students in the only middle school in a small northeastern town were used to investigate several hypotheses. Two sets of models were used to test hypotheses in Study 1, using structural equation modeling. First, a set of autoregressive longitudinal models was used to test whether students’ motivational antecedents in the fall predicted students’ coping in the spring, controlling for coping in fall. Significant or marginally significant relationships were found between autonomous motivation and two ways of coping, strategizing and self-encouragement. Second, two-wave bivariate latent change score models were used to investigate relationships between change in the three motivational antecedents and change in academic coping across the year. Significant associations were found between change in each motivational antecedent and change in several of the ways of coping investigated. In Study 2, autoregressive longitudinal models were used to investigate two sets of hypotheses. First, peer group averages of each motivational variable were tested as predictors of change in students’ own levels of that variable. Peer group average perceived control in fall was found to marginally significantly predict change in students' own perceived control across the year. Second, peer group averages of each motivational variable were tested as predictors of change in each of several ways of students' coping. Peer group average perceived control was the only one of the three motivational variables found to predict change in students' academic coping across the year, and only marginally significantly for one way of coping, projection. Potential contributions, limitations, and implications of the research are described as well as future research directions.

Dedication

This dissertation is dedicated to my high school friend, Normandie Ross.

Acknowledgments

I want to acknowledge the contributions of the members of my dissertation committee, past and present, and express my deep gratitude for their support and guidance. I am especially grateful to the late Dr. Thomas Kindermann, who graciously took me on as a student, shared his enthusiasm for peer research, and shepherded me through graduate school, doing everything possible to temper my zeal, channel my energy, and keep me focused.

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Chapter 1. Problem Statement

Students face a variety of challenges and obstacles in the academic domain, which may include test anxiety, poor performance, or difficulties with mastery of subject matter. Stressful experiences of adversity at school are aggravated by changing conditions during the transition to middle school, a time when declines in academic engagement and motivation are widespread. Students' successful navigation of academic adversity and of difficult developmental transitions is dependent on their access to a repertoire of effective coping strategies. Adaptive ways of coping, such as strategizing and self-encouragement, enable students to persist in learning, while maladaptive strategies, such as projection and self-pity, exacerbate frustration and setbacks. Academic coping has been found to be an important predictor of academic outcomes, including engagement in schoolwork and academic performance (Skinner & Saxton, 2019).

Students' peers, the other students in the school context, play an important role in successful engagement in academic activity. Students are surrounded by other students in both collaborative and teacher-oriented classroom activities, during recess and lunch breaks, and after school. Their interactions with each other are an important developmental context with consequences for academic outcomes (Ryan & Shin, 2018). The motivation and engagement of a student's peers have been shown to have a positive relationship with a student's own academic outcomes (Juvonen et al., 2012). An especially important type of peer influence comes from groups of other students with which a student has affiliative bonds, the classmates that an individual student hangs out with and engages in joint activity with on a recurring basis (Kindermann, 2007). Groups of significantly affiliated peers at school comprise a prominent and influential feature of students' social contexts, with a potential impact on academic coping.

Theoretical Foundations

Two research traditions are foundational for the investigation of academic coping. One is a motivational perspective derived from the Self-system Model of Motivational Development (SSMMD, Connell & Wellborn, 1991), which highlights the role of three basic self-system processes (SSPs), competence, autonomy, and relatedness. The other is a contextual perspective derived from bioecological theory (Bronfenbrenner & Morris, 2006) and emphasizing the importance of three sets of social partners in the academic domain, parents, teachers, and peers (Skinner et al., 2022; Wentzel, 2021). Self-system processes and the contextual perspective are combined in the motivational model of academic coping (Skinner & Wellborn, 1997; Skinner & Saxton, 2019). According to this model, motivational processes are highly relevant to patterns of academic coping. They can help us understand students' coping repertoires and their individual preferences for different ways of coping.

Motivational Antecedents of Academic Coping

Antecedents of academic coping include the states, processes, and individual or social characteristics that precede adverse academic situations and events. These antecedents influence preferences for specific coping strategies. Because academic coping occurs within the context of ongoing learning, the most important antecedents may be those that involve the individual student's motivation and their cognitive and emotional orientation toward the tasks and objectives of their learning activities.

The development of coping intertwined with the development of the basic psychological self-system processes of competence, relatedness, and autonomy (Connell & Wellborn, 1991; Skinner & Wellborn, 1997). Students appraise adverse circumstances in terms of their implications for the satisfaction of these three basic psychological needs. The individual student's evaluations of the extent to which their needs for competence, relatedness, and autonomy are met can be considered motivational resources or liabilities. High levels of these factors positively predict the use of adaptive ways of academic coping, while low levels predict the use of maladaptive ways of academic coping (Skinner & Saxton, 2020).

The self-system process of competence is especially important for understanding academic coping, because so much of learning activity is organized or colored by the pursuit of competence and the evaluation of competence. Academic stressors often involve obstacles encountered in the pursuit of competence (Burnett & Fanshawe, 1997). Self-perceptions of competence, of scholastic ability, and of a student's capacity to successfully complete learning tasks, have been found to predict an adaptive problem-solving profile of academic coping (Mantzicopoulos, 1990, 1997). In addition to self-perceived competence, other aspects of the self-system process of competence may be related to choices of ways of academic coping. Specifically, perceived control and catastrophizing are two components of the competence self-system process, one with positive effects and the other with negative effects on learning activity. These two components of the competence process are relevant motivational antecedents involved in students' relative preferences for different coping strategies.

Perceived control in the academic domain is a set of beliefs described as "generalized expectations about the extent to which a student can produce desired and prevent undesired events in school" (Skinner et al., 1998, p. 27). Catastrophizing of competence has been described as "the tendency to make primary appraisals of adverse situations or events as having negative implications for the cause, consequences, or controllability of present or future events," or "negative implications for the characteristics or evaluation of the self." (Skinner & Wellborn, 1997, p. 392). Perceived control has been found to positively predict adaptive coping (Doron et al., 2009; for review see Skinner & Saxton, 2019), while catastrophizing has been found to be negatively associated with adaptive coping and positively associated with maladaptive coping (Skinner & Saxton, 2020).

A third motivational antecedent of academic coping involves the self-system process of autonomy. The extent to which students embrace academic tasks because of their own enjoyment, interest, or identification with learning activity constitutes their autonomous academic motivation (Deci et al., 1991; Patrick et al., 1993). Autonomous motivation involves volition and choice, and is distinguished from controlled motivation, which involves external or internal pressure or coercion (Vansteenkiste et al., 2006). Autonomous motivation in the academic domain has been found to be a strong predictor of students' preferences for ways of academic coping (Doron et al., 2011).

These three motivational antecedents, perceived control, autonomous motivation, and catastrophizing are known to play a role in academic coping. However, there are gaps in our understanding of the processes involved. First, the effects of the three motivational antecedents on how coping changes over time have not been investigated. Second, they have not previously been investigated in conjunction with one another to develop an understanding of their interrelationships and relative importance to various ways of academic coping and their change over time. And third, there is a need for more evidence about how the context of the transition to middle school, including the role of peers, may uniquely affect these processes. The two studies in this research attempt to fill these gaps in existing knowledge.

The Role of Peers in Academic Coping

Peers may contribute to academic coping in several ways. Most notably, peers may themselves be the means of coping. Students turn to fellow students for comfort and encouragement, or for instrumental assistance, when using comfort-seeking or help-seeking as ways to cope (Stake, 2006; Ryan & Shim, 2012). Additionally, a recent study shows peers' coping is also influential on student's own coping (Grimes et al., n.d.). Peers may also influence coping indirectly, through their effects on the motivational processes underlying the use of coping strategies. These indirect effects of peers can be investigated using techniques similar to those used to investigate other forms of peer influence in academic contexts. If research can uncover the roles that peers play in promoting students' adaptive coping (or buffering them from the use of maladaptive coping), then teachers can use that information to better understand peer interactions and use their roles in the classroom to guide and facilitate positive peer processes and curtail negative peer processes.

The Current Research

Two studies were conducted to expand the knowledge of academic coping by investigating the relationships between three motivational antecedents and peer influence and changes in coping over the first year of middle school. The literature review examines what is known about perceived control, autonomous motivation, and catastrophizing as antecedents of academic coping. Additionally, literature on the role of peers in the emergence and development of the three motivational antecedents is reviewed.

Study 1 investigated the role of the three motivational antecedents by examining them as predictors of change in coping across the first year of middle school. Study 2 investigated whether peer group averages of the three motivational antecedents have an impact on students' own motivational variables and on the changes in their ways of academic coping over the first year of middle school.

Chapter 2. Literature Review

Many people remember gleeful feelings of anticipation and excitement leading up to the start of the academic year and the first days of school, as summer ended and fall approached. Those feelings don't always last through the year, and for most students their enjoyment subsides as the years go by. The reality of school is not always consistent with initial positive expectations. A variety of stressful and negative experiences are often encountered as part of education. These difficult experiences may contribute to declines in enthusiasm and motivation as time goes by. The consequences of these difficulties, in turn, may depend on the use of various coping strategies that make up students' styles of responding to adversity in the school context.

For educators, it is helpful to know as much as possible about academic stress and coping. Research has focused on various facets of academic stress and coping, including numerous individual and contextual factors. A potentially powerful, but largely unstudied, contextual factor is the peer group, a student's affiliated agemates, who may have important effects on both the experience of stress and styles of coping. This literature review will describe features of academic adversity which produces stress, the connection of students' experiences of stress to the school context and then to ongoing learning activity, and the general processes of cognitive and emotional processing applicable to all experiences of adversity and stress. Literature specifically addressing stress and coping in academic contexts will be reviewed. A motivational model of academic coping will be described, and key components of relevant motivational processes identified. Finally, the review will consider the literature on peers at school and research findings that may shed light on the role of peers in academic stress and coping.

Adversity and Stress in Academic Contexts

To understand the impact of academic stress and the variation that exists in coping responses, we can begin by considering the variety of types of adversity and stressful experiences students have at school or in connection with schoolwork. There are many sources and types of adversity encountered by adolescents. Overall, academic adversity has been found to be the most impactful source of stress in the lives of most adolescents (Anniko et al., 2019). Within academic adversity, there is a wide diversity of negative experiences. For example, in adolescence, a measure developed by Byrne and colleagues (2007), assess ten types of adversity faced by this age group. Three of them are types of academic adversity, and a fourth, school/leisure conflict, is school-related. These authors' category of school performance includes difficulty with material, teacher expectations, pressure, keeping up, and lack of interest. The category of attendance-related stress is distinct and occurs when just getting up and going to school are stressful. Teacher interaction stress includes not being respected and listened to, overt antagonistic conduct by teacher, and teachers who are restrictive or unsupportive.

Also looking at adolescence, but focused on academic stressors only, Burnett and Fanshawe (1997) identified nine categories of academic adversity, some of which are similar to the stressors described by Byrne and colleagues (2007). In addition, they highlight pressure from parents and school-related conflict, stress related to independence (not being treated as mature, not being allowed to make decisions), and stress coming from the school environment (crowded or noisy classrooms, poor heating, cooling, or lighting). All these stressors are important and relevant to student's experience of education and overall level of stress.

Smith and Pollak (2021), discussing effects of severe and toxic stress in early childhood, have suggested that we can best understand the impact of stress not by differentiating categories or classification of stressors, but by looking at specific characteristics of the situation and the individual in the experience of stress. The situation includes events, the physical environment, and the social context. The characteristics of adversity that are likely to be most relevant to understanding stress and coping at school may be those that impact the pursuit of goal-directed action. There is diversity in the sources of academic adversity, ranging from physical factors to interpersonal factors to intrapersonal factors. The impact of these factors on coping may be largely a function of their relation to the nature of the activity which students pursue at school, their learning. So, potentially stressful academic adversity includes all the interferences, challenges, and obstacles to purposive learning activity.

Early Adolescence and the Transition to Middle School

School transitions are important times for the development of academic motivation and coping in adolescents, because of the many changes and adjustments students face when moving from one type of school to another, whether that be from elementary school to middle school, middle school to high school, or high school to college. The transition to middle school may be especially consequential, because it coincides for most students with early adolescence, a time when biological and cognitive changes are transforming the functioning and experience of individuals moving rapidly toward life as a grown-up, accompanied by important developments in the adolescent brain (Crone, 2016). It is a time when students face many novel or increased challenges at school, partly because the structure and organization of educational institutions and activities fail to keep up with students' own development. Early adolescents during and following the transition to middle school in American society exhibit a pattern of declines in academic motivation and performance, a pattern which includes declines in their interest in school and valuing of school (Gottfried et al., 2001).

Stage-Environment Fit Theory explains this unfavorable developmental pattern of academic outcomes (Eccles & Midgley, 1989; Eccles et al. 1993). The theory describes middle school students' psychological and developmental needs as being mismatched with the organization of the schools they attend. As a result, needs go unmet and students develop sub-optimally. Eccles and Midgley (1989) described five important developmental changes experienced by adolescents which are often met by low support and poor responses from the environment: 1) advances in critical thinking, 2) more differentiated conceptions of ability, 3) desire for more control, 4) greater self-consciousness and social comparison, and 5) changing relationships with peers and others non-parental figures. Empirical research supports the description of stage and environment misfit for adolescents in school contexts and its relevance in explaining motivational and achievement declines across adolescence (Eccles et al., 1993; Benner & Wang, 2014). The same age-specific needs for complex and critical thinking, choice, control, and relatedness, described by Eccles and Midgley (1989) as relevant to the development of motivation, are also relevant to the development of academic coping at this time.

Motivational Model of Academic Coping

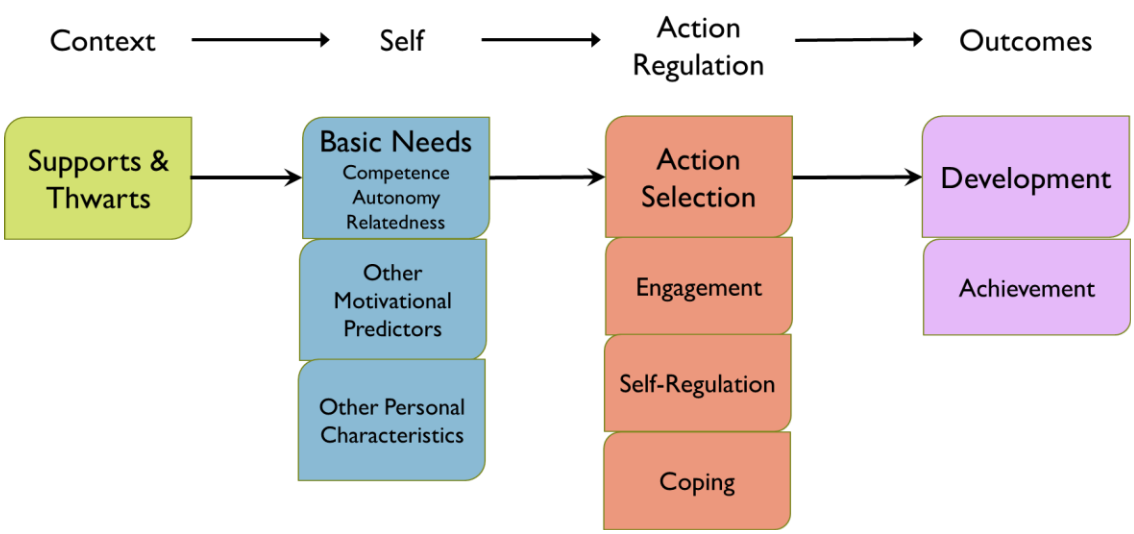
Learning activity is purposive and goal-directed (Heckhausen, 1977). Students involved in schoolwork are directing their actions to accomplishing academic tasks. This goal-directed learning activity taps into a basic psychological process of striving for competence. Students are not only concerned with whether they complete academic tasks, they pay attention to how much they learn and how well they learn it. Students are trying to do something, and they want to do it well. Because learning activity is motivated behavior, coping with adversity encountered during learning activity is shaped by their motivation, their underlying motives and the intensity of their efforts.

One approach to the analysis of motivational processes is contained in the Self-System Model of Motivational Development (SSMMD; Connell & Wellborn, 1991; Skinner et al., 2009). Figure 2.1 diagrams key components of the model. While encompassing the direction and intensity of action, motivation is also the wellspring of action. The SSMMD conceptualizes motivation in relation to action regulation, an umbrella term which includes the selection of action, levels of engagement or disengagement, self-regulation, and processes of coping with events that interfere with action. Action regulation always occurs within a social context and discrete actions are often situated within ongoing streams of activity, which may be initiated or shaped by the social context.

The SSMMD focuses on three basic motivational processes underlying action regulation: competence, autonomy, and relatedness, which are critical self-system processes (SSPs). Competence involves “producing desired outcomes and avoiding negative outcomes,” while autonomy involves choice and “connectedness between one’s actions and personal goals and values,” and relatedness includes the “need to feel securely connected,” and “to experience oneself as worthy and capable of love and respect” (Connell & Wellborn, 1991). High levels of competence, autonomy, and relatedness stimulate motivation because they contribute to self-determination (Deci & Ryan, 1985). Low levels of competence, autonomy, and relatedness deplete motivation and become personal and interpersonal motivational liabilities.

Figure 2.1

Self-System Model of Motivational Development (SSMMD)

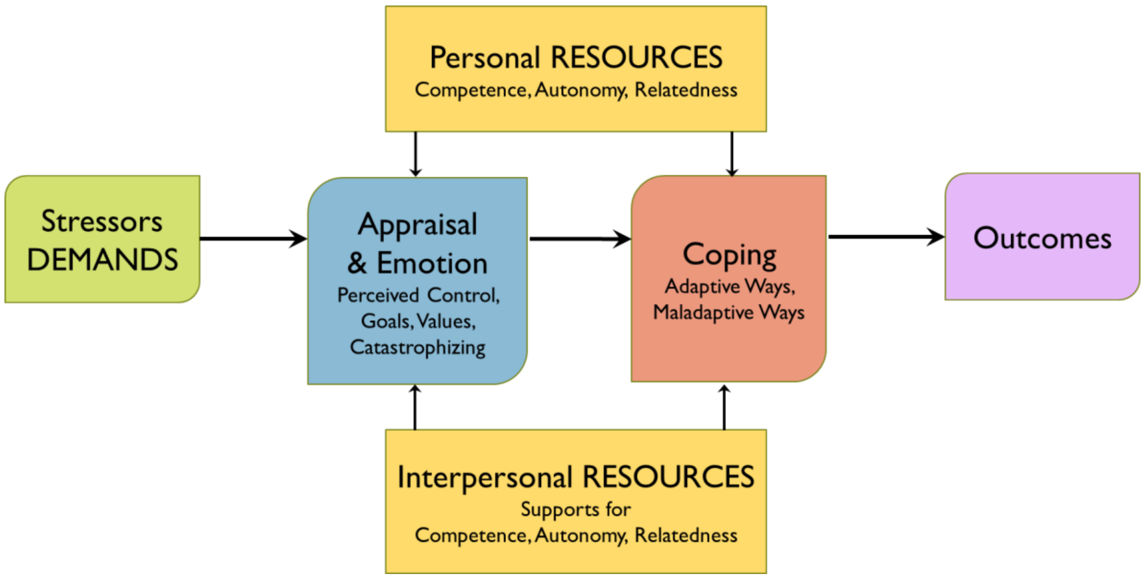


SSP's are relevant to stress and coping because their impairment is a primary source of stress (Skinner & Wellborn, 1994). In the pursuit of learning activity, frustrated attempts to do well, to pursue interests and preferences, or to connect with parents, teachers, and peers in supportive relationships, are all sources of adversity. These challenging and potentially threatening experiences introduce stress and evoke coping. In addition, the psychological importance of each of these three SSP's, as well as the importance of contextual conditions that promote or thwart their satisfaction, makes them relevant to all goal-directed action, including learning activity. As a result, these three processes will also influence students' appraisals and reactions to setbacks, difficulties, and other academic adversity, even when diminished competence, autonomy, or relatedness is not an overt characteristic of the adversity.

The motivational model of academic coping (Figure 2.2) provides a framework which incorporates individual and interpersonal influences on students' academic coping. The model describes coping with academic challenges and setbacks in terms of the processes that lead from contextual and individual characteristics to the selection of specific ways of coping (Skinner & Wellborn, 1997; Skinner & Saxton, 2019). The motivational model of academic coping is based on the more general motivational model of coping in childhood and adolescence (Skinner & Wellborn, 1994) which, in turn, is based on the SSMMD (Connell & Wellborn, 1991). Within the motivational model of academic coping, the three basic psychological needs of competence, autonomy, and relatedness serve as sources of motivation when they are being met but produce frustration and stress when they are thwarted.

Figure 2.2

Motivational Model of Academic Coping



According to the motivational model of academic coping, cognitive and emotional processes of appraisal and reactivity mediate between stress and coping. These include the individual's evaluation of the demands they are facing and the resources available to meet those demands. Appraisal has long been recognized as relevant to the elicitation and selection of reactions and responses to adversity. It has a central role, for example, in the transactional model of stress and coping (Lazarus & Folkman, 1984). This model describes appraisal processes as determinants of whether stressful conditions or events represent challenge, threat, or a sustained harm or loss. The role of appraisal and the distinction between challenge and threat are also recognized in other theoretical treatments of stress and coping (Fisher, 1986; Raftery-Helmer & Grolnick, 2016); Seery et al., 2009; Skinner et al., 2003). Distinguishing between challenge and threat has an important effect on the selection of ways of academic coping. When adverse conditions and events are appraised as challenges, positive and adaptive ways of coping are more likely to emerge. When situations are appraised as threats or losses, students are more likely to have serious interruptions of learning activity, powerful emotional experiences, and may respond with less effective, maladaptive ways of academic coping (Skinner et al., 2013).

The appraisal of potentially stressful challenges and threats depends on the evaluation of the demands present and the resources available to meet those demands (Lazarus & Folkman, 1984; Skinner et al., 2003). In the course of learning activity, challenges and setbacks, such as upcoming exams, poor grades, and heavy workload, are demands. Resources include the student's personal characteristics, and the possibilities for access to interpersonal resources, including instrumental and emotional support, as well as the classroom and school contexts within which learning activity takes place. Gaps in personal resources, such as disengagement, disaffection, and patterns of negative thinking, or gaps in interpersonal resources, such as poor teacher and peer relationships, are liabilities (Skinner et al., 2013).

Students' personal and interpersonal resources and liabilities affect their assessment of adversity and the possibilities for responding. Paramount among the individual resources or liabilities influencing learning activity is the quality of a student's motivation. A student may have, for example, a strong interest in a subject and a desire to grow and learn. Another student may have a dislike for academic tasks, or a pattern of negative expectations. Motivation colors all facets of reacting and responding to challenges and setbacks. Strong academic motivation leads students to preserve and protect what is valued and cared about and to take action to attain chosen objectives and persist in their pursuit of long-term goals.

Although each of the three primary self-system processes (competence, autonomy, and relatedness) plays a unique role in the development of motivation, the need for competence seems to be especially important for learning activity. The processes of appraisal and emotional reactivity that lead to the selection of specific ways of coping in academic contexts are shaped by the important role played by the pursuit of competence within learning activity. Connell & Wellborn have described the competence process in academic contexts as involving two components: "(1) knowledge about how to do well in school, i.e., perceived strategies for achieving outcomes; and (2) beliefs that one can execute those strategies, i.e., perceived capacities" (Connell & Wellborn, 1991, p. 53).

Three motivational constructs are especially relevant to the pursuit of competence in learning activity. One is perceived control, which reflects students' beliefs about relevant strategies and capacities. Another relevant construct is autonomous motivation, which reflects the strength and sources of students' desire to pursue learning activity. Although a reflection of the autonomy process, rather than the competence process itself, autonomous motivation strongly influences pursuit of competence in learning activity. A third relevant construct is catastrophizing, a tendency demonstrated by some students in the academic domain to fall into a pattern of negative expectations and interpretations in their pursuit of academic competence, especially when challenges and setbacks are encountered. I will briefly introduce these constructs here and explore the relevant research below in the section covering the three focal motivational antecedents of academic coping.

The concept of perceived control captures the first important way that learning activity is organized in relation to the self-system competence process. Perceived control arises from the student's ongoing evaluation of a set of causal factors relevant to the production of desirable outcomes, reflecting their experience of the link between these factors and their own outcomes. These evaluations make up a student's set of mean-end beliefs about causal factors, which include effort, ability, powerful others, luck, and unknown or uncontrollable causes. Students evaluate the relative importance of these means-end relationships, as well as their own access to them as learning strategies, based on their perceptions of their own capacities. These competence-related beliefs about strategies and capacities are key components of a student's sense of perceived control. A third dimension of perceived control, students' overall sense of control, evolves from their strategy and capacity beliefs, and plays an important role in motivated learning activity (Skinner et al., 1990), and in academic coping (Skinner & Wellborn, 1997).

In addition to control-related beliefs, a second factor related to the competence process encompasses students' overall level of commitment and reasons for pursuing learning activity. These contribute to the quality of their motivation and participation and are organized by the need for autonomy. This feature of students' academic orientations has been described using the distinction between autonomous and controlled motivation. Autonomous motivation is present when students are committed to learning activity and pursue it as an end in itself, or because they embrace it and take ownership (Vansteenkiste et al., 2006).

Finally, the third construct, catastrophizing, presents a potential hazard for students. Competence-related catastrophizing is a motivational liability that can reduce levels of engagement in academic tasks and increase the risk of disaffection and disengagement (Skinner et al., 2013). This is a pattern of biased thinking, based on negative expectations and interpretations of situations and events, a pattern of distorted cognition that can overtake the appraisal of adversity and lead to maladaptive coping. In order to set the stage for a deeper exploration of the research on these constructs, I will first describe, in the next section, the specific ways of coping that occur in the academic domain.

Varieties of Academic Coping

The variety of ways a student might use to cope with academic adversity can be classified according to a coping taxonomy developed by Skinner and colleagues, which organizes coping strategies into 12 families (Skinner et al., 2003). Strategies of coping are classified according to whether they are associated with challenge appraisals, in which case they are grouped as adaptive coping, or associated with threat appraisals, in which case they are grouped as maladaptive coping. Coping strategies are further distinguished by whether they focus efforts on the self or on the context, including other people.

Finally, coping strategies may be distinguished by which of three adaptive functions they involve. There are three of these functional categories: 1) management of affordances and contingencies of the situation, which is associated with the self-system process of competence; 2) management of affect and social resources to deal with the reaction or phenomenal experience of adversity, which entails coordination of emotion,

emotion regulation, and reliance on self and social resources, and is associated with the self-system process of relatedness; and 3) management of preferences, including goals and intentions, which entails coordination of options and preferences, and is associated with the self-system process of autonomy. This classifications of two possibilities of challenge or threat, two possibilities of self or context, and three adaptive functions results in 12 possible families of coping. Eleven of these are associated with eleven specific ways of academic coping, five adaptive ways and six maladaptive ways (Skinner et al., 2013). The ways of academic coping are summarized in Table 2.1. For each of the eleven, its correlation with engagement in a large sample of third to sixth graders is shown (Skinner et al., 2013). Engagement involves strong behavioral and emotional involvement in academic tasks (Pitzer & Skinner, 2017).

Table 2.1

Ways of Academic Coping

	ENG *r*
Adaptive Ways of Coping, in order of prevalence	
Strategizing. Attempts to figure out what to do to solve problems or prevent them in future encounters.	.590
Help-seeking. Going to teachers or other adults for instrumental aid in understanding material or figuring out how to learn more effectively.	.654
Comfort-seeking. Turning to others for emotional reassurance, consolation, and cheer.	.533
Self-encouragement. Attempts to regulate one's flagging emotions by bolstering confidence and optimism.	.582
Commitment. Attempts to remind oneself why challenging academic work is personally important and worth the effort.	.578
Maladaptive Ways of Coping, in order of prevalence	
Confusion. Stress reaction in which thoughts or next steps become unclear or disorganized.	-.534
Escape. Attempts to mentally avoid or remove oneself from difficulties and poor outcomes.	-.453
Concealment. Attempts to prevent others from finding out about the occurrence of negative events.	-.485
Self-Pity. Feeling sorry for oneself and one's tribulations.	-.627
Rumination. Preoccupation with the negative or anxious features of a stressful situation.	-.171
Projection. Blaming other people for the negative outcome.	-.652

Correlations (*r*) are shown for each way of coping with engagement (ENG) in the fall for a sample of 1,020 students in grades 3 through 6 (Skinner et al., 2013). All correlations are significant at the p <.001 level, except ns = nonsignificant.

Adaptive Ways of Academic Coping

The five ways of adaptive academic coping described by Skinner and colleagues (2013) are: strategizing, help-seeking, comfort-seeking, self-encouragement, and commitment. The most common of these is *strategizing*, which involves proactive approach and problem-solving. This way of coping is reflected in attempts to understand the problem and take action to reengage and improve future results. Strategizing is strongly correlated with *help-seeking*, the second most common way of academic coping. Help-seeking involves asking someone for information or assistance. In classroom settings, students are using this way of coping when they ask the teacher or other students for information or assistance.

Although some studies combine help-seeking and other ways of coping under the umbrella of social support, the taxonomy of academic coping presented here distinguishes help-seeking, in which the teacher or other social partners provide instrumental and informational support, from *comfort-seeking*, which involves turning to others for emotional support and encouragement. This comfort and reassurance can improve mood and prepare the student emotionally to continue with learning activity.

Alternatively, the student may turn to their own mental resources for comfort and reassurance, in another way of adaptive coping, *self-encouragement*. Like comfort-seeking, the use of self-encouragement helps to up-regulate emotion, restore confidence, and prepare for action, but here the encouragement comes from within, rather than from social partners. *Commitment* involves reminders of the personal importance of academic outcomes. It can have a positive impact on emotions, but commitment is primarily about cognitive framing, motivation, and behavior. It relies on the individual's metamotivational capacity to manage the salience of values and preferences to energize action (Miele & Scholer, 2018).

Studies have found that adaptive ways of coping plateau in late childhood and decrease in early adolescence (Skinner et al., 1998; Skinner & Saxton, 2019, 2020). Results have been most consistent across studies, and effect sizes largest for declines in the problem-solving group, which includes strategizing. Early adolescent declines have also been seen for cognitive strategies such as commitment and self-encouragement, even though this is a time when cognitive capacities generally, and abstract thinking specifically, are increasing. This apparent divergence between a normative trend to have increasing access to complex thinking and cognitive reframing to cope with stress generally during adolescence (Skinner & Zimmer-Gembeck, 2018), and the domain-specific declines in adaptive ways of academic coping in relation to school, may be a reflection of the central role played by the need for competence and competence-related motivational processes in academic coping. The severity of the challenges and frustrations related to unfavorable school contexts and experiences might be overshadowing the opportunity to apply emerging cognitive capacities to meet these challenges.

Maladaptive Ways of Academic Coping

In addition to the adaptive families of coping, there are six maladaptive families, each represented by a maladaptive way of academic coping. All six of the maladaptive ways of academic coping are associated with primary appraisals of threat rather than challenge, emerging when demands are assessed as exceeding resources (Skinner et al., 2003). *Confusion* is a reaction to challenging circumstances that reflects being overwhelmed or feeling helpless. Confusion is unproductive. The confused student is unresponsive. They typically have an experience of going blank or getting stuck. Confusion is a common form of maladaptive coping, that occurs when the need for competence is thwarted by limitations stemming from the self. The second most common form of maladaptive coping is *rumination*, which involves the presence of repetitive, worrisome thoughts. Rumination is only weakly correlated with other forms of maladaptive coping. *Self-pity* is associated with helplessness and involves feeling sorry for oneself. Students who respond with self-pity may be seeing themselves as controlled by chance or powerful others (Stober, 2003). In *concealment*, students try to hide their failures, mistakes, or difficulties from the teacher and other students.

Two other forms of maladaptive coping are less common. *Escape* is mental avoidance or denial that involves downplaying or detaching from the academic task or topic that led to the setback. *Projection* involves blaming others, typically the teacher. Projection can also take the form of blaming the wording of a test of other features of the academic context as being unfair. It is the least common way of maladaptive coping and is strongly negatively correlated with strategizing and help-seeking.

Several studies have found that maladaptive ways of academic coping increase in early adolescence from relatively low levels in late childhood (Skinner et al., 1998; Skinner & Saxton, 2019, 2020). The clearest findings have been for escape, which increases across early adolescence before leveling off in late adolescence. There was also some strong evidence that self-pity and projection increase in early adolescence, as well as the average repertoire or profile of maladaptive academic coping. These increases in preferences for maladaptive ways of coping may be related to increases in negative experiences and frustration of basic self-system processes of competence, autonomy, and relatedness during the transition to middle school.

Motivational Antecedents of Academic Coping

Three motivational constructs are centrally important in the stress appraisal process in academic contexts and mediate between stress and coping. These are perceived control, autonomous motivation, and catastrophizing, referred to here as motivational antecedents of academic coping. All three are involved in the processes of appraisal which precede the selection of coping strategies in the academic domain. These processes influence the appraisal of adversity because of their relevance to academic activity and the central role of the pursuit of competence. In the academic domain, an individual student can vary from high to low on perceived control. They can also be at any level ranging from high to low on autonomous motivation and on catastrophizing. Although these variables may be correlated, they are distinct constructs. Autonomous motivation is not just a reflection of perceived control. While perceived control pertains to expectations about outcomes, autonomous motivation characterizes the source and quality of action. Catastrophizing is not just low perceived control, it includes a tendency to favor negative interpretations and expectation, even when they are not consistent with objective facts or past experience. Because they capture key components of the appraisal of challenges and setbacks within learning activity, these constructs are useful predictors of coping strategy preferences in the face of academic adversity.

Perceived Control

Perceived control represents our perception or subjective understanding of the effect we have over the environment (Skinner, 1995). It is the individual’s perception of the extent to which outcomes depend on their own behavior. Based on personal and vicarious experience, control represents the individual's perceived capacity to get the things they need and want, and to avoid the things they don't want, or that threaten or harm them. Some conditions are clearly uncontrollable, such as loss due to death or destruction, or events caused by powerful external forces, in which case they referred to as objectively uncontrollable. But perceived control involves subjective assessment and interpretation of situations and events. Subjective control depends on the individual's perspective, and the specific aims, preferences, and priorities that are salient to the individual in specific circumstances. The ability to affect the environment is important. When people are engaged in purposive activity, they generally want to be effective in their interactions. Perceptions of control may be situation specific, but experiences of control become generalized, and across development a general sense of perceived control emerges. The overall sense of control influences the perception of possibilities and the behavior that results. Perceived control is associated with high levels of social participation and well-being across the lifespan (Infurna et al., 2011).

Perceived control affects a person's actions by influencing their choice of which actions to undertake and their management of ongoing action (Skinner, 1995). Action is warranted where control exists, within the space between possibilities and limitations. High perceived control undergirds a sense of personal agency, even in the face of stressful conditions (Thoits, 2006). Perceived control is a personal resource that can be drawn on in navigating challenge, and facilitating successful goal pursuit (Lazarus & Folkman, 1984; Causey & Dubow, 1992, 1993; Thoits, 2006). Low perceived control, on the other hand, is associated with hesitation in the face of obstacles, feelings of helplessness, and low levels of perseverance toward goals.

Early conceptualizations of perceived control focused on locus of control, highlighting the difference between events and situations that were controllable by the individual and those that were controlled by external forces (Rotter, 1966). Beliefs about the causes of events, however, are only one component of a set of beliefs that contribute to an individual's perceived control. Overall sense of control is a separate belief that depends on two additional sets of beliefs, strategy beliefs and capacity beliefs, with all three components working together in the formation of perceived control (Skinner et al., 1988). Strategy beliefs are individual's perception of causal connections or means-end relationships, expressed in the form of means-end relationships between causes and effects that can provide opportunities for different strategies to produce outcomes. This set of beliefs consists of perceptions of the relative importance of different sources of control, including internal sources (effort and ability), and external sources (powerful others, fate, and unknown causes), which map on to the assessments encompassed within the construct of locus of control. Another set of beliefs involves the individual's access to these strategies, which depends on the individual skills and capacities for taking advantage of means end relationships to produce effects and obtain desired consequences.

While strategy (means-end) beliefs are assessed to obtain a full picture of an individual's perceived control, the other two components, the sense of control, or expectancies of producing desired outcomes, and capacity beliefs, assessment of the individual's relevant skills and abilities, have been found to play larger roles in producing the effect of perceived control on emotional and behavioral outcomes. (Little et al., 1995, Vanlede et al, 2006). In their longitudinal study of perceived control, Skinner and colleagues (1998) found strategy beliefs had somewhat lower correlations with academic engagement than capacity beliefs and with overall control beliefs, over a five-year period from third to seventh grade. Additionally, the association of strategy beliefs and engagement showed a marked decline from sixth to seventh grade, relative to more modest declines in the correlations of capacity beliefs and overall control beliefs with engagement over the same developmental transition. Beliefs about means-end relationships, such as those captured in measures of strategy beliefs, may be less informative by themselves. Capacity beliefs and overall sense of control may be better predictors of outcomes, at least in some domains where strategy beliefs appear to be less consequential, possibly the case for academic performance (Vanlede et al., 2006).

Perceived Control and Learning Activity

Perceived control is relevant to learning activity. Perceived control acts as a guidance system in the pursuit of competence. Competence depends on skills and knowledge that are often acquired through participation in organized learning activity, such as that occurring at school. Perceived control exists both as a general belief about overall control, relevant across multiple domains, and as specific beliefs or assessments of individual ability to exert control in separate domains or specific situations (Skinner, 1995). Within the stream of learning activity, students' experiences establish, maintain, or threaten their sense of control. In the current research, the focus is on perceived control over academic outcomes, including test scores, grades, and successful completion of everyday academic tasks such as homework and responding to questions in class. Existing research shows, in the academic domain, perceived control is positively associated with engagement and achievement (You et al., 2011). It is a motivational force which orients students to pursue academic goals and increases the intensity of their effort. Perceived control is domain specific. Within-person fluctuation in perceived control in the academic domain can affect the connection of control beliefs to academic outcomes, so the assessment of perceived control is best done using domain-specific and situation-specific measures tailored to academic contexts (Musher-Eizenman et al., 2002).

Related Constructs

In the academic domain, the sense of control is similar to self-efficacy, although the two constructs are distinct (Rodgers et al., 2008). Self-efficacy is the individual's belief in their ability to execute necessary behaviors to produce specific outcomes and is always relative to a specific domain or type of task (Bandura, 1977, 1997). Self-efficacy is a strong predictor of academic engagement and achievement (Schunk & DiBenedetto, 2016). Research on the relationship between self-efficacy and academic coping is limited, but one study of middle school students found self-efficacy to be positively associated with problem-solving coping and negatively associated with escape and projection (Friedel et al., 2007). A recent study using an undergraduate sample in Spain, found significant relationships between student's levels of self-efficacy and their membership in motivational profiles with different profiles of approach, social, and avoidance coping (Freire et al., 2020). Students with heavy reliance on approach coping had the highest mean self-efficacy levels. Self-efficacy, however, is distinguished from perceived control in being more specifically focused on the set of behaviors necessary to accomplish desired results, rather than on overall perceptions of control or separate assessments of specific means of attaining desired outcomes. Research findings involving self-efficacy, therefore, are only suggestive, and don't provide evidence about effects of perceived control.

Similarly, some research on causal attributions has found evidence for relationships between this distinct construct and academic outcomes (Weiner, 1985, 2018). No findings on the relationship of causal attributions to academic coping, however, were found in a recent review of existing research on academic coping (Skinner & Saxton, 2019). Despite the similarity between some measures of causal attributions and some measures of the perceived control component of beliefs about means-end relationships (strategy beliefs), research on causal attributions is only marginally relevant in the study of perceived control.

Development of Perceived Control

Perceived control begins its development in infancy and continues to develop across the lifespan. In childhood, domain specific control beliefs develop relative to learning activity (Little et al., 1995; Skinner et al., 1998). Across childhood and adolescence typical patterns of change are seen in perceived control. In early adolescence, with the transition to middle school, students' sense of control ischallenged by the difficult situations that students face. In a longitudinal study of perceived control that followed two cohorts of students from 3rd to 7th grade, perceived control dropped steadily across sixth and seventh grade (Skinner et al., 1998).

Perceived Control and Academic Coping

Perceived control is related to academic coping in two ways. First, levels of perceived control have an impact on the appraisals of potentially stressful situations as threats or challenges. The level of stress experienced in the face of academic adversity has been linked empirically to levels of control, with lower perceived control associated with more intense experiences of school-related stress (Hilsman & Garber, 1995; Lopez, 1999). In their transactional model of stress and coping, Lazarus and Folkman (1984) included control beliefs as a dimension of appraisal, listing it as a person-specific factor in the appraisal process that leads to coping. The importance of situation-specific control beliefs in eliciting either challenge or threat appraisals was reviewed by Folkman (1984). In the studies reviewed, high perceived control was found to be associated with challenge appraisals, and may be accompanied by excitement, eagerness, and hopefulness. Low perceived control, on the other hand, was associated with threat appraisals, which are more often accompanied by strong negative emotions such as fear and anxiety. Threat related cognitions and emotions reduce focus on the problem and increase the need to respond to experiences of distress. Folkman (1984) also described a connection between low perceptions of control in a situation and an increased probability of shifting from direct, problem-focused coping into a wider range of coping options, including regulation of strong negative emotion, and cognitive responses such as reframing.

An empirical study of perceived control in relation to appraisal and coping in the face of examination-related stress was conducted by Folkman and Lazarus (1985) and looked at individual and situational differences in stress related to exams in a college sample. Their results revealed both individual differences and situation specificity in the prediction of academic coping by perceived control. Individual differences were found in patterns of threat and challenge appraisals, with challenge appraisals associated with responding to an upcoming exam by proactively strategizing and preparing, while threat appraisals were associated with emotion-focused and maladaptive ways of coping such as distancing, self-blame, and emotional support seeking. Challenge and threat appraisals were also associated with differences in emotional experience, with typical challenge emotions including hope and eagerness, and threat emotions ranging from fear through worry and anxiety. Differences in cognitive, emotional, and behavioral responses were accompanied by differences in perceived control. In this study, perceived control was significantly associated with challenge (β = .63, p < .05), but not with threat appraisals (β = -.15, ns). The study found that individual students often made use of more than one way of coping, and sometimes experienced both challenge-related and threat-related emotions. The results also showed situation-specific differences in the appraisals, emotional reactions, and coping responses between the assessments made before the exam and those made after the exam was taken but before the exam scores were revealed. These results suggest that academic coping preferences are responses to situations which, although they may be influenced by dispositional factors such as perceived control, also depend on the interpretation and meaning of events and circumstances to the individual student.

The second way perceived control can impact academic coping is directly, by influencing the choice of coping strategies. Compas and colleagues (1991) reviewed evidence for a relationship between perceived control and coping. Their review suggests that overall sense of control mediates the effects of contingency (means-end) beliefs and competence (capacity) beliefs on the choice of coping strategies and has a direct effect on coping through its positive association with readiness for problems-solving. This control-related readiness is associated with a belief that persistence can pay off (Weisz, 1986). Compas and colleagues (1991) also discussed the indirect effect of perceived control on coping through appraisals of threat and challenge. Challenge appraisals are associated with re-engagement and persistence, while threat appraisals are associated with strong emotional reactions which may require diversion of effort to regulation of emotion. In one reviewed study, Forsythe & Compas (1987), using a sample of U.S. undergraduates, found evidence for a significant relationship between high perceived control and problem-solving, but they did not see a consistent connection of low control to maladaptive forms of coping. This suggests that, at least in their operationalization, perceived control, with its clear positive relationship to challenge appraisals, may be a good predictor of adaptive coping, but that other factors, may need to be included to explain the relationships of perceived control to the maladaptive ways of coping that are more likely in the face of threat, frustration and distress.

In another review of perceived control and coping, Skinner and Zimmer-Gembeck (2011), emphasize the role of control perceptions in the use of competence-related coping strategies. Consistent with the motivational model of academic coping, relative frequencies of use of different ways of coping are thought to be related to the satisfaction or thwarting of students' psychological needs, especially competence. Strategizing and help-seeking, for example, reflect orientations toward mastery and persistence, which are associated with high levels of perceived control and with having the need for competence met. Helplessness orientations, on the other hand, which are associated with confusion and escape, are found when the need for competence is thwarted. Additionally, the authors note that low perceived control is associated with unfavorable experiences and behaviors, including distress, reactivity, rigid coping, and not learning from experience.

These negative experiences may in turn be associated with the use of more maladaptive ways of coping.

In dissertation research based on the same dataset as used in this proposed research, Greene (2015) investigated the relationship between perceived control and academic coping in fourth and sixth graders. Four specific ways of coping were investigated: strategizing, help-seeking, escape, and confusion. Greene found that perceived control in the fall was a significant predictor of change in both adaptive and maladaptive coping. Perceived coping in fall significantly positively predicted coping in the spring for strategizing and help-seeking, controlling for the levels of coping in the fall, and significantly negatively predicted spring coping for escape and confusion, controlling for the levels of coping in the fall. This was true for both fourth grade and sixth grade participants. In this study, although mean levels of the predictors and outcomes differed between the two age groups, there was no significant interaction between perceived control and age. This indicated that the relationship between control and coping was not significantly different between the two age groups.

Other studies connecting perceived control with academic coping have found relationships between control beliefs and specific coping strategies, as well as adaptive and maladaptive aggregates. In a comprehensive review of existing studies on academic coping, Skinner & Saxton (2020), found that in the empirical research reviewed perceived control was most clearly associated with the problem-solving family of coping (Friedel et al., 2007) and with the support-seeking family (Causey & Dubow, 1992; Reschly et al., 2008). Evidence was also found for positive associations between perceived control and adaptive coping aggregates (Causey & Dubow, 1993). Negative associations were found between perceived control and two families of maladaptive coping, escape, and submission (which includes obsession) in one study (Friedel et al., 2007). Another study found a negative association between perceived control and oppositional coping such as venting of negative emotion (Causey & Dubow, 1992). In addition, one of the reviewed studies found positive associations between certain specific maladaptive control-related *beliefs*, such as attributions to external and uncontrollable causes, and specific families of maladaptive academic coping, such as those that include self-pity, and projection (Raftery & Grolnick, 2016).

Autonomous Motivation

The character of the motivation underlying involvement in learning activity influences the way students cope with the challenges they encounter. The more strongly motivated students are to complete a task or make progress toward academic goals, the more likely they are to persist and to approach problems directly, attempting to circumvent or overcome obstacles. In the Self-system Model of Motivational Development (SSMMD; Connell & Wellborn, 1991) and in self-determination theory (SDT; Deci & Ryan, 1985; Ryan & Deci, 2000, 2020), the quality of motivation involves, in addition to the pursuit of competence, a natural desire or need for autonomy. People have an intrinsic tendency to engage spontaneously in activities that provide interest and enjoyment, even without the presence of external rewards. The need for autonomy explains the rewarding feeling of having personally initiated action. Fulfilment of the need for autonomy leads to taking ownership of autonomously chosen actions and increases motivational force and intensity. Autonomous motivation can be distinguished from controlled motivation, which results from external sources or internal pressure, including external standards, other people's wishes, rewards, and punishments (Ryan & Deci, 2000). The search for autonomy plays an important role in academic motivation, engagement, and achievement (Connell & Wellborn, 1991).

Autonomous motivation is distinct from perceived control (Skinner,1996). While perceived control reflects effectance motivation (White, 1959; Harter, 1978), or the desire to competently effect the environment, the need for autonomy is related to one's relative ability to make choices free of external pressure and coercion, and to act authentically and with full volition (Deci & Ryan, 1985). The need for autonomy affects the processing of experiences of adversity and plays a role in the elicitation and selection of coping responses (Skinner & Edge, 2002). Autonomous motivation exists when the need for autonomy is being met. It is a process that organizes activity by prioritizing action which is freely chosen on the basis of the individual's own interests and preferences.

Autonomous Motivation and Learning Activity

SDT describes a set of types of motivation, ranging from most controlled to most autonomous: extrinsic, introjected, identified, integrated, and intrinsic. Fully intrinsic motivation is present when things are done for their own sake and for intrinsic interest and enjoyment. The closely related category of identified regulation occurs when an individual identifies with and personally endorses the value of a task or activity and consequently experiences a high level of willingness to act (Ryan & Deci, 2020). These two types of autonomous motivation are associated with positive academic outcomes. A recent meta-analysis found significant relationships between a variety of measures of autonomous motivation and academic motivation, engagement and achievement, in childhood, adolescent, and undergraduate samples (Howard et al., 2021).

Identified regulation, which along with intrinsic motivation is considered a type of autonomous motivation, may be especially interesting as a predictor of academic outcomes during adolescence. Identified regulation has been seen to significantly predict academic achievement (Guay & Bureau, 2018). In person-centered approaches, where clusters or latent profiles of students with frequently seen combinations of motivation types have been identified, studies have found identified motivation to be as high or higher than intrinsic motivation in groups of students with autonomous motivation profiles (Boiché & Stephan, 2014; Ratelle et al., 2007)

Related Constructs

Autonomous motivation is similar to a few other motivational constructs, such as goal relevance, commitment, school identification, and valuing, which have been investigated as predictors in some coping research. The relevance of potentially stressful adverse situations or events to an individual's goals is a frequently mentioned dimension of appraisal in theories of stress and coping (Lazarus & Folkman, 1984; Lazarus, 2000; Blascovich, 2008). In the transactional perspective of Lazarus and Folkman (1984), assessments of the probabilities of harm or benefit in a given situation depend on the goals being pursued and the strength of these goals. In the academic domain, a student might ask themselves questions like "does this matter to me?" or "how does this affect what I'm trying to do and what I want to accomplish?" When students have autonomous motivation for learning and academic tasks, their participation in learning activity is freely chosen and they willingly establish and embrace goals to successfully complete academic tasks. Learning activity then has goal relevance.

In another perspective on coping, the biopsychosocial model of challenge and threat (BPSM), goal relevance plays a central role in the process that leads to coping. Involvement in motivated activity is considered the starting point for the evaluation of demands and resources that lead to appraisals of challenge or threat (Blascovich, 2008). Here again, goal relevance is related to but distinct from autonomous motivation.

Commitment is another construct similar to autonomous motivation. It is also related to goal relevance. In the transactional model of stress and coping, Lazarus includes goal relevance with values and beliefs in a set of considerations that underlie primary appraisal, the evaluation of what is at stake when faced with potentially stressful circumstances. According to Lazarus, our goals are important in the appraisals leading to coping, because they involve commitment, which “implies that a person will strive hard to attain the goal despite discouragement and adversity” (Lazarus, 2000, p. 200). Commitment involves strength and stability of purpose. It isn’t synonymous with goal relevance but can sometimes be an antecedent and sometimes a consequence. When we are committed to a goal that is being challenged or frustrated in a situation, that goal is highly relevant in the appraisal of obstacles and rough spots. Commitment thus contributes to the emotional reaction and coping response. Commitment is also sometimes a consequence of goal relevance. Students may become more committed to tasks and short-term goals that are relevant to attaining an overarching or long-term goal. Commitment can be a double-edged sword. Commitment makes us vulnerable and increases the probability that an event or situation will be interpreted as a threat, but at the same time commitment stimulates approach and problem-solving (Lazarus & Folkman, 1984).

Autonomous motivation is also similar to the construct of identification with school, which has been used to explain trajectories of attainment and dropout (Finn, 1989; Voelkl, 1997). Identification with school was described by Finn (1989) as a combination of belongingness and valuing. Belongingness is present when a student believes that the school environment is an important part of their own experience. Although it may contribute to identification in Finn's conceptualization, belonging is a separate and distinct construct (Hamm & Faircloth, 2005). Valuing is present when a student is committed to learning and values school-relevant goals. The perspective on valuing included Finn's (1989) description of identification is similar to the conceptualization of value in Expectancy-Value Theory (EVT, Eccles & Wigfield, 2020). EVT refers to school related valuing as subjective task value, and describes four components: interest/enjoyment value, attainment value, utility value, and relative cost. Interest, enjoyment, and other forms of valuing although they may be correlated with autonomous motivation, are not synonymous with it.

Existing research approaches autonomous motivation, goal relevance, commitment, identification, and valuing separately, but does not establish clear boundaries between them. They appear to be closely related to autonomous motivation, but any research findings on the relationships of these similar constructs to academic coping would only be suggestive of processes involving autonomous motivation and would not provide direct evidence on the relationship between autonomous motivation and coping. Autonomous motivation has its own story to be told about academic coping.

Development of Autonomous Motivation

Longitudinal studies have found intrinsic motivation, measured in terms of interest and enjoyment, to decline across childhood and adolescence. Similar declines, however, are not consistently found in studies of identified regulation (Boiché & Stephan, 2014; Ratelle et al., 2007). Self-perceptions of identified regulation increased in one qualitative study of Italian adolescents, leading the authors to suggest it may make an increasingly important contribution to success in school during adolescence (Aliverini et al., 2008). With intrinsic motivation declining on average but identified motivation holding steady or increasing, identified motivation becomes especially interesting in early adolescence.

Autonomous Motivation and Academic Coping

All students have goals in relation to their academic tasks, even if their goal may only be to please the teacher or parents, to get by without getting into trouble. Because their academic engagement is freely chosen, students with autonomous motivation have high levels of commitment to goals involving successful participation in learning activity. A few studies have specifically investigated relationships between autonomous motivation and academic coping. In three experimental studies based on self-determination theory, undergraduate students were asked to complete speech-giving, puzzles, and cognitive tasks. It was found that, in the face of these tasks involving self-regulatory challenges, autonomous choice results in less depletion of cognitive and emotional resources, and lower reductions in persistence, than does controlled choice (Moller et al., 2006). A longitudinal study of autonomous motivation among undergraduates found non-autonomous, or controlled orientation toward choice of future careers to be associated with self-reported maladaptive coping strategies, including denial, behavioral and mental disengagement, and self-handicapping (Knee & Zuckerman, 1989).

In addition to these studies that examined autonomous motivation as a binary construct, one study separately investigated each of the types of autonomous and non-autonomous motivation in relation to academic coping. In a correlational study of undergraduates, Doron and colleagues (2011) found that problem-focused coping was positively predicted by identified motivation (r = .17, p = .03). Emotion-focused coping, however, was not significantly predicted by identified motivation (r = .01, p = .83), although emotion-focused was significantly positively predicted by intrinsic and introjected motivation, and significantly negatively predicted by extrinsic motivation.

Given the importance of challenge and threat appraisals to the situational emergence of specific ways of coping, it is useful to consider how these appraisals of challenge versus threat relate to autonomous motivation and to ways of coping. Low levels of autonomous motivation are associated with threat appraisals. With threat appraisals, challenges and setbacks are interpreted in terms of potential harm and loss, rather than as opportunities to forge ahead, so maladaptive coping responses become more likely. In experimental studies of undergraduates, priming of autonomous versus controlled motivation has been found to predict threat appraisals (Hodgins et al, 2010) and levels of maladaptive coping responses (Hodgins et al, 2006) when students in laboratory settings were asked to perform verbal interview and speech-giving tasks. In another experimental study, undergraduate student athletes were randomly assigned to priming with either autonomous or controlled goal motives for difficult physical tasks

(Ntoumanis et al., 2014). Controlled goal motives positively predicted threat appraisals, and disengagement coping, and negatively predicted persistence. Autonomous goal motives positively predicted challenge appraisals and task-oriented coping and negatively predicted disengagement coping. Controlled goal motives did not significantly predict challenge appraisals, and autonomous goal motives did not significantly predict threat appraisals.

Students' interpretations of difficult and stressful situations and events lead to choices between alternatives ways of academic coping, and these choices are related to the individual student's experiences of autonomy (as well as competence and relatedness) in their schoolwork (Skinner & Wellborn, 1991). In their review of academic coping, Skinner & Saxton (2019) found high levels of autonomy satisfaction, a sense of being able to make choices and pursue actions according to the student's own interests and preferences, is positively correlated with strategizing and other adaptive ways of coping, and negatively correlated with maladaptive ways of coping. It appears that autonomous motivation can be expected to influence academic coping through its effects on the appraisal process that leads through assessments of challenge or threat and the evaluation of coping potential. Students make their interpretations of challenges, setbacks, and failures in light of the meaning of their participation in learning activity and its personal importance. The reviewed research suggests that, in general, autonomous motivation is most likely to lead to an appraisal of events as presenting challenge rather than threat, to persistence or re-engagement following setbacks, and to adaptive coping. In contrast, controlled motivation such as rewards or external pressure, is more likely to lead to appraisals of threat, to distress, frustration, and to maladaptive coping.

Catastrophizing

Catastrophizing is a pattern of negative thoughts about events, situations, and the self (Leitenberg et al., 1986; Vasey & Borkovec, 1992). Viewed cognitively, catastrophizing includes negative interpretations of events and situations encountered in the course of activity, and negative expectations of what can happen next. Negative interpretations can involve a strongly unfavorable view of circumstances, leading to a conclusion that the worst possible has happened or is going to happen. Catastrophizing also involves expectations of low likelihood or controllability of events, leading to a conclusion that nothing can be done. Such negative conclusions may not necessarily be warranted by the actual circumstances. Catastrophizing also usually involves inaccurate perceptions and exaggerations. It is a prominent construct in research on cognitive bias and distortion (Weems et al., 2007). Catastrophizing is associated with threat appraisals (Beck et al., 2005).

Although catastrophizing and other cognitive distortions have been extensively studied by clinical psychologists, these biased cognitions frequently occur in nonclinical samples as well (Marques et al., 2013; Muris et al., 2004; Weems et al., 2007). Patterns of cognitive bias often underlie symptoms of clinical and nonclinical anxiety and may account for some of the reliance on maladaptive coping strategies (Clark & Beck, 2010). In the academic domain, patterns of biased interpretations and expectations can emerge in relation to potentially stressful adverse situations and events, including ordinary day-to-day challenges and setbacks. Such a pattern of cognitive bias can be explained in terms of unmet psychological needs. Students whose needs are thwarted are prone to making catastrophizing appraisals of these adverse circumstances (Skinner and Saxton, 2020).

When catastrophizing emerges in the school context, it can have an impact on how students cope.

Catastrophizing and Learning Activity

Catastrophizing in academic contexts has been described by Skinner and Wellborn (1991) as something that emerges within self-system processes when needs are thwarted. It is defined separately for each of the three basic self-system processes: competence, autonomy, and relatedness. Catastrophizing of competence may be most relevant for understanding academic stress and coping, because of the centrality of competence to learning activity. Students often focus on competence-related features of educational activity. Catastrophizing of competence has two parts: 1) catastrophizing of the context in terms of negative academic outcomes, and 2) catastrophizing of academic competence of the self. Catastrophizing of the context is defined as making appraisals of adverse situations or events as having negative implications for the cause, consequences, or controllability of present or future events related to academic tasks and learning activity. Catastrophizing of competence of the self is defined as making appraisals of adverse situations or events as having negative implications for the characteristics or evaluation of the self.

These two aspects of catastrophizing are closely related and have been combined into a single measure in some existing research. Catastrophizing has been found to be negatively related to the desirable academic characteristics of resilience and achievement. In a sample of U.S. third through sixth graders, catastrophizing of academic competence was investigated in relation to motivational resilience and academic achievement (Pitzer & Skinner, 2017). Catastrophizing of competence was significantly negatively correlated with motivational resilience, and also significantly negatively correlated with academic achievement.

Related Constructs

Catastrophizing is similar to some other constructs which have been investigated in relation to coping, including pessimism and self-doubt. Pessimism is the opposite of optimism. These constructs are used to refer to patterns of expecting things to go well versus expecting things to go poorly. Carver and Scheier have studied optimism and pessimism as trait-like, defining dispositional optimism as generalized expectancies that personal outcomes will be positive (Carver & Scheier, 2014). A person with generalized low levels of optimism exhibits dispositional pessimism. Relationships between dispositional optimism, dispositional pessimism and academic coping have been investigated empirically. Dispositional optimism has been found to predict problem-focused and approach coping, while dispositional pessimism predicted emotion-focused and avoidance coping (Nes & Segerstrom, 2006). In contrast, however, dispositional pessimism is more focused on expectations of future events, rather than on the meaning of past events and current situations.

Another construct similar to catastrophizing also involves pessimism. Defensive pessimism is the adoption of pessimistic thinking as a strategic response to potential threats to perceived competence and self-evaluation within, for example, the academic domain. Students with defensive pessimism expect the worst. By reducing their own expectations and those of parents and teachers, these students avoid looking or feeling bad when poor results occur for academic tasks and assessments (Norem & Cantor, 1986). Defensive pessimism often produces self-handicapping, a pattern reduced expectations and lowered performance which reduces threats to the self (Cantor & Norem, 1989). Defensive pessimism in turn is linked to maladaptive coping strategies, including avoidance and rumination. Defensive pessimism overlaps with catastrophizing, with both involving negative thoughts about future outcomes. Defensive pessimism, however, is conceptualized in terms of a strategic purpose, the prevention of negative evaluations of the self, based on performance. Catastrophizing is not contingent on any particular motive or desired outcome.

Self-doubt is another concept similar to catastrophizing. Self-doubt may lead to or result from catastrophizing cognitions that interpret circumstances as having negative implications for the self. Negative evaluation of the self is at the core of catastrophizing. Self-doubt has been defined as an act or state of doubting oneself and having doubt or instability in self-views (Braslow et al., 2012). As a construct, self-doubt focuses on levels of uncertainty about the characteristics of the self, while catastrophizing focuses on negative interpretations of events and circumstances and their implications. In relation to academic activity, self-doubt has been assessed in terms of how unsure students are of their abilities in general (Oleson et al., 2000). This contrasts with catastrophizing of competence, where there is a negative self-evaluation of the level of academic ability in the face of adversity. The two are related. Self-doubt is a more trait-like conceptualization, while catastrophizing is more state-like. Both may be bound to similar emotional experiences of doubt, disappointment, or discouragement. Additionally, even when trait-like, uncertainty about ability may lead to temporary negative self-evaluations when tasks are difficult, or setbacks are encountered. Harlow and Cantor (1995) have observed that self-doubt is associated in some students with defensive pessimism, which increases negative cognitions as part of a strategic response, geared to reducing the negative implications of potential setbacks or failure. Self-doubt is linked to a variety of maladaptive ways of coping, including denial, behavioral and mental disengagement, and rumination, through the elicitation of defensive pessimism and self-handicapping (Oleson et al., 2000; Wichman & Hermann, 2009; Zuckerman et al., 1998).

Development of Catastrophizing

Clinical research on catastrophizing has investigated its developmental history, focusing on early childhood risk factors. But catastrophizing tendencies can continue to develop across the lifespan. Early adolescence may be a transitional time when levels of catastrophizing are changing for some students. In a longitudinal study that followed a sample of U.S. children from infancy to fifth grade, negative cognitive style was found to reflect gender and temperament, but also to develop in response to parenting practices and life events (Mezulis et al., 2011). Following the same sample during adolescence, although the overall levels of negative cognitive style for the average of all participants did not change significantly, the researchers discovered through latent profile analysis that there were three subgroups with different trajectories. One group, representing 22% of the sample, showed increasing negative cognitive style across the four years from age 11 to age 15, while 9% showed a decreasing trajectory, and 71% were stable. Membership in the group with increasing negative style was predicted by sex, temperament, and life stress during the study period. Because early adolescence and the transition to middle school are stressful, early adolescence may be an opportune age group for examining the effects of catastrophizing, especially in the academic domain.

Catastrophizing and Academic Coping

Research using data from the same source as the data for the proposed dissertation research has found relationships between catastrophizing and academic coping. In a sample of U.S. third through sixth graders, catastrophizing of academic competence was investigated in relation to academic coping (Skinner et al., 2013). Catastrophizing of competence was found to have significant correlations with total adaptive academic coping (r = -.69 in fall, r = -.66 in spring), and total maladaptive academic coping (r = .69 in fall, r = .66 in spring, p < .001) as well as separate ways of adaptive coping (r range from -.37 to -.60, p < .001) and separate ways of maladaptive coping (r range from .13 to .67, p < .001).

Skinner and Saxton (2020) investigated the effect of catastrophizing on trajectories of each of six ways of maladaptive academic coping across a four-year period from the beginning of third to the end of sixth grade. Catastrophizing was operationalized using a combined scale of 27 items for catastrophizing of context and self in relation to relatedness, autonomy, and competence. Differences in levels of catastrophizing were consistently associated with developmental trends for differences in the levels of the five of the ways of maladaptive coping. The slopes of the trajectories of change in coping, in which average levels of maladaptive coping continually increased across fifth and sixth grades, were not noticeably different for groups of students with different levels of catastrophizing. Mean level changes in catastrophizing itself across the years were not reported. Relationships between catastrophizing and changes in ways of adaptive coping were not investigated in this study. In analyses based on including a concept tangentially related to catastrophizing, relationships were identified between higher levels of a measure of combined positive appraisals of context and self in relation to all three self-system processes (relatedness, autonomy, and relatedness) and higher levels of students' use of five ways of adaptive coping. Although not explicitly defined as measures of low catastrophizing in this part of the study, the positive appraisals for self-systems are likely correlated with low catastrophizing, and the result suggests that lower catastrophizing could predict higher use of adaptive ways of academic coping. The general pattern of adaptive coping, with mean levels of all five adaptive ways continually declining across fifth and sixth grades, did not show up for students in the groups with high level of positive self-system appraisals, suggesting that low levels of catastrophizing, which can be expected to correspond to positive self-system appraisals. Specifically, *low catastrophizing* might be a protective factor against normative declines in adaptive ways of coping at the beginning of adolescence. This does not suggest, however, any particular relationship between *high catastrophizing* and adaptive or maladaptive coping.

Unique Effects of Motivational Antecedents of Academic Coping

Some existing research has addressed two of the motivational antecedents or similar constructs within a single study, either in relation to academic coping, or as predictors of other academic outcomes. Most of this research suggests that these three predictors are complementary or additive, with each contributing uniquely to outcomes. Some research has also investigated the possibility that motivational antecedents may interact, with the effect of one predictor depending on the level of another.

Perceived control and autonomous motivation make unique contributions to academic engagement. In a study of elementary school students, Patrick, Skinner, and Connell (1993) found that autonomous motivation, assessed using a composite index

(RAI; Ryan & Connell, 1989) significantly predicted behavioral engagement ($\beta = .25$, $p < .001$) and emotional engagement ($\beta = .27$, $p < .001$), controlling for the effect of perceived control, assessed using a composite index (ConMax; Skinner et al., 1990) on behavioral engagement ($\beta = .56$, $p < .001$) and emotional engagement ($\beta = .53$, $p < .001$). No significant interaction effects were found. In a study of high-ability elementary school students, autonomous motivation was found to make unique contributions to some behaviors and emotions that are associated with academic coping (persistence, avoidance, ignoring, participation, faking), controlling for a construct that is similar to one perceived control component (capacity beliefs about ability), perceived competence (Miserandino, 1996). Potential interaction effects were not reported. Although of limited generalizability, this study suggests that the contribution of autonomous motivation to academic coping may be above and beyond the contribution of perceived control, at least for the "ability capacity" component of control.

Different patterns of coping might exist for students with different combinations of levels on perceived control and autonomous motivation. In a study that sought to understand differences in test anxiety and emotion regulation associated with test taking, using an undergraduate sample, Davis et al. (2008), found differences in preferences for five ways of coping between groups of students in five motivational profiles, which had been identified on the basis of student characteristics related to perceived control and autonomous motivation. Control-related characteristics were assessed using measures of efficacy and agency ("can"). Characteristics related to autonomous motivation were assessed using measures of goal relevance and goal congruence ("care"). Students high on all predictors (care and can group) showed opposite patterns of coping preferences from those found among students in the profile where levels were low on all predictors ("don't care and can't"). Task-focused coping was at its highest level in the all-high group and lowest levels in the all-low group, out of the five profiles. Interestingly, tension reduction coping was also at its highest level in the all-high group and at the lowest level in the all-low group, suggest there may be complex relationships between motivational variables and students' repertories of academic coping, rather than a binary tradeoff between problem-focused and emotion-focused coping. Levels of the other three ways of coping included in the study, reappraisal, wishful thinking, and self-blame, also showed opposite patterns between these two groups, although not at their most extreme levels out of the five groups. Patterns of coping found within the other three groups of students, those with low levels on one pair of motivational antecedents and medium levels on the other pair, and those with moderate levels on both sets, were unique for each combination. This suggests that the predictors in the study, which were similar to constructs of perceived control and autonomous motivation, may not operate in a simple additive fashion, but rather may combine in various complex relationships that are associated with unique patterns of responding to stress.

Perceived control and catastrophizing are related in that catastrophizing is associated with low levels of perceived control, but they are considered distinct constructs and should have unique effects. No studies were found that included both perceived control and catastrophizing as predictors of academic coping or other academic outcomes, but one study investigated both perceived control and pessimism. Fontaine and colleagues (1993) investigated the relationships between optimism/pessimism on coping in a U.S. undergraduate sample and included perceived control over stress as a covariate.

Both optimism/pessimism and perceived control over stress were significantly correlated with specific ways of coping. Also, perceived control and optimism/pessimism, were only modestly correlated with each other ($r = .39$, $p < .01$). The low correlations suggest that optimism/pessimism and perceived control are distinct constructs, but the authors did not investigate their separate or combined contribution to coping using, for example, multiple regression. This does not, however, provide evidence that a similar result would be found for catastrophizing itself and perceived control, since pessimism and catastrophizing are not synonymous.

The unique roles and potential interactions of autonomous motivation and catastrophizing as predictors of academic coping have not been investigated in existing research. One study, however, included both pessimism and autonomous motivation as predictors of academic coping. A sample of Canadian undergraduates was used to investigate the relationships between optimism, pessimism, autonomous versus controlled motivation, and task-oriented and disengagement coping (Thompson & Gaudreau, 2008). Controlled motivation mediated the relationship between pessimism and disengagement coping. Additionally, disengagement coping was associated with increases in controlled motivation. Autonomous motivation mediated the effect of optimism on task-oriented coping. Additionally, task-oriented coping was associated with increases in self-determined motivation. This study provides no direct evidence on the unique roles of autonomous motivation and catastrophizing, but it does show some interesting relationships for pessimism, which is related to catastrophizing.

Overall, the reviewed studies, although not providing direct evidence, at least suggest a positive relationship between catastrophizing and maladaptive ways of coping may exist. No clear evidence or implications were found for a relationship between catastrophizing and adaptive coping.

Peers at School

The social context makes unique and substantial contributions to students' experiences of school and to the development of their motivation and engagement (Wentzel, 2004, 2021). A social contextual perspective emphasizes the role of three social partners in development generally, and academic activity specifically. Parents, teachers and peers each make unique contributions to development and to learning (Skinner et al., 2022). The current research focuses specifically on the role of peers. In general, relationships with friends and peer group members play an important role in human development. Peer relationships are a context for the development of essential skills and capabilities, including cooperation in joint activity, navigation of social structures, leading and following, and control of hostility and aggression (Rubin et al., 2015), as well as in the development of prosocial behavior (Dirks et al., 2018).

In the academic domain, friendships and peer groups are a context for the development of academic interests and goals. These effects occur through socialization of norms and values, modeling of academic behaviors, and sense of belonging at school resulting from joint participation and social bonds (Ryan & Shin, 2018). Some studies have identified peer effects at the classroom level or on the basis of popularity or social status, while other studies have identified influence within friendships or peer groups. Levels of individual student academic engagement, for example, have been found to be influenced by the level of engagement within a student's group of closely affiliated peers (Kindermann, 2007).

Challenges in the Study of Peer Effects

Peer relationships and associated influence processes are challenging to study. Reliably identifying students' groups of influential peers, for example, requires detailed and time-consuming procedures, such as social-cognitive mapping (SCM; Cairns et al, 1985). Characterizing peer group attributes requires both the reliable assessment of the characteristics of individual group members and the characterization of the group itself, typically achieved by computing a group average of individual characteristics (Kindermann, 1993). Additionally, the explanation of similarities between an individual and the other group members, as well as change in the degree of similarity over time, requires the investigation of the simultaneously occurring and interacting processes of selection and influence.

Similarity between friends and members of closely affiliated groups has long been recognized and described as homophily. The two origins of homophily, selection on the basis of existing similarity and influence processes through which individuals become more similar over time, are challenging to distinguish (Kandel, 1978). Children and adolescents form ties with others their age on the basis of a variety of characteristics, including popularity, academic competence, social and emotional skills or dispositions, and aggression or its absence, and the selection is often made on the basis of similarity (Bukowski et al., 2000). Observable characteristics, such as physical traits and behaviors, provide a more obvious basis for selection and deselection than mental states or dispositions (Urberg et al., 1998). In longitudinal models, selection effects are often identified as the correlation between individual levels on a variable and their social partners at the first time point (Kindermann, 2007).

Peers influence children and adolescents on a variety of characteristics and behaviors. Many researchers have focused on negative influences involving, for example, aggression, substance use, and disruptive behavior, but peers also have positive influences. Peers, , can positively affect academic motivation and engagement, as well as participation in extracurricular activities (Juvonen et al., 2012). A recent meta-analysis found effect sizes for peer influence are greatest for externalizing behaviors (aggression, substance use, and disruptive behavior), smaller for some internal variables (depressive symptoms and anxiety), but also consistently significant for desirable academic behaviors across late childhood and adolescence (Giletta et al., 2021). Peer influence may extend beyond the adoption of observable behaviors to include attitudes and values that are discernible within conversational and classroom interactions with friends and peer group members. Chow and colleagues (2018) found evidence of influence, but not selection, effects for academic task values in the first two years of high school. In a late adolescent sample, Wang and colleagues (2018) found evidence of selection effects in peer networks based on behavioral academic engagement, but not based on cognitive or emotional engagement. They found influence effects, however, for all three components of academic engagement.

Peer influence occurs through a variety of pathways. Behavioral mechanisms include reinforcement and observational learning, while mechanisms of influence that depend on cognitive processes include conformity with norms, identification with role models, and social comparison (Kindermann, 2016; Laursen, 2018). Peer influence also occurs indirectly by stimulating motivation; peers can be fun (Laursen et al., 2020), and may be a valuable source of reassurance and encouragement in school contexts (Khan, 2012).

Peers at School in Early Adolescence

In addition to the advances in cognitive processes that characterize adolescence (Byrnes, 2006), extensive changes are happening in adolescents' social cognition and the organization of their social worlds. These developments emerge in response to changes in both the adolescent brain and in their developmental contexts, which jointly contribute to more complex social information processing (Blakemore & Mills, 2014). Social cognitive change in adolescence includes greater sensitivity to social rewards (Foulkes & Blakemore, 2016), to social evaluation (Somerville, 2013), and to social rejection (Sebastian et al., 2010). As captured in the concepts of adolescent egocentrism and imaginary audience, adolescence is characterized by heightened awareness of social signals and concern for what other people think and feel about oneself (Vartanian, 2000). Social comparison is at peak levels during adolescence, compared to later periods of development (Buunk et al., 2020). Classroom practices in middle school, which often promote performance rather than mastery orientations, can further contribute to adolescents' sensitivity to social evaluation and the prominent role of social comparison in adolescent social cognition (Butera & Darnon, 2017). Concomitantly with heighted social awareness and more complex social information processing, social influence from agemates and conformity to behaviors and attitudes of prominent individuals and reference groups are increasingly widespread in early adolescence (Allen et al., 2022; Laursen & Faur, 2022; Laursen & Veenstra, 2021).

Changes in social cognition are associated with an overall social reorientation in early adolescence (Nelson et al., 2016). Adolescent social life is organized to a greater extent around activity with other adolescents, compared to activity with siblings, parents, or other adults. The amount of time spent with agemates outside the home increases (Larson & Richards, 1991; Larson et al., 1996; Lam et al., 2014). During the transition to middle school, old friendships from elementary school may disappear, while new friendships and connections with unfamiliar peers are forming. Greater instability in social relationships provides greater opportunities for exploration, self-definition, and identity formation. At the same time that new and different relationships are appearing, relationships with peers generally are more complex, and involve more caring, sharing, and helping (Brown & Larson, 2009). The quality of adolescent relationships changes, with greater levels of intimacy and reciprocity (Jones et al., 1989; Rotenberg & Chase, 1992). Adolescent peer relationships involve a unique social structure of status, groups, and evaluative judgements (Farmer et al., 2016). Adolescents spend more time with groups, compared to dyadic friendships, and establishing group memberships and consolidating group identities has been described as a key developmental task of adolescence (Newman & Newman, 2001).

The increasing prevalence and changing characteristics of peer relationships make them an important developmental context with potential implications for developmental changes in coping. Hirsch (1985) used case studies to illustrate how students' coping with adversity may involve support from a network of closely affiliated peers. Another study found that adolescents who received support from both family and peers had better coping than those who relied primarily on one or the other (Palmonari et al, 1991).

Informational, instrumental, and emotional support all become common components of peer relationships, and not just with best friends (Cantin & Boivin, 2004). In addition, considering the ascendance of peer influence in early adolescence, peers may impact students' academic coping directly, by modeling or reinforcing specific adaptive and maladaptive ways of coping, or indirectly, through their influence on associated factors, such as motivational antecedents of coping.

Peers and Coping

There are at least four different pathways through which peers can influence academic coping. These are four ways peers can serve as a resource and have a positive impact on students in school. Three of these have been investigated in existing research. First, when students reach out to their peers for help, encouragement, and reassurance, peers themselves become the means of coping. Second, the ways of coping used by peers may serve as a resource for a student's own involvement in schoolwork and academic tasks, promoting their academic engagement. Third, the ways of coping used by peers may influence the student's own use of those same ways of coping. I will begin by describing the existing research on these three pathways. Then I will review literature relevant to the fourth pathway, which is the focus of the proposed research: how peers might influence academic coping by shaping its motivational antecedents, in this case by influencing perceived control, autonomous motivation, and catastrophizing.

Peers as the Means of Coping

Perhaps the most important way in which peers are involved in the coping of children and adolescents is that they can be accessed directly, as the means of coping, when they are relied on for help, instrumental assistance, encouragement, comfort, and emotional support. Help-seeking is turning to others for advice or assistance with specific challenging tasks and problems. Comfort seeking is turning to others in the face of a problem or challenge for reassurance, encouragement, or emotional support. “It’s going to be alright; you’re going to be okay.” In childhood, turning to others for comfort and assistance most typically involves adults, rather than other children, but in adolescence the balance shifts. Peers become an increasingly important source of support, especially after the transition out of elementary school. Research on social support sometimes combines or conflates help and comfort, but these two types of interactions show up and play out differently.

Help-seeking from Peers

Close friends, affiliated peers, and even other agemates at school with no special connection to a student, these types of peers can all be turned to as sources of aid and assistance. Best friends are an important source of academic help, because close friendships typically involve high levels of sharing and mutual support (Berndt & Keefe, 1996). Affiliated peers, members of a student’s group of acquaintances and other students that they spend time with and join in activities together with, are also potential sources of academic assistance. Other classmates may be turned to because of their proximity in the classroom, or their level of knowledge or skill with specific tasks.

Not all students rely on peers to the same extent for help in learning and completing academic tasks. Three patterns of help-seeking from peers have been identified: avoidance, expedient, and adaptive (Ryan et al., 2005). Some students, for one reason or another, avoid seeking assistance from their agemates. This pattern includes students who are socially inhibited or lack close relationships, as well as those who believe help-seeking is “uncool,” or embarrassing. Other students exhibit expedient help-seeking, reaching out to peers to do their work for them or give them answers, forms of help that don’t improve their own skills or learning. Finally, some students make use of help-seeking in an adaptive way that contributes toward their involvement and learning process. Adaptive help seeking is associated with a mastery orientation, while expedient help-seeking is negatively correlated with mastery goals (Shim et al., 2013). The transition to middle school, with teachers increasingly emphasizing performance on test, grades, and demonstrating ability, encourages expedient help-seeking, which increases at this time relative to adaptive help-seeking (Ryan & Shim, 2012). The shift to performance goals and expedient help-seeking is also associated with greater reliance on social comparison and greater concern with social embarrassment in early adolescence (Newman, 2002). These developments may impair the potential of peers to exert a positive influence in the academic domain. On the other hand, social goals in adolescence overlap with academic goals and increased attention to the social world can enhance the potentially positive role of peers when social connections are made with peers who value and engage with schoolwork (King et al., 2012; Roussel et al., 2011). The social world of adolescence is also a positive force in learning activity when it is a context for cooperation and cooperative learning (Newman, 2002; Roseth et al., 2008).

Comfort-seeking from Peers

Comfort-seeking from peers increases in importance during adolescence as adolescent relationships, on average, show greater intimacy and self-disclosure. Increasing intimacy in adolescence is part of an overall social reorientation that affects the quality and content of relationships and the choice of social partners (Jones et al., 1989; Nelson et al., 2016). Self-disclosure is promoted by enhanced closeness in relationships (Chow & Buhrmester, 2011). Self-disclosure increases with age and is higher in girls than in boys (Papini et al., 1990; Valkenburg et al., 2011). Reciprocity in disclosures, a pattern of mutual exchange, also emerges in late childhood and becomes a feature of close adolescent relationships (Rotenberg & Mann, 1986; Rotenberg & Chase, 1992).

Several beneficial aspects of comfort-seeking have been described. These include encouragement (Khan, 2012; Stake, 2006), reassurance (Harlow & Cantor, 1994), emotional soothing (Chatterjee et al., 2017), and reduced worry (Altermatt, 2007). But comfort-seeking can also have costs. Harlow and Cantor (1994) found, in a college sample, that when academic concerns spill over into the social domain in the form of looking for reassurance, a social cost is incurred by some students, because not all social partners are amenable to offering support. Comfort-seeking, like help-seeking, is an available adaptive coping strategy for students who feel comfortable seeking it, and whose closely affiliated peers are willing and able to respond in supportive ways (Altermatt & Broady, 2009; Chow & Buhrmester, 2011).

Peers' Coping as a Resource for Students' Engagement

The ways of coping used by peers may act as a resource for a student's involvement in schoolwork and academic tasks, reflected in their engagement. Although proximal processes involved in such effects have not been thoroughly explored, it may be that when students see their peers overcoming challenges and setbacks through the use of proactive behaviors, such as strategizing and help-seeking, or positive cognitive responses that maintain engagement, such as self-encouragement and commitment, they will themselves adopt similar approaches and be influenced to maintain their own academic engagement. A master's thesis using the same data as the current research explored this possibility (Grimes, 2019). No significant effects were found for peer group averages of 11 ways of coping or the adaptive or maladaptive aggregates of academic coping predicting students' individual engagement over the course of the first year of middle year (Grimes, 2019).

Peers' Coping as a Resource for Students' Coping

The ways of coping used by peers may influence the student's own use of those same ways of coping. This direct influence of peer group members' ways of coping may occur through one or more of the influence mechanisms that have been described for peers in childhood and adolescence. Peers' coping, for example, may manifest as observable behavior that serves as a model for observational learning or identification with a role model. Alternatively, peers may influence the individual student's adoption of coping strategies by information exchange and self-disclosure within conversations. A study using the same data as the current research explores the possibility of influence on student academic coping from peers' levels of ways of coping (Grimes et al., n.d.). Peer group averages for strategizing, help-seeking, and total adaptive coping in the fall significantly predicted individual students' coping using those strategies in the spring, controlling for students' fall levels of those variables ($\beta = .277$, $p < .01$, $\beta = .266$, $p < .01$, $\beta = .225$, $p < .01$, respectively). No other ways of coping by peers significantly predicted students' own coping across the year.

Peer Influence on Motivational Antecedents of Academic Coping

Having introduced existing research on peers as the means of coping, peer coping as a resource for engagement, and influences of peers' ways of coping on individual students' ways of coping, I turn now to the focus of the current research, the influence of peers on motivational antecedents of academic coping. The proposed research will investigate whether peers can influence academic coping indirectly, through their effects on perceived control, autonomous motivation, and catastrophizing. Some research has found evidence for the role of peers in students' self-efficacy, which may be related to perceived control. Other research on peer influence on school motivation, behavior, and emotion is only suggestive of how peers might impact the three motivational antecedents.

Peer Effects on Perceived Control

Although there are no studies of peer effects on perceived control *per se*, some research has investigated a similar construct, academic self-efficacy. In the perceived control literature, capacity beliefs are expectations about access to strategies for doing well in school, including effort and ability (Skinner et al., 1989). Self-efficacy has been defined as perceived capabilities for learning or performing actions (Bandura, 1977). Academic self-efficacy is thus similar to capacity beliefs for access to ability in academic tasks. Other people are known to play an important role in the development of self-efficacy. Help, expectations, and standards coming from others have been shown to contribute to self-efficacy (Bandura, 1997). Two studies on middle school students have investigated the effects of peers on student self-efficacy for learning. I will consider each of these studies in turn.

Nelson and DeBacker (2008), using a sample that included sixth, seventh and ninth graders (51% were White), found that belongingness (sense of acceptance and belonging with other students; Goodenow, 1993) predicted self-efficacy (standardized regression coefficient = .23, $p < .001$). Also included in the analysis as predictors were two characteristics of students' best friends, namely school valuing and resistance to school norms, but neither was significantly related to student's self-efficacy (standardized regression coefficients .10 and -.05, respectively, ns). Best friend's own self-efficacy was not tested as a predictor of student self-efficacy. The study thus provided no evidence for an influence of peers on self-efficacy.

Shin and Ryan (2014) used stochastic actor-based social network analysis (Steglich et al., 2010) to investigated peer selection and influence effects on academic motivation and achievement, including self-efficacy, intrinsic value, and effortful engagement. The sample consisted of U.S. 6^{th}-graders (37%-40% White). Although there was a selection effect for friendships based on similarity in self-efficacy, there was not a significant effect for influence. Peers did not influence each other over the course of the year to become more similar in terms of self-efficacy, which was operationalized as beliefs about the ability to be successful with schoolwork. The authors suggested that effects of peers on self-efficacy could be related to processes of social comparison, which may operate differently for different students. If this is the case peers' self-efficacy could be having a positive influence for some students and a negative influence for other students, with no significant average effect for the sample overall. Shin and Ryan (2014) did find, however, that peers overall do significantly influence levels of valuing of school and of effortful engagement, causing students to become more similar over time on these attributes.

One other study with a middle school sample has investigated peer effects for a different competence-related belief, expectancies for success, which is another construct similar to capacity beliefs for ability. Ryan (2001) found that peer group average level of expectancies for success did not influence student's own expectancies over the course of the year. The sample was U.S. seventh graders (68% White), who were in their first year of middle school. Expectancy for success was operationalized as beliefs about how well a student would do in school.

Altermatt (2019) also investigated peer effects on self-efficacy but using a college undergraduate sample (92% White), looking for evidence of potential mechanisms for effects on student self-efficacy of interpersonal interactions with friends. The study focused on the perceived quality and content of interactions with friends, assessing five separate components of perceived support from peers as predictors of self-efficacy. The results showed that students' perceptions of supportive responses from friends to academic successes (enthusiasm and congratulations) had a significant effect on self-efficacy, mediated by perceptions of overall academic support from friends, but that supportive responses to academic challenges (helping, comforting, encouragement), while contributing to perceived support, did not directly or indirectly predict self-efficacy. Although results are inconclusive, this and other studies suggest that we should not rule out the possibility that peers can affect self-efficacy and, analogously, may also potentially influence perceived control.

Peer Effects on Autonomous Motivation

Autonomously motivated learning activity, because it is internally originating, freely chosen, and independent action, would appear to have little to do with common types of peer influence such as conformity and approval-seeking. Although friends and peer group members who like school and embrace learning tasks may serve as role-models, it is not clear that this would be enough for a student to experience the same level of intrinsic interest and enthusiastic participation, unless their own existing interests and enjoyment leaned in that direction. No existing research directly addresses the extent of peer influence on autonomous motivation. A useful way to begin considering the possibility of this influence is by looking at the development of autonomous motivation during the transition from childhood to adolescence. It will also be useful to consider research on peer effects for the closely related construct of intrinsic value.

Educational psychologists have long recognized the pervasive decline of intrinsic motivation across late childhood and adolescence (Gottried et al., 2001). The mismatch between the school environment and students' developing needs and capacities has been identified as an important contributor to these declines (Eccles & Midgley, 1989). The quality of individual student's experiences with success and failure, however, and their interpretation of information about their own ability, are also important in shaping trajectories of intrinsic motivation at school (Gottfried et al., 2007). If students' normative declines in autonomous motivation during early adolescence result from their experiences in school, positive and supportive relationships with peers who are motivated to learn and who are coping constructively with difficulties might buffer this risk by reframing the interpretations of negative experiences and influencing students' responses.

Peer relationships could provide a context where academic challenges and poor performance can be discussed and interpreted in positive ways and met with reassurance and encouragement from peers (Altermatt & Broady, 2009; Stake, 2006). Positive interpretations and encouragement may come from students who themselves value school, have high levels of interest and enjoyment, and who cope well with challenges and setbacks. These positive interactions could allow students to maintain their commitment to school and stimulate them to continue placing a high value on education, even though they may not be at the top of their class. This might counteract the normative tendency for autonomous motivation to decline. It is also possible, however, that autonomous motivation stems from deeper and more stable individual characteristics which may be resistant to social influence. Peer influences on academic engagement may operate through social comparison, self-presentation, and introjected motivation, rather than through any effect of peers on autonomous motivation.

One longitudinal study found evidence that adolescent peers' valuing of school influences students' own academic values. Shin and Ryan (2014) used actor-based models (Steglich et al., 2010) to separate selection and influence in a year-long study of 6^{th} graders. Intrinsic value was assessed using items regarding students' interest in and enjoyment of schoolwork. Across the year, students were found to influence each other on levels of intrinsic value, even though no selection effects were found for intrinsic value. Small selection effects were found, however for visible behavior in the classroom, including effortful behavior and disruptive behavior. It appears that, even though friends are not chosen on the basis of their academic values, those values can be influential on a student's own values. Values are correlated with autonomous motivation but are a distinct construct. Although the evidence on peer influence on intrinsic value is suggestive, it does not provide direct support for the possibility of peers' autonomous motivation having an influence on individual students' motivation. Since valuing and autonomous motivation are distinct constructs, this research on valuing is of limited value in understanding what role, if any, peers might play in the development of students' autonomous motivation. Overall, there is no clear evidence directly or indirectly supporting the possibility that peers influence autonomous motivation.

Peer Effects on Catastrophizing

No previous research has investigated the influence of peers on catastrophizing in academic contexts. From what we know about catastrophizing, however, as reviewed above in the section on motivational antecedents of academic coping, it may be possible to develop some expectations about the potential for peer influence on this phenomenon. Catastrophizing is a pattern of negative cognitions, interpretations, and expectations about outcomes in the academic context and about personal characteristics relevant to academic success. Negative cognitions are often associated with negative affect and specific negative emotions such as sadness, anger, disappointment, and discouragement. A category of negative cognitions with some similarity to academic catastrophizing, depressogenic cognitive style, has been the topic of research into the cognitive correlates of depression and anxiety.

Depressogenic cognitive style is a pattern of negative causal attributions, interpretations, and expectations triggered by negative events and situations (Alloy et al., 1999). At least two widely used instruments for assessing negative cognitive style contain subscales for catastrophizing (Cognitive Emotion Regulation Question, CERQ, Garnefski et al, 2001; Children's Negative Cognitive Error Questionnaire, CNCEQ, Leitenberg, 1986). One study has investigated the possibility of peer influence on negative cognitive style during adolescence. In a longitudinal study of friends' influence on depression in an adolescent sample, Stevens and Prinstein (2005) assessed both depressive symptoms and depressogenic attribution style at two time points. Assessment of depressogenic attribution style was made with the Children's Attributional Style Questionnaire – Revised (CASQ-R, Thompson et al., 1998), an 18-item measure focused on overgeneralization and causal attribution to negative aspects of the self, which are cognitions similar to catastrophizing. The authors found a significant relationship between friends' depressive symptoms change in individual depressive symptoms and individual depressogenic attribution style. Friends' depressogenic attribution style, however, was not a significant predictor of change in individual depressive symptoms or of change in individual depressogenic attribution style.

The findings in the Stevens and Prinstein (2005) study showed no influence from friends on negative cognitive style in adolescence, although there did seem to be influence on depressive symptoms. This result is interesting, because negative cognitions are often investigated as an antecedent of depression (Alloy et al., 1999). Contrary to what might be expected from this hypothesized prominent role of cognitions, the Stevens and Prinstein findings imply that any peer effect on depressive symptoms doesn't come from adopting peers' negative thoughts and beliefs, but rather from sharing emotional experiences. In a longitudinal study of Finnish high school students, Kiuru and colleagues (2012) found evidence of convergence of individuals toward the peer group average level of depressive symptoms, in a process they described as socialization of emotion.

Although not directly investigating catastrophizing, the evidence from these two studies suggests that adolescent peers are not actually influential in shaping negative cognitive style over time, but instead play a role in shaping emotional experiences or emotional expression. It is not clear from existing research that peers can influence catastrophizing.

Chapter 3. Study 1 – Motivational Antecedents

Two studies were conducted to investigate the effects of three motivationally relevant antecedents of academic coping. This chapter describes Study 1, which focuses on the prediction of academic coping by the student's own motivational variables. Chapter 4 covers Study 2, which investigated peer influence on the three motivational antecedents of academic coping.

Aim and Research Questions

Study 1 uses longitudinal data to investigate a motivational account of changes in academic coping. According to this account, academic coping is shaped by underlying motivational constructs relevant to the experience of academic challenges and setbacks and their meaning in the pursuit of ongoing learning activities. Three primary motivational constructs have been identified on the basis of the literature review, as discussed in Chapter 2. These are perceived control, autonomous motivation, and catastrophizing. Each represents a different set of beliefs having an impact on the experience of academic adversity. Study 1 investigated the impact of each of the predictors separately on changes in academic coping across one school year, using two approaches. First, the relationships between beginning levels of the three motivational antecedents and change in coping across the year were investigated using autoregressive longitudinal models. This type of model, sometimes called a "launch" model (Kindermann & Skinner, 1992), is effective for investigating the association between a temporally precedent predictor and an outcome, with change in the outcome conceptualized as values at the second time point controlling for values at the first time point (Newsom, 2024). Second, the association between changes in the three motivational antecedents and changes in coping across the year was investigated using bivariate latent change score models. This type of model, sometimes called a "change-to-change model" (Kindermann & Skinner, 1992), is effective for investigating relationships where change is conceptualized as the difference between values at two time points (Newsom, 2024). Six academic coping constructs were selected for the study. Effects of motivational antecedents on changes in academic coping were investigated for total adaptive coping, total maladaptive coping, as well as for two common ways of adaptive coping, strategizing and self-encouragement, and for two ways of maladaptive coping, projection and self-pity.

The following research questions and hypotheses were formulated for Study1.

Research Question 1: Perceived Control

RQ1. Perceived control: Does perceived control predict changes in academic coping across the first year of middle school?

Research Question 1a: Perceived Control – Level-to-Change

RQ1a. Level-to-change: Does level of perceived control in the fall predict academic coping in spring, controlling for academic coping in fall?

Hypothesis 1a1: The level of perceived control in the fall positively predicts total adaptive coping in spring, controlling for total adaptive coping in fall.

Hypothesis 1a2: The level of perceived control in the fall positively predicts each specific way of adaptive coping (strategizing and self-encouragement) in spring, controlling, for that way of adaptive coping in fall.

Hypothesis 1a3: The level of perceived control in the fall negatively predicts total maladaptive coping in spring, controlling for total maladaptive coping in fall.

Hypothesis 1a4: The level of perceived control in the fall negatively predicts each specific way of maladaptive coping (projection and self-pity) in spring, controlling for that way of maladaptive coping in fall.

Research Question 1b: Perceived Control – Change-to-Change

RQ1b. Change-to-change: Are changes in perceived control from fall to spring associated with changes in academic coping from fall to spring?

Hypothesis 1b1: Change in perceived control from fall to spring is positively associated with change in total adaptive coping from fall to spring.

Hypothesis 1b2: Change in perceived control from fall to spring is positively associated with change in each specific way of adaptive coping (strategizing and self-encouragement), from fall to spring.

Hypothesis 1b3: Change in perceived control from fall to spring is negatively associated with change in total maladaptive coping from fall to spring.

Hypothesis 1b4: Change in perceived control from fall to spring is negatively associated with change in each specific way of maladaptive coping (projection and self-pity), from fall to spring.

Research Question 2: Autonomous Motivation

RQ2. Autonomous motivation: Does autonomous motivation predict changes in academic coping across the first year of middle school?

Research Question 2a: Autonomous Motivation – Level-to-Change

RQ2a. Level-to-change: Does level of autonomous motivation in the fall predict academic coping in spring, controlling for academic coping in fall?

Hypothesis 2a1: The level of autonomous motivation in the fall positively predicts total adaptive coping in spring, controlling for total adaptive coping in fall.

Hypothesis 2a2: The level of autonomous motivation in the fall positively predicts each specific way of adaptive coping (strategizing and self-encouragement) in spring, controlling for that way of adaptive coping in fall.

Hypothesis 2a3: The level of autonomous motivation in the fall negatively predicts total maladaptive coping in spring, controlling for total maladaptive coping in fall.

Hypothesis 2a4: The level of autonomous motivation in the fall negatively predicts each specific way of maladaptive coping (projection and self-pity) in spring, controlling for that way of maladaptive coping in fall.

Research Question 2b: Autonomous Motivation – Change-to-Change

RQ2b. Change-to-change: Are changes in autonomous motivation from fall to spring associated with changes in academic coping from fall to spring?

Hypothesis 2b1: Change in autonomous motivation from fall to spring is positively associated with change in total adaptive coping from fall to spring.

Hypothesis 2b2: Change in autonomous motivation from fall to spring is positively associated with change in each specific way of adaptive coping (strategizing and self-encouragement), from fall to spring.

Hypothesis 2b3: Change in autonomous motivation from fall to spring is negatively associated with change in total maladaptive coping from fall to spring.

Hypothesis 2b4: Change in autonomous motivation from fall to spring is negatively associated with change in each specific way of maladaptive coping (projection and self-pity), from fall to spring.

Research Question 3: Catastrophizing

RQ3. Catastrophizing: Does catastrophizing predict changes in academic coping across the first year of middle school?

Research Question 3a: Catastrophizing – Level-to-Change

RQ3a. Level-to-change: Does level of catastrophizing in the fall predict academic coping in spring, controlling for academic coping in fall?

Hypothesis 3a1: The level of catastrophizing in the fall negatively predicts total adaptive coping in spring, controlling for total adaptive coping in fall.

Hypothesis 3a2: The level of catastrophizing in the fall negatively predicts each specific way of adaptive coping (strategizing and self-encouragement) in spring, controlling for that way of adaptive coping in fall.

Hypothesis 3a3: The level of catastrophizing in the fall positively predicts total maladaptive coping in spring, controlling for total maladaptive coping in fall.

Hypothesis 3a4: The level of catastrophizing in the fall positively predicts each specific way of maladaptive coping (projection and self-pity) in spring, controlling for that way of maladaptive coping in fall.

Research Question 3b: Catastrophizing – Change-to-Change

RQ3b. Change-to-change: Are changes in catastrophizing from fall to spring, associated with changes in academic coping from fall to spring?

Hypothesis 3b1: Change in catastrophizing from fall to spring is negatively associated with change in total adaptive coping from fall to spring.

Hypothesis 3b2: Change in catastrophizing from fall to spring is negatively associated with change in each specific way of adaptive coping (strategizing and self-encouragement), from fall to spring.

Hypothesis 3b3: Change in catastrophizing from fall to spring is positively associated with change in total maladaptive coping from fall to spring.

Hypothesis 3b4: Change in catastrophizing from fall to spring is positively associated with change in each specific way of maladaptive coping (projection and self-pity), from fall to spring.

Research Question 4: Unique Effects

RQ4. Unique effects (levels-to-change): Do perceived control, autonomous motivation, and catastrophizing each uniquely predict coping in spring, controlling for academic coping in fall?

Hypothesis 4a: The levels of perceived control, autonomous motivation, and catastrophizing in the fall each uniquely predicts total adaptive coping in spring, controlling for total adaptive coping in fall, and controlling for the other two of these three variables.

Hypothesis 4b: The levels of perceived control, autonomous motivation, and catastrophizing in the fall each uniquely predicts each specific way of adaptive coping (strategizing and self-encouragement) in spring, controlling for that way of adaptive coping in fall, and controlling for the other two of these three variables.

Hypothesis 4c: The levels of perceived control, autonomous motivation, and catastrophizing in the fall each uniquely predicts total maladaptive coping in spring, controlling for total maladaptive coping in fall, and controlling for the other two of these three variables.

Hypothesis 4d: The levels of perceived control, autonomous motivation, and catastrophizing in the fall each uniquely predicts each specific way of maladaptive coping (projection and self-pity) in spring, controlling for that way of maladaptive coping in fall, and controlling for the other two of these three variables.

Research Design and Methods

The data for Study 1 come from an existing dataset which includes two time points, fall and spring, for an entire cohort of sixth graders in the only public middle school in a town in the northeastern United States. Data collection was done during the 1990-1991 academic year. At the time of the study, approvals were in place from the school Principal and teachers, as well as the University of Rochester. The current study was conducted pursuant to a determination from the Human Subjects Review Board of Portland State University that further review was not required because the study does not constitute research with human subjects according to relevant guidelines.

Participants

The sample consisted of 366 sixth graders enrolled at the school. The sample is 48% female. Ethnicity and socioeconomic status data were not collected. The town, however, was predominately (over 90%) European American by descent, and largely lower middle to middle class. 87% of the adult population had at least a high school degree.

The data collection was organized around the students' homerooms. Each student had one homeroom teacher and had a class in their homeroom once a day. All 13 sixth grade homeroom teachers in the school participated in the study, allowing the collection of data from students in their class.

Procedure

Data collection took place at two time points, October and May, of sixth grade, the students' first year in middle school. Students completed self-report questionnaires containing items assessing each of the study variables. Teachers were not present in the classroom during completion of questionnaires by students.

Measures

Student questionnaires included multiple items assessing each construct. Response options for all items consisted of 4-point Likert type scales with available responses of: (1) not at all true, (2) not very true, (3) sort of true, or (4) very true. Negatively worded items, present in the measure of perceived control, were reverse coded. Likert-type scales are ordinal measures, with response options representing a set of ordered categories, but they are often treated as continuous variables. Research supports the treatment of ordinal variables as continuous in many instances, because there is often no practical difference in the results of analysis, especially when measures have five or more response categories (Finney & DiStefano, 2013; Rhemtulla et al., 2012). Because the items in all measures have four response categories, a selection of analyses were performed comparing the weighted least squares approach for ordinal variables to the maximum likelihood approach with robust standard errors for continuous variables. It was determined that treating the variables as continuous did not have any important impact on the conclusions.

Measures for all constructs in the analyses are represented as latent variables, with multiple items for each construct serving as observed indicators for the latent variable. Confirmatory factor analyses were conducted for each measure at each of the two time points. Results are shown in Appendix 1. Correlated item residuals in the factor models were investigated using modification indices. Residual correlations were scrutinized for theoretically justifiable relationships potentially indicating something in common between the items not captured in the common factor of the construct. Significant residual correlations with theoretical justification were retained in the structural equation models used to test research hypotheses.

Academic Coping

Five separate ways of adaptive academic coping and six separate ways of maladaptive academic coping have been identified (Skinner et al., 2013), and are assessed in the dataset using student responses to items measuring their coping with everyday problems with academic work. All scales have been used in previous research and found to have good stability across time. Internal consistency reliabilities (Cronbach's α) ranged from .59 to .81(Skinner et al., 2013). Similar psychometric properties were found in the current study (see below under "Preliminary Analyses"). Although in some cases, alpha was below commonly used cutoffs of acceptability, confirmatory factor analysis showed good model fit and adequate loadings for all ways of coping (see Table 3.1). Four of the eleven ways of academic coping were selected for investigation in the current study, based on their associations with the three motivational predictors on which the study focuses: strategizing, self-encouragement, projection, and self-pity. In addition, second-order factor models were created for total adaptive and total maladaptive coping. Each second-order factor model is comprised of five ways of coping. Rumination, although identified as a common maladaptive way of coping, is not highly correlated with other maladaptive ways, and was excluded from the current study.

The set of items for each way of academic coping asks students about their response to stressful events in school, with items using one of four different stems ("When something bad happens to me in school …," "When I have trouble with a subject in school …," "When I run into a problem on an important test …," "When I have difficulty learning something …"). Five of the subscales assessed adaptive ways of coping, including *strategizing* (e.g., "…I try to see what I did wrong), *help-seeking* (e.g., "…I ask for some help with understanding the material"), *comfort-seeking* (e.g., "…I talk about it with someone who will make me feel better"), *self-encouragement* (e.g., "…I tell myself it'll be okay"), and *commitment* (e.g., "I think about all the reasons it's important to me"). Five of the subscales assessed maladaptive ways of coping, including *confusion* (e.g., "I'm not sure what to do next"), *escape* (e.g., "…I tell myself it's not such a big deal"), *concealment* (e.g., "…I don't tell anyone about it"), *self-pity* (e.g., "…I say 'this always happens to me'"), and *projection* (e.g., "…I say it was the teacher's fault").

Confirmatory factor analysis (CFA) models of the five-item scales for each of ten ways of coping at each of two time points (fall and spring) were tested using Mplus version 8.9 (Muthén & Muthén, 2023). Fit statistics for CFA models are shown in Table 3.1. Item loadings (as well as fit statistics) are shown in Appendix 1. The chi-square values were nonsignificant for all ten individual ways of coping in fall and in spring indicating good fit to the data. Because chi-square is sensitive to sample size and several other conditions, however, alternative fit indices were also examined to determine whether the fit was adequate. Taken together, the alternative fit indices indicated acceptable fit for each of the ten separate ways of coping (RMSEA .000 to .059, CFI .966 to 1.000, SRMR .014 to .036), meeting standards suggested by Hu and Bentler (1999) for a good fitting model. Loadings for all items in all measures were above .4, except the measure of self-encouragement. Confirmatory factor models for self-encouragement had two items with loads below .4 at both fall and spring, suggesting results involving this measure may be of less than desirable reliability. This is taken into account in interpreting the structural models testing hypotheses involving the measure for this way of coping.

Second-order confirmatory factor analysis (CFA) models were tested for total adaptive coping and total maladaptive coping. Total adaptive coping was modeled as a latent variable with five separate ways of adaptive coping (strategizing, help-seeking, comfort-seeking, self-encouragement, and commitment), each with five items, as indicators predicted by the latent construct. The chi-square value was significant in fall and in spring (see Table 3.1), but the alternative fit indices indicated acceptable fit overall for the second-order factor model of total adaptive coping in fall (RMSEA = .027, 90% CI [.017 to .036], CFI = .949, SRMR = .051) and in spring (RMSEA = .035, 90% CI [.026 to .044], CFI = .931, SRMR = .056).

Total maladaptive coping was modeled as a latent variable with five separate ways of maladaptive coping (confusion, escape, concealment, projection, and self-pity), each with five items, as indicators predicted by the latent construct. The chi-square was significant in fall and in spring (see Table 3.1), but the alternative fit indices indicated acceptable fit overall for the second-order factor model of total maladaptive coping in fall (RMSEA = .037, 90% CI [.028 .044], CFI = .943, SRMR = .055) and in spring (RMSEA = .045, 90% CI [.037 053], CFI = .910, SRMR = 058).

Table 3.1

Confirmatory Factor Analysis Model Fit Statistics (N = 348)

Construct	Chi Sq.(df) *p*	RMSEA [.90]	CFI	SRMR
Total adaptive coping, fall	332.044(265) .003	.027 [.017 .036]	.949	.051
Total adaptive coping, spring	364.697(265) .000	.035 [.026 .044]	.931	.056
Strategizing, fall	8.588(4) .072	.059 [.000 .113]	.967	.036
Strategizing, spring	6.809(4) .146	.049 [.000 .111]	.982	.029
Help-seeking, fall	5.278(4) .260	.031 [.000 .093]	.994	.021
Help-seeking, spring	3.984(4) .408	.000 [.000 .088]	1.000	.020
Comfort-seeking, fall	5.924(4) .205	.038 [.000 .097]	.980	.027
Comfort-seeking, spring	2.628(4) 622	000 [.000 .072]	1.000	020
Commitment, fall	1.433(5) .921	.000 [.000 .026]	1.000	.014
Commitment, spring	6.636(5) .250	.033 [.000 .092]	.991	.030
Total maladaptive coping, fall	387.351(261) .000	.037 [.028 .044]	.943	.055
Total mal. coping, spring	431.664(267) .000	.045 [.037 .053]	.910	.058
Confusion, fall	5.383(5) .371	.015 [.000 .079]	.998	.023
Confusion, spring	10.608(5) .060	.062 [.000 .115]	.966	.035
Concealment, fall	4.228(4) .376	.013 [.000 .084]	.999	.019
Concealment, spring	6.070(4) .194	.042 [.000 .104]	.989	.023
Escape, fall	3.927(5) .560	.000 [.000 .067]	1.000	.019
Escape, spring	5.012(5) .414	.003 [.000 .081]	1.000	.025
Projection, fall	5.362(5) .373	.015 [.000 .078]	.998	.019
Projection, spring	4.356(5) .499	.000 [.000 .075]	1.000	.024
Self-pity, fall	7.576(4) .181	.039 [.000 .092]	.992	.024
Self-pity, spring	8.282(5) .141	.047 [.000 .102]	.991	.022
Autonomous motivation, fall	6.618(1) .010	.130 [.051 .230]	.966	.023
Autonomous mot., spring	4.221(1) .040	.104 [.018 .215]	.977	.022
Perceived control, fall	4.390(5) .495	.000 [.000 .071]	1.000	.022
Perceived control, spring	8.048(5) .154	.045 [.000 .100]	.972	.029
Catastrophizing, fall	46.457(24) .004	.053 [.029 .075]	.968	.034
Catastrophizing, spring	32.406 (24) .117	.034 [.000 .062]	.986	.031

Raw Versus Allocation Scores

There is a challenge in the assessment of the various ways of coping using self-report data. Students whose academic coping repertoires include several coping strategies and who report high levels on many ways of coping may be experiencing high levels of stress overall. Their self-reported use of individual ways of coping may be overstated in relation to other students because their responses to questionnaire items reflect not only their preference for individual ways of coping, but also their level of coping overall, capturing variance related to their total stress. Traditionally, to account for this phenomenon, many researchers have converted raw subscale scores (sometimes referred to as absolute scores) to *allocation scores* (sometimes referred to as relative or proportional scores), by dividing the average across the items for each subscale by the total of all the subscale scores of that student for all coping subscales. Allocation scores have been described as a way to assess the extent to which students distribute their coping resources between the various components of their coping repertoires, and as a way to effectively control for the effect of total stress (Skinner et al., 2013). Allocation scores, however, are not without their critics (Lapp & Collins, 1993). In addition, allocation scores are more cumbersome to implement in models using latent variables, because there are no scale averages in these models, only separate items.

In the current studies, with all analyses using latent variables, an alternative approach was implemented. First, total coping for ten ways of academic coping (five adaptive ways and five maladaptive ways; rumination was excluded) was computed for each participant, to be tested as an additional control variable in each of the analyses. To ensure that the total coping variable would be comparable between students, values for students with missing data were set to the sample mean for that way of coping at each respective time point. so that all students' total coping variable would reflect the sum of values for all ten ways of coping. Next, models were tested for all hypotheses in Research Questions 1a, 2a, and 3a, with total coping entered as an additional predictor. Although total coping is significantly correlated with many of the coping variables, it was not found to be a significant predictor of spring coping, controlling for fall coping, in any of the models. Because its impact in the predictive models was not significant, the models were then run without total coping as a control variable, and it is the results of these models that are reported in the results section.

Perceived Control

Control beliefs, students' generalized expectancies of whether they can produce success and avoid failure in school, were assessed with five items taken from two subscales from The Student's Perceptions of Control Questionnaire (SPCQ, Wellborn et al., 1989). The SPCQ is a longer instrument with ten subscales, one subscale assessing general control beliefs, five subscales assessing facets of control strategy beliefs (effort, ability, luck, powerful others, and unknown causes, as means to ends), and four subscales assessing facets of control capacity beliefs (effort, ability, luck, and powerful others, as individual perceived capacities). Beliefs about effort and about the ability to produce outcomes may be especially salient in relation to students' orientation to learning activity. The items chosen for the current study come from the two subscales which assess general control beliefs and effort capacity beliefs. These subscales are closely related conceptually to students' expectancies for the production of desirable school outcomes and are strongly correlated in the target sample (r^2 =.78 in fall, .67 in spring, $p < .01$;

Skinner et al., 1998). All items use a four-point Likert-type scale with response options ranging from (1) not at all true to (4) very true. Sample items for general control beliefs include "I can do well in school if I want to," and "I can't get good grades no matter I do" (reversed). Sample items for effort capacity beliefs include "When I'm in class, I can work hard," and "I have trouble working hard in school" (reversed).

The five items for perceived control were selected from the SPCQ on the basis of psychometric properties. Because of the relatively strong negative correlation between perceived control and catastrophizing, exploratory factor analysis (EFA) was used to investigate the factor structure of the twelve items comprising the general control beliefs and effort capacity beliefs subscales of the SPCQ and the nine items for catastrophizing of competence, to determine whether there was multidimensionality in the factor structure, which might result in collinearity between the measures of perceived control and catastrophizing. EFA's conducted using SPSS 29 (IBM Corp., 2022) at the two time points revealed that the negatively worded items from the two subscales of control loaded on a separate factor with items from the catastrophizing scale (catastrophizing of competence and self-derogation of competence, see below). The negatively worded items were excluded from the assessment of perceived control. Although Cronbach's alpha reliability was acceptable for the six positively worded items, confirmatory factor analysis did not indicate good fit to the data at the spring time point. Further investigation revealed that one item, "I can get good grades in school," was poorly correlated with the other five items, possibly because it references both academic ability and control over outcomes.

The resulting five-item scale of positively worded items had suboptimal internal consistency reliability; Cronbach's alpha was .68 at fall, and.65 at spring. Although this alpha is below commonly used cutoffs of acceptability, confirmatory factor analysis indicated the five-item measure had good measurement properties. This measure of perceived control, using only positively worded items, was adopted and used in all analyses for Study 1and Study 2. This is an operationalization of perceived control representing agentic control over academic outcomes through the student's individual action, based on what the student does, without direct reference to relatively enduring personal characteristics such as intelligence, ability, or skill in any of the items.

Confirmatory factor analysis (CFA) models of the five-item scale for perceived control at fall and spring were tested using Mplus version 8.9 (Muthén & Muthén, 2023). Fit statistics for CFA models are shown in Table 3.1. Items loadings (as well as fit statistics) are shown in Appendix 1. The chi-square values were nonsignificant for perceived control at fall ($\chi 2$ (5) = 4.390, p = .495), and at spring ($\chi 2$ (5) = 8.048, p = .154), indicating good fit to the data. Because chi-square is sensitive to sample size and several other conditions, however, alternative fit indices were also examined to determine whether the fit was adequate. Taken together, the alternative fit indices indicated acceptable fit for the five-item scale of perceived control at fall (RMSEA = .000, 90% CI [.000 .071], CFI = 1.000, SRMR = .022) and at spring (RMSEA = .045, 90% CI [.000 .100], CFI = .972, SRMR = .029).

Autonomous Motivation

Participants' autonomous motivation was assessed using the five items of the Identified Regulation subscale of the Self-Regulatory Style Questionnaire (SRQ, Connell

& Ryan, 1987). The measure has been found to have Cronbach's alpha between .62 and .82, and evidence of convergent and divergent validity (Ryan & Connell, 1989). Although some values of alpha are below commonly used cutoffs of acceptability, confirmatory factor analysis in the current study indicated the measure had good measurement properties. All items use a four-point Likert-type scale with response options ranging from (1) not at all true to (4) very true. Sample items include, "Why do I do my classwork? Because I want to learn new things," and "Why do I try to do well in school? Because doing well in school is important to me."

Confirmatory factor analysis (CFA) models of the scale for autonomous motivation at fall and spring were tested using Mplus version 8.9 (Muthén & Muthén, 2023). Fit statistics for CFA models are shown in Table 3.1. Item loadings (as well as fit statistics) are shown in Appendix 1. The chi-square values were significant for autonomous motivation at fall ($\chi 2$ (1) = 6.818, p = .0101), and at spring ($\chi 2$ (1) = 4.221, p = .0399, suggesting poor fit to the data. Alternative fit indices were also tested. CFI and SRMR indicated acceptable fit for the four-item scale of autonomous motivation, and RMSEA, indicated unacceptable fit, at fall (RMSEA = .130, 90% CI [.051 230], CFI = .966, SRMR = .023), and at spring (RMSEA = .104, 90% CI [.018 .215], CFI = .977, SRMR = .022). The values for CFI and SRMR meet standards suggested by Hu and Bentler (1999). RMSEA using traditional cutoffs may indicate unacceptable fit in confirmatory factor analysis, compared to CFI and SRMR (Goretzko et al., 2023). The overall fit for the CFA of autonomous motivation appears adequate for this research.

Catastrophizing

The assessment of catastrophizing of competence was done using a nine-item scale assessing negative expectancies of aspects of academic ability and outcomes in academic tasks. This measure is a four-point Likert-type scale with response options ranging from (1) not at all true to (4) very true. All items begin with the stem, "When something bad happens to me at school (like not doing well on a test, or not being able to answer an important question on a test)." Sample items include "I worry that I'll never learn how to do it," and "I feel totally stupid." Internal consistency reliability (Cronbach's alpha) in previous studies of third through sixth graders have been between .86 and .88 in one study (Skinner et al., 2013) and between .84 and .86 in another study (Skinner & Saxton, 2020). As an indication of predictive validity, one previous study found the measure significantly positively correlated with adaptive coping and negatively correlated with maladaptive coping (Skinner et al., 2013). Another study found that groups of students with different levels of catastrophizing, in combination with different levels of teacher support, had significantly different developmental trajectories of adaptive and maladaptive coping from third to sixth grade (Skinner & Saxton, 2020).

Confirmatory factor analysis (CFA) models of the nine item scale for catastrophizing were tested at each of two time points (fall and spring), using Mplus version 8.9 (Muthén & Muthén, 2023). Fit statistics for CFA models are shown in Table 3.1. Item loadings (as well as fit statistics) are shown in Appendix 1. The chi-square value was significant for catastrophizing at fall ($\chi2$ (24) = 46.457, p = .004), and nonsignificant at spring ($\chi2$ (24) = 32.406, p = .117, suggesting poor fit to the data at fall, and acceptable fit at spring. Alternative fit indices indicated acceptable fit at fall

(RMSEA = .053, 90% CI [.029 .075], CFI = .968, SRMR = .034), and at spring (RMSEA = .034, 90% CI [.000 .062], CFI = .986, SRMR = .031).

Analysis Plan

Analyses of longitudinal data to test all research hypotheses were conducted using structural equation modeling (SEM). SEM has several advantages over the traditional multiple regression approach, among which are its ability to model and estimate more complex effects, including more than one dependent variable and indirect effects (Kline, 2023). Importantly, SEM differs from multiple regression in that SEM does not assume there is no measurement error but can explicitly model it through the use of latent variables, observed indicators, and error terms. This overcomes some of the potential for biased estimates resulting from measurement error in multivariate regression models (Newsom, 2024). The models were estimated using full information maximum likelihood (FIML). FIML with robust standard errors (Yuan & Bentler, 1998) is an effective and widely used method of estimation that handles missing data well (Enders & Bandalos, 2001; Lei & Wu, 2012). Two different types of SEM models were used to test the two different types of hypotheses for the research questions.

Levels of Predictors

The relationships of the levels of autonomous motivation, perceived control, and catastrophizing in the fall to changes in levels of ways of academic coping over the year were investigated using autoregressive predictive models. Separate analyses were conducted for each research hypothesis, investigating the relationships for each predictor for each coping outcome variable (adaptive and maladaptive coping aggregates, and four separate ways of coping). An example of the analyses is depicted in the path diagram shown in Figure 3.1, showing the results for the test of Hypothesis 1a4, concerning the relationship between perceived control in fall and projection in spring, controlling for projection in fall.

Longitudinal autoregressive models are an established approach to the investigation of longitudinal data involving covariates, offering several advantages over bivariate regressions of a predictor on an outcome. First, by including the individual's level of the outcome at the first time point as an additional predictor, individuals serve as their own control, effectively partially out the effect of stability in the outcome from the relationship between the covariate at the first time point and the outcome at the second time point. Secondly, within the SEM framework, the correlation of the outcome at the first time point with the covariate predictor, also at the first time point, is estimated in addition to the regression coefficients, effectively controlling for the effect of pre-existing relationships between the predictor and the outcome (Newsom, 2024). And finally, this model is easily expanded to include additional controls, such as biological sex or age, as well as potential confounding third variables, providing for a more meaningful estimate of the regression coefficient representing the unique relationship between the predictor and the outcome.

Longitudinal autoregressive models assess the potential causal role of initial levels in predicting the unfolding of trajectories of developmental change and may be referred to as "launch models" (Kindermann & Skinner, 1992). Some longitudinal autoregressive models include additional pathways, modeling the relationship of the outcome variable to the predictor forward in time, in addition to relationship of the predictor to the outcome, effectively treating both variables and predictor and outcome, to assess the possibility of bidirectional causality. These are referred to as cross-lagged models. Because coping behaviors are understood theoretically as outgrowths of the appraisal of adversity, including motivationally relevant appraisals (see literature review in Chapter 2), the pathway from motivationally relevant antecedents to coping is expected to be significant, and the reverse pathway from coping to changes in motivational variables is assumed to be much smaller or non-significant. Testing of the reverse pathway is beyond the scope of the current study, and cross-lagged models will not be tested.

Longitudinal autoregressive models are not without their potential limitations. One issue, the potential bias in regression coefficients resulting from measurement error is effectively overcome by including measurement models of latent variables in the SEM frameworks (but see Sorjonen et al., 2022). Longitudinal latent variable models require the assessment of measurement invariance between occasions as an additional step in the analysis and the results of this investigation are described below under "Preliminary Analyses." Additional issues with the use of longitudinal autoregressive regression models arise in connection with the conceptualization and assessment of change. In longitudinal autoregressive models, the relationship between the outcome at the two time points, which represents the change in the outcome and is partialled out from the relationship between the covariate predictor and the outcome, is estimated as the autocorrelation of the outcome variable between the two time points. This approach to conceptualizing change in the outcome variable captures the stability in the rank order of the participants on the variable over time, rather than the average amount of change (Newsom, 2024).

Change in Predictors

In addition to the effects of levels of the three motivational predictors on coping over time, the relationships of changes in the motivational predictors over the year on changes in coping were investigated. Because early adolescence is a time of dramatic change in both individual characteristics and contextual factors related to motivation, it is an ideal age group to investigate the relationships between changes in motivational antecedents and changes in academic coping. Part “b” of each research question calls for the investigation of the effect of changes in the predictors over the year (rather than levels at the beginning of the year as in Part “a”) on changes in the outcomes. To test the change-to-change hypotheses for these research questions, the relationships of the changes in autonomous motivation, perceived control, and catastrophizing in the fall to changes in ways of academic coping were estimated using two-wave latent change score models (2W-LCS). 2W-LCS is a type of model tailored specifically to the evaluation of the relation between two constructs involving longitudinal data with only two time points (Henk & Castro-Schilo 2016; Finch & Shim, 2018). Latent change score models (LCS, McArdle & Nesselroade, 1994), in general, focus on the measurable change in an outcome variable and model this difference as a latent variable, using measurement models where the latent change variable is a common factor with a set of multiple indicators across time points. 2W-LCS models have been developed to investigate change where data is available from only two time points. Because the change in the outcomes, the specific coping measure in each of the various models, is modeled as a latent variable, instead of as an autoregression, these models are based on a conceptualization of change that is theoretically distinct from the approach used in Part “a” of the research questions.

2W-LCS models, as described by Henk and Castro-Shilo (2016), require three indicator variables for each construct. The levels of the variables at the first and second time points are then modeled by the latent variable means. An additional latent variable is specified to represent change between the two latent variables at the two time points. The Time 2 latent variable is specified as being predicted by both the comparable latent variable at Time 1 and the latent change score. The regression coefficients for the pathways from Time 1 to Time 2 of the latent variable and from the latent change score variable to the Time 2 variable are fixed to one, which contributes to capturing all the change between the time points in the latent change score variable. The relationship between the Time 1 latent variable and the latent change is modeled as a correlation. The model can be expanded to include additional constructs as predictors. Mean structures may also be included in this type of model, and they will be included in the models tested for the current proposed research. An example of the 2W-LCS model is depicted in Figure 3.2, which diagrams the results for research Hypothesis 1b2, latent change in perceived control predicting latent change in strategizing.

The results of the 2W-LCS analyses include estimated regression coefficients and correlations, as well as significance levels and model fit statistics. Interpretation focuses on the relationship between the latent change scores for the two variables. Biological sex was included as a time-invariant covariate, predicting latent change in each coping measure. Inclusion of the initial level of the predictor variable as a predictor of the latent change in the outcome variable in the 2W-LCS, is an optional addition to the core model based on the latent change in the predictor variable, that was not included in these analyses. Grimm and colleagues (2012) introduced an expanded LCS model including effects for both the levels and the change in levels of latent variables in relationships between dynamic processes over multiple time points. Henk and Castro-Shilo (2016), however, caution against inclusion of cross-construct regressions between initial levels, unless there is theoretical justification for expecting the operation of such effects in underlying processes, because these model parameters may alter the estimates of the change-to-change effects linking the two constructs, without providing more meaningful results. Inclusion of extraneous pathways could also interfere with the ability of a model to estimate effects of interest, resulting in poor model fit or non-significant relationships. Although initial levels can be important, their effects are separately investigated in Part "a" of the first three research questions. The 2W-LCS models were used to focus on the relationships between the changes in the three motivational antecedents and the changes in academic coping.

One study analyzing a developmental process with a motivational predictor may be useful to consider in thinking about the processes in the current study. Gottfried and colleagues (2007) investigated the dynamic interrelationship between intrinsic math motivation and achievement with multiple time points spanning a period of several years. Using latent growth curve models, they estimated levels and shapes (slopes) of trajectories for each construct and then examined the correlations between the parameters. The study found that *slopes* of motivational trajectories were strongly associated with levels of achievement (r = .85, p < .05) and modestly associated with *slopes* of achievement trajectories (r = .21, p < .05), while *levels* of motivation trajectories were not significantly associated with either levels or slopes of achievement trajectories. This result seems to indicate that change in motivation over time was more relevant to explaining achievement trajectories than was specific levels of motivation. This underscores the benefit of considering level-to-change and change-to-change effects separately.

Tests of Assumptions

Prior to analysis of structural models to test hypotheses for the research questions, the possibility of violation of underlying assumptions of structural equation modeling was considered (Kline, 2023). The following assumptions were investigated:

1. *Missing Data Analysis*: whether there was systematic missingness in the data and the implications of missingness for the estimation of structural models.

2. *Correlations and Collinearity*: whether study variables were independent and the implications of any potential collinearities for results of the analyses.

3. *Normality of Distributions:* whether study variables were normally and multivariate normally distributed and the implications of any potential nonnormality for results of the analyses.

4. *Measurement Invariance:* whether study variables were assessed without changes in measurement properties and the implications of any potential variance in measurement properties for results of the analyses.

Missing Data Analysis

Patterns of missing data were investigated. Missing data are concerning for two reasons. First, missing data effectively reduces the sample size. Less data affects the ability to make statistical inference. For any given effect size in the population, the significance level of statistical tests increases as sample size decreases. Smaller sample size makes it harder to find significant effects. Second, when missingness is related to the values that are missing, analyses may result in biased estimates (Schafer & Graham, 2002; Graham, 2009). Types of missingness are classified according to the three categories defined by Rubin (1976), as missing not at random (MNAR), missing at random (MAR), or missing completely at random (MCAR). If the probability of missingness is unrelated to the true value of the variable and also unrelated to the values for other variables that are not missing, the type of missingness is called missing completely at random (MCAR). If the probability of missingness is unrelated to the true value of the variable but is related to values for other variables that are not missing, the type of missingness is called missing at random (MAR). If the probability of missingness is dependent on the true value of the variable, the missingness is called missing not at random (MNAR). When data is not MCAR, the observed data are not a completely random sample from the population, so generalizability of results from analysis of the sample to the population comes into question. Missingness that is MNAR is the worst type, because it can result in the largest biases in estimates of model parameters. Missingness that is MAR can also be problematic, depending on the extent to which it deviates from MCAR, and the extent of any resulting bias in the model parameter estimates and standard errors in the analyses.

Patterns of missingness in the data were identified. Several participants were missing data for entire scales or the majority of items on scales in the questionnaires. 11 participants were missing the majority of data for academic coping at the fall time point. 45 participants were missing the majority of data for academic coping at the spring time point. 46 participants were missing the majority of data for all three motivational antecedents at the fall time point. Of these, only one participant was missing the majority of coping data for both time points, while eight participants were missing the majority of data for coping and for motivational antecedents at the fall time point, and an additional seven participants were missing the majority of data for coping at the spring time point and for motivational antecedents at the fall time point. There were also 31 participants with a pattern of missingness widely distributed across different sections of the questionnaires. None of these patterns of missingness were due to planned missingness, where entire questionnaires or scales on questionnaires are missing by design because certain participants were not administered those surveys at all or some time points. Rather, the missingness of entire scales resulted from participants being absent or, in some cases, not completing entire sections of the questionnaires or, in other cases, not completing large numbers of items on the questionnaires.

There is no effective procedure for establishing with certainty that data meet the stringent definition of missing completely at random (MCAR) or even the somewhat less stringent definition of missing at random (MAR). It is possible, however, to gather evidence that makes it possible to assess, to some extent, whether these are plausible assumptions about the data. To assess the plausibility of assuming MCAR for the dataset, logistic regression was used to find the relationships between study variables and another set of variables included in the dataset, teacher-reported academic engagement.

Teacher-reported engagement has very different patterns of missingness than the student-reported variables. A total of 11 participants were missing the majority of their coping data at fall, but only five of these were also missing teacher-reported engagement. 45 participants were missing the majority of their coping data at spring, but only 10 of these also had missing teacher-reported engagement at the fall time point. Logistic regression models were tested with teacher-reported engagement as a predictor of missingness for each of 10 ways of coping and each of three motivational antecedents at fall and spring. Teacher-reported engagement in fall did not significantly predict missingness for autonomous motivation, perceived control, catastrophizing, strategizing, self-encouragement, projection, or self-pity in fall or in spring. Biological sex was not a significant predictor of missingness for any of these variables in fall, but was a significant predictor in spring for missingness of all variables: autonomous motivation (B = -.76, S.E. = .25, $p < .01$, OR = .44, 95%CI[.27, .71]), perceived control (B = -.69, S.E. = .25, $p < .01$, OR = .47, 95%CI[.29, .76]), catastrophizing (B = -.87, S.E. = .25, $p < .01$, OR = .42, 95%CI[.29, .76]), strategizing (B = -.88, S.E. = .25, $p < .01$, OR = .41, 95%CI[.25, .68]), self-encouragement (B = -.81, S.E. = .25, $p < .01$, OR = .45, 95%CI[.28, .72]), projection (B = -.77, S.E. = .25, $p < .05$, OR = ..53, 95%CI[.33, .88]), or self-pity (B = -.72, S.E. = .26, $p < .01$, OR = .49, 95%CI[.29, .82]). These tests showed that, overall, in spring, girls were approximately half as likely as boys to have data missing. This indicates an assumption that data is missing MCAR would not be reasonable. Because teacher-reported engagement, however, which is correlated with motivational antecedents and with the various ways of coping, was not a significant predictor of missingness, the possibility that data is missing only MAR, and not MNAR, remains plausible.

Biological sex is included in all models and, using FIML, will help compensate for effects of missingness correlated with sex. Additionally, items from the teacher-reported engagement scale are included as auxiliary variables in FIML estimation of all models, to produce adjusted estimates and reduce potential bias due to missingness not MCAR.

Correlations and Collinearity

High intercorrelations among predictor variables can result in failure of estimation algorithms to reach an acceptable solution or in biased estimation of model parameters (Kline, 2015). The strong correlations of catastrophizing with total maladaptive coping and self-pity suggest the possibility of collinearity between these variables. As described in detail below, this led to challenges encountered in the estimation of the models used to test the research hypotheses involving these variables.

Normality of Distributions

Distributions of study variables were examined using statistics of skewness and kurtosis in SPSS 29 (IBM Corp., 2022) to assess normality. Scale averages were used for initial tests, and follow-up tests were conducted on individual items. Statistics for skewness and kurtosis for scale averages are shown in Table 3.4. Some items exceeded suggested cutoffs for skewness and kurtosis (Hair et al., 2010). Because of the effect of possible nonnormality of some items on model estimates, but maximum likelihood with robust standard errors was used to reduce bias in standard errors when there are small to moderate departures from normality (Savalei & Rosseel, 2022).

To test the assumption of multivariate normality for structural equation models, Mardia tests were conducted for the items in the scale for each construct. All the scales had statistically significant Mardia test statistics ($p < .05$), indicating that none of the scales exhibited significant departures from multivariate normality assessed with this statistic.

Measurement Invariance

Structural equation modeling (SEM) is based on an assumption that variables are measured without error. To reduce the impact of measurement error on the analyses, all models are constructed using latent variables, with each construct represented by a measurement model of at least four observed items. This procedure is intended to reduce the effects of measurement error (Kline, 2023). In addition, all scales used in the SEM models, for both the three motivational antecedents and all measures of academic coping, were tested for measurement invariance across the two time points (fall and spring). A series of progressively constrained models (configural, weak, strong) were analyzed for each scale. The Bryant-Satorra scaled difference test was used to evaluate the difference in the chi-square index of fit between the progressively constrained models for each scale. Fit statistics for each model, and results of the Bryant-Satorra scaled differences tests, are shown in Table 3.2. All models had acceptable fit index values for RMSEA ($< .06$). The Bryant-Satorra scaled difference test result between the configural, and weak invariance models was found to be nonsignificant for all scales. The difference between the weak and strong invariance models was found to be nonsignificant for all scales, except for strategizing and the second order factor model for total maladaptive coping, where the Bryant-Satorra scaled difference test results were significant. Collectively, the evidence regarding model fit led to the conclusion that the assumption of strong invariance was adequately met for all scales except strategizing and total maladaptive coping. Given that strong invariance is considered sufficient to satisfy the assumption that the same construct is being measured in the same metric over time (Widaman, Ferrer, & Conger, 2010), analysis proceeded to the fitting of the structural equation models, with the awareness that the interpretation of the results for the models including strategizing and total maladaptive coping may be impaired to the extent that estimates of model parameters might be affected by the somewhat limited measurement invariance.

Table 3.2

Measurement Invariance of Scales for Motivational Antecedents
(N = 343 at Fall. N = 337 at Spring.)

Construct	Invariance Model	χ^2 (*df*)	$\Delta\ \chi^2$ (Δ*df*)	CFI	RMSEA [90% CI]
Antecedents:					
Perceived Control	Configural	51.38(29)**		.935	.047 [.025 .068]
	Weak	53.47(33)*	2.08(4)	.940	.042 [.019 .063]
	Strong	60.11(37)**	6.64(4)	.932	.043 [.021 .062]
Autonomous Motivation	Configural	27.70(13)*		.966	.057 [.027 .087]
	Weak	34.01(16)**	6.31(3)	.959	.057 [.030 .084]
	Strong	39.02(19)**	5.01(3)	.954	.055 [.030 .080]
Catastrophizing	Configural	170.07(119)**		.968	.035 [.022 .047]
	Weak	175.71(127)**	5.64(8)	.970	.033 [.020 .045]
	Strong	181.61(135)**	5.91(8)	.971	.032 [.018 .043]

* $p < .05$. ** $p < .01$.

Table 3.3

Measurement Invariance of Scales for Academic Coping
(N = 343 at Fall. N = 337 at Spring.)

Construct	Invariance Model	χ^2 (*df*)	Δ χ^2 (Δ*df*)	CFI	RMSEA [90% CI]
Strategizing	Configural	38.36(27)		.970	.035 [.000 .059]
	Weak	46.61(31)*	8.25	.959	.038 [.010 .060]
	Strong	56.67(35)*	10.07*	.945	.042 [.019 .061]
Self-encouragement	Configural	38.90(27)		.947	.036 [.000 .059]
	Weak	42.41(31)	3.51(4)	.949	.033 [.000 .055]
	Strong	49.28(35)	6.87(4)	.936	.034 [.000 .955]
Total Adaptive	Configural	969.56(701)**		.894	.033 [.028 .038]
	Weak	972.55(704)**	2.99(3)	.894	.033 [.028 .038]
	Strong	975.10(707)**	2.55(3)	.894	.033 [.028 .033]
Projection	Configural	33.13(29)		.992	.020 [.000 .048]
	Weak	41.65(33)	8.52(4)	.984	.028 [.000 .051]
	Strong	43.24(37)	1.59(4)	.989	.922 [.000 .046]
Self-pity	Configural	45.30(29)*		.982	.040 [.014 .062]
	Weak	49.17(33)*	3.88(4)	.982	.038 [.010 .059]
	Strong	54.34(37)*	5.17(4)	.981	.037 [.011 .057]
Total Maladaptive	Configural	1031.21(706)**		.912	.037 [.032 .041]
	Weak	1037.84(709)**	6.62(3)	.911	.037 [.032 .041]
	Strong	1048.51(712)**	10.68(3)**	.909	.037 [.032 .042]

* $p < .05$. ** $p < .01$.

Descriptive Statistics

Descriptive statistics were examined to assess the properties of the data and to test the assumptions for subsequent structural equation modelling. Descriptive statistics including means, standard deviations, minimum, maximum, and internal consistencies (Cronbach's alpha) in fall and spring for each construct are shown in Table 3.4. These analyses were conducted using SPSS v. 28. For computation of means and standard deviations, items included in each construct were averaged. Standard deviations for each construct were generally consistent across the two time points, with only small differences seen between fall and spring. Mean differences were not tested for significance and changes in means from fall to spring appear small. Spring mean levels for ways of adaptive coping were somewhat higher in spring than in fall and means for ways of maladaptive coping were lower in spring than in fall. Strategizing, for example, which had the biggest difference, had a mean value of 3.37 in fall and a mean of 3.26 in spring. Means of perceived control and autonomous motivation were both somewhat lower in spring than in fall, with mean perceived control of 3.37 in fall compared to 3.26 in spring, while mean autonomous motivation was 3.17 in fall compared to 3.00 in spring. Catastrophizing changed little. Statistics for skewness and kurtosis are discussed below under "Tests of Assumptions." Descriptive statistics are shown for all ways of coping. The proposed analyses, however, include only the adaptive and maladaptive aggregates and four of the specific ways of coping.

Table 3.5 provides preliminary descriptive statistics for difference scores of predictors and outcomes. Difference scores are provided for informational purposes but must be interpreted with caution. These are arithmetic differences between fall and spring values. Although means levels are unbiased, individual participant difference scores and assessment of variability are susceptible to measurement error. The main analyses used for testing research hypotheses use autoregression or latent changes scores instead of difference scores. The difference scores are presented here as possibly indicative of general patterns, both as mean levels in the descriptives (Table 3.5), and in terms of relationships with other variables, in their correlations (Table 3.7). The means of the difference scores reflect the small differences seen in the mean levels of variables from fall to spring. Although susceptible to bias by measurement error, the standard deviations, and the minima and maxima, appear to indicate considerable variation in the difference scores with many students having relatively large increases, and many students having relatively large decreases in all of the study variables.

Table 3.4

Summary of Descriptive Statistics

	N	*M* (S.D.)	Min	Max	Skew.	Kurtosis	Alpha
Perceived Control Fall	335	3.37 (.53)	1.00	4.00	-.91	1.16	.67
Perceived Control Spring	300	3.26 (.57)	1.00	4.00	-.65	.32	.65
Autonomous Motivation Fall	335	3.17 (.67)	1.00	4.00	-.71	.27	.76
Autonomous Mot. Spring	296	3.00 (.74)	1.00	4.00	-.59	- .06	.72
Catastrophizing Fall	335	2.18 (.68)	1.00	4.00	.41	- .29	.86
Catastrophizing Spring	299	2.15 (.69)	1.00	4.00	.37	- .37	.87
Sex	366	1.47 (.50)	1.00	2.00	.12	-2.00	
Total Coping Fall	343	27.90 (3.15)	17.70	37.45	-.06	.50	
Adaptive Coping:							
Strategizing Fall	278	3.10 (.54)	1.00	4.00	-.56	1.03	.67
Strategizing Spring	228	2.92 (.59)	1.40	400	-.04	- .53	.71
Help Seeking Fall	294	3.08 (.59)	1.20	4.00	-.44	.08	.76
Help Seeking Spring	235	3.02 (.58)	1.40	4.00	-.24	- .27	.74
Comfort Seeking Fall	270	2.99 (.57)	1.00	4.00	-.37	.02	.67
Comfort Seeking Spring	221	2.88 (.65)	1.00	400	-.38	.17	.76
Self-Encouragement Fall	271	3.00 (.52)	1.00	4.00	-.58	.85	.59
Self-Encouragement Spring	223	2.86 (.55)	1.20	4.00	-.18	-.05	.61
Commitment Fall	287	2.97 (.53)	1.40	4.00	-.30	-.06	.65
Commitment Spring	236	2.90 (.63)	1.00	4.00	-.30	-.21	.76
Total Adaptive Fall	311	3.03 (.44)	1.20	4.00	-.47	.93	
Total Adap. Spring	263	2.93 (.50)	1.60	4.00	.00	-.46	
Maladaptive Coping:							
Confusion Fall	274	2.26 (.68)	1.00	4.00	.06	-.46	.77
Confusion Spring	220	2.30 (.67)	1.00	4.00	-.11	-.51	.73
Escape Fall	331	1.95 (.63)	1.00	3.80	.35	-.43	.74
Escape Spring	294	2.04 (.64)	1.00	3.67	.09	-.84	.73
Concealment Fall	291	2.10 (.66)	1.00	3.80	.19	-.55	.75
Concealment Spring	233	2.01 (.62)	1.00	3.60	.13	-.89	.73
Self-pity Fall	300	2.14 (.74)	1.00	4.00	.16	-.77	.82
Self-pity Spring	239	2.09 (.78)	1.00	4.00	.36	-.65	.86
Projection Fall	272	1.83 (.66)	1.00	4.00	.69	-.02	.79
Projection Spring	218	1.94 (.66)	1.00	3.60	.33	-.63	.76
Total Mal. Fall	316	2.11 (.59)	1.00	3.70	.17	-.60	
Total Mal. Spring	257	2.09 (.59)	1.00	3.55	.04	-.71	

Table 3.5

Summary of Descriptive Statistics for Difference Scores

	N	*M* (S.D.)	Min	Max	Skewness	Kurtosis
Δ Perceived Control	291	-.11 (.52)	-1.80	1.80	-.37	1.50
Δ Autonomous Motivation	288	-.17 (.70)	-2.00	2.33	-0.13	.84
Δ Catastrophizing	291	-.04 (.54)	-2.00	1.33	-0.40	.73
Adaptive Coping Fall:						
Δ Strategizing	198	-.16 (.57)	-1.80	1.60	-0.03	.53
Δ Help Seeking	213	-.04 (.51)	-2.20	1.80	0.14	1.91
Δ Comfort Seeking	190	-.12 (.62)	-2.60	2.00	-0.44	2.24
Δ Self-Encouragement	191	-.12 (.58)	-2.40	1.40	-0.57	1.51
Δ Commitment	209	-.09 (.59)	-2.20	1.60	-0.58	1.62
Δ Total Adaptive	248	-.10 (.44)	-2.00	1.35	-0.50	1.77
Maladaptive Coping Fall:						
Δ Confusion	185	.04 (.58)	-2.00	1.80	-0.19	1.45
Δ Escape	283	.07 (.65)	-2.60	2.00	-0.48	.95
Δ Concealment	212	-.10 (.56)	-2.20	1.40	-0.13	.96
Δ Self-pity	221	-.07 (.55)	-1.80	2.20	0.09	1.35
Δ Projection	184	.08 (.57)	-2.40	1.60	-0.23	1.60
Δ Total Maladaptive	246	.02 (.42)	-1.20	1.20	0.12	.35

Correlations

Correlations were examined for all study variables. Correlations between fall values of predictors, fall values of coping, and the spring values for coping were computed using SPSS 28, and are shown in Table 3.6. The first column shows stability, the correlation between each variable at fall and the same variable in spring. All variables were moderately to highly stable across the two time points. The highest stabilities were for catastrophizing ($r(291) = .673$, $p < .01$), total maladaptive coping ($r(246) = .739$, $p < .01$), and self-pity ($r(221) = .738$, $p < .01$). Correlations between predictors and outcomes revealed certain patterns in the data. Perceived control and autonomous motivation in fall are significantly positively correlated with adaptive ways of coping and the total adaptive coping aggregate, and significantly negatively correlated with maladaptive ways of coping and the total maladaptive coping aggregate, in spring. The strongest across time correlation for fall perceived control is with projection in spring ($r(215) = -.438$ $p < .01$) and the weakest is with self-pity ($r(235) = -.309$, $p < .01$). The strongest across time correlation for fall autonomous motivation is with total adaptive coping ($r(259) = .497$, $p < .01$) and the weakest is with self-pity ($r(235) = -.135$, $p < .050$). Catastrophizing, on the other hand, was significantly positively correlated with the maladaptive ways of coping, projection ($r(215) = .376$, $p < .01$), with self-pity ($r(235) = 691$, $p < .01$), and with total maladaptive coping ($r(253) = .664$, $p < .01$), but among adaptive ways was only significantly negatively correlated with self-encouragement ($r(220) = -.195$, $p < .01$).

Correlations between fall levels of predictors, fall levels of coping, and difference scores of predictors, on the one hand (rows), and the difference scores of ways of coping, on the other (columns), are shown in Table 3.7. The first column shows the correlation between the value of each variable in fall and the difference scores (spring minus fall) for that same variable. All these values are significant moderate negative correlations which could represent, at least in part, regression toward the mean. There are interesting disparities between the correlations of levels of predictors and outcomes and the change in outcomes as compared to the relationships between changes in the predictors and the change in outcomes. Levels of motivational predictors, *perceived control, autonomous motivation, and catastrophizing*, in the fall, are not significantly correlated with difference scores for ways of adaptive coping, and only *catastrophizing* is correlated (and only weakly) with difference scores for some maladaptive coping measures ($r(246) = -.155$, $p < .05$ for total maladaptive coping; $r(184) = -.161$, $p < .05$ for projection). The difference scores for the motivational antecedents, by contrast, are more widely correlated with the difference scores for the various ways of coping. Difference scores for *perceived control* are significantly positively correlated with differences scores for total adaptive coping ($r(248) = .252$, $p < .01$), and strategizing ($r(198) = .231$, $p < .01$), but not significantly correlated with differences score for any maladaptive coping measures, suggesting that changes in perceived control, using the operationalization in this study, may be a better predictor of change in adaptive than of change in maladaptive coping. Difference scores for *autonomous motivation* were significantly positively correlated with difference scores for all adaptive coping measures ($r(248) = .365$, $p < .01$ for total adaptive coping; $r(198) = .371$, $p <$,01, for strategizing; and $r(191) = .209$, $p < .01$), and significantly negatively correlated with difference scores for all maladaptive coping measures ($r(246) = -.244$, $p < .01$ for total maladaptive coping;

$r(184) = -.217$, $p < .01$ for projection; $r(221) = -225$, $p < .01$ for self-pity), suggesting that changes in autonomous motivation may be a predictor of both adaptive and maladaptive coping. Differences scores for *catastrophizing* were not significantly correlated with difference scores for any adaptive coping measure but were significantly positively correlated with difference scores for all three maladaptive coping measures ($r(246) = .560$, $p < .01$ for total maladaptive coping; $r(184) = .463$, $p < .01$ for projection, $r(221) = .507$, $p < .01$ for self-pity), suggesting that changes in catastrophizing may be a better predictor of change in maladaptive coping than of change in adaptive coping.

Intercorrelations between sex, total coping, levels of three motivational antecedent variables, and ways of coping, at single time points, are shown in Table 3.8. Sex was significantly positively correlated with perceived control in fall ($r(335) = .117$, $p < .05$) and autonomous motivation in fall ($r(335) = .256$, $p < .01$), with all ways of adaptive coping ($r(311) = .234$, $p < .01$ for total adaptive coping; $r(278) = .223$, $p < .01$ for strategizing; and $r(271) = .167$, $p < .01$ for self-encouragement), and significantly negatively correlated only with projection ($r(272) = -.196$, $p < .01$) among maladaptive ways of coping. These correlations indicate that mean levels of some adaptive ways of coping were higher for girls than for boys, while the mean level of the maladaptive way projection was higher for boys than for girls. Correlations for sex in spring were similar to the fall correlations, except that sex was not significantly correlated with strategizing, and sex was significantly negatively correlated with total maladaptive coping ($r(257) = .130$, $p < .05$) in spring. Intercorrelations between sex and difference scores are shown in Table 3.7. Sex was not significantly correlated with difference scores for the motivational antecedent variables, nor with difference scores for coping variables, except that sex was weakly negatively correlated with differences scores for projection ($r(184) = -.147$, $p < .05$).

The fall value for total coping (sum of variables for 10 ways of coping) was strongly positively correlated with catastrophizing in fall ($r(335) = .667$, $p < .01$). Fall total coping was weakly to moderately positively correlated with adaptive coping variables and moderately to strongly positively correlated with maladaptive ways of coping, with the strongest correlation being between total coping and total maladaptive coping in fall ($r(316) = .729$, $p < .01$). Interestingly, total coping was weakly negatively correlated with difference scores in all coping variables, with the strongest correlation being between total coping and total maladaptive coping ($r(246) = -.226$, $p < .01$), indicating that higher levels of total coping were associated with larger decreases, or smaller increases, in all ways of coping, both adaptive and maladaptive. Preliminary analyses, however, indicated that total coping was not a significant predictor in structural models, and it was not included in any of the models used to test hypotheses.

Table 3.6

Summary of Correlations Among Variables of Interest (Levels in Fall to Levels in Spring) ($N = 218$ to $N = 335$)

	Same Variable Stability	AD Spring	ST Spring	SE Spring	MAL Spring	PJ Spring	SP Spring
Sex		.155*	.111	.042	-.130*	-.243**	-.064
Total Coping		.197**	.237**	.092	.515**	.292**	.596**
Perceived Control Fall	.537**	.412**	.362**	.323**	-.373**	-.438**	-.309**
Autonomous Mot. Fall	.494**	.497**	.444**	.341**	-.261**	-.337**	-.135*
Catastrophizing Fall	.673**	-.057	-.025	-.195**	.664**	.376**	.691**
Total Adaptive Coping (AD) Fall	.568**	.568**	.525**	.448**	-.250**	-.376**	-.147*
Strategizing (ST) Fall	.475**	.491**	.475**	.327**	-.200**	-.282**	-.099
Self-Encouragement (SE) Fall	.389**	.375**	.360**	.389**	-.278**	-.283**	-.187**
Total Maladaptive Coping (MAL) Fall	.739**	-.196**	-.139*	-.180**	.739**	.571**	.734**
Projection (PJ) Fall	.596**	-.319**	-.302**	-.221**	.601**	.596**	.536**
Self-Pity (SP) Fall	.738**	-.089	-.054	-.112	.679**	.465**	.738**

* $p < .05$. ** $p < .01$.

Table 3.7

Summary of Correlations for Difference Scores (Levels in Fall and Differences, with Differences) (N = 191 to N = 335)

	Same Var. Diff.	AD Diff.	ST Diff	SE Diff.	MAL Diff.	PJ Diff.	SP Diff.
Sex		.010	.029	-.047	-.072	-.147*	-.020
Total Coping Fall		-.152*	-.056	-.159*	-.226**	-.173*	-.111
Perceived Control Fall	-.378**	-.048	-.024	.058	.033	-.014	.036
Autonomous Mot. Fall	-.439**	-.026	.002	.051	.088	-.011	.092
Catastrophizing Fall	-.360**	.075	.080	-.028	-.155*	-.161*	-.085
Total Adaptive Coping Fall	-.337**	-.337**	-.176*	-.160*	.069	.071	.077
Strategizing Fall	-.416**	-.242**	-.416**	-.039	.037	.082	.044
Self-Encouragement Fall	-.457**	-.322**	-.059	-.457**	-.004	.016	.091
Total Maladaptive Coping Fall	-.332**	.059	.021	-.020	-.332**	-.234**	-.166*
Projection Fall	-.401**	.094	.016	-.006	-.259**	-.401**	-.093
Self-Pity Fall	-.301**	.082	.034	.055	-.278**	-.124	-.301**
Perceived Control Difference		.252**	.231**	.138	-.043	-.115	-.043
Autonomous Mot. Difference		.365**	.371**	.209**	-.244**	-.217**	-.225**
Catastrophizing Difference		-.112	-.018	-.033	.560**	.463**	.507**

* $p < .05$. ** $p < .01$.

Table 3.8

Fall Correlations and Spring Correlations Among Study 1 Variables (N = 348)

	Sex	Total Coping	Perc. Control	Auton. Mot.	Catastr.	Total Adapt.	Strateg.	Self-Encour.	Total Maladp.	Project.	Self-Pity
Sex		.086	.129*	.234**	.006	.155*	.111	.042	-.130*	-.243**	-.064
Total Coping (Fall)	.086		-.115*	.073	.497**	.197**	.237**	.092	.515**	.292**	.596**
Perceived Control	.117*	.006		.478**	-.196**	.537**	.527**	.432**	-.427**	-.535**	-.363**
Autonomous Motivation	.256**	.159**	.460**		-.031	.604**	.602**	.445*	-.325**	-.468**	-.208**
Catastrophiz.	.094	.667**	-.291**	-.102**		-.014	.064	-.142*	.783**	.491**	.800**
Total Adaptive Coping	.234**	.411**	.543**	.636**	-.112*		.853**	.765**	-.275**	-.364**	-.143*
Strategizing	.223**	.393**	.511**	.583**	-.062	.838**		.483**	-.172**	-.366**	-.005
Self-Encourag.	.167**	.338**	.420**	.460**	-.213**	.789**	.561**		-.240**	-.249**	-.179**
Total Maladapt. Coping	-.082	.729**	-.360**	-.259**	.820**	-.239**	-.170**	-.216**		.789**	.894**
Projection	-.196**	.478**	-.381**	-.345**	.556**	-.373**	-.326**	-.226**	.808**		.604**
Self-Pity	-.052	.715**	-.330**	-.183**	.789**	-.166**	-.109	-.185**	.886**	.590**	

* $p < .05$. ** $p < .01$.

Correlations of levels of variables in fall are shown below the diagonal. Correlations of levels of variables in spring are shown below the diagonal.

Results of Study 1

Structural equation models were separately estimated for each part of each research question to investigate the relationship between the three motivational variables, perceived control, autonomous motivation, and catastrophizing, and change across the school year in ways of academic coping: total adaptive, total maladaptive, and four separate ways of coping (research questions one, two, and three). In addition, models were tested that included all three motivational variables in fall as predictors of changes in ways of academic coping, to investigate unique effects (research question four). Biological sex was used as a control variable in all models. Each of the first three research questions had two parts, with the first part involving levels-to-change relationships investigated using longitudinal autoregressive models and the second part involving change-to-change relationships investigated using latent change score models. Under each part of each research question, four separate hypotheses were tested covering the six coping measures (total adaptive, specific adaptive ways of strategizing and self-encouragement, total maladaptive, and specific maladaptive ways of projection and self-pity).

Research Question 1 - Perceived Control

RQ1. Perceived control. Does perceived control predict changes in academic coping across the first year of middle school?

Research Question 1 investigated the relationship between perceived control and change in student's coping. Part "a" looked at the relationship between student's level of perceived control in fall and change in various ways of coping across the academic year, modeled using autoregressive longitudinal models. Part "b" looked at the relationship between change in student's perceived control across the year and change in student's various ways of academic coping across the year, modeled using two-wave bivariate latent change score models.

Research Question 1a - Perceived Control – Levels-to-Change.

RQ1a. Level-to-change. Does level of perceived control in the fall predict academic coping in spring, controlling for academic coping in fall?

Results for question 1a, investigating the relationship between students' perceived control in fall and change in student's ways of academic coping, using autoregressive longitudinal models, are shown in Table 3.9. Structural equation models were separately estimated for each subpart of the research question to investigate the relationship between levels of perceived control in fall and change in ways of academic coping from fall to spring: total adaptive, total maladaptive, and four separate ways of coping. Biological sex was included as a control variable in all models.

Hypothesis 1a1. The level of perceived control in the fall positively predicts total adaptive coping in spring, controlling for total adaptive coping in fall.

Hypothesis 1a1 was not supported. An autoregressive longitudinal model was tested to investigate the relationship between perceived control in fall and change in total adaptive coping from fall to spring. Total adaptive coping was modeled as a second-order factor with five components (strategizing, help-seeking, comfort-seeking, self-encouragement, and commitment). The chi-square value was significant ($\chi2$ (1,407) = 1,763.795, $p < .01$), suggesting poor fit to the data. Although CFI, a relative fit index, indicated some less than acceptable fit (CFI = .905), two absolute fit indices (RMSEA = .027, 90% CI [.023 .031], SRMR = .059) did indicate acceptable fit. Research suggests that CFI may be biased downward in large and complex models (Shi et al., 2019). Overall, model fit appears to be adequate.

Perceived control in fall did not significantly predict total adaptive coping in spring, controlling for total adaptive coping in fall (and controlling for sex), $\beta = .071$, $b = .101$, S.E. = .188, ns. Total adaptive coping was highly stable over time, $\beta = .666$, $b = .927$, S.E. = .215, $p < .01$. Biological sex was not a significant predictor in this model (see Table 3.9).

Hypothesis 1a2. The level of perceived control in the fall positively predicts each specific way of adaptive coping (strategizing and self-encouragement) in spring, controlling, for that way of adaptive coping in fall.

Hypothesis 1a2 was not supported. Autoregressive longitudinal models were tested to investigate the relationships between perceived control in fall and changes in strategizing and in self-encouragement from fall to spring. The chi-square values for strategizing ($\chi2$ (89) = 117.621, $p < .05$), and for self-encouragement ($\chi2$ (89) = 119.367, $p < .05$) were significant, suggesting poor fit to the data in both models. CFI, a relative fit index, however, indicated acceptable fit in the strategizing model (CFI = .959), and approached acceptable fit in the self-encouragement model (CFI = .937). Two absolute fit indices indicated acceptable fit both for strategizing (RMSEA = .030, 90% CI [.012 .044], SRMR = .048), and for self-encouragement (RMSEA = .031, 90% CI [.014 .045], SRMR = .051). Overall, model fit appears to be adequate.

Perceived control in fall did not significantly predict strategizing in spring, controlling for strategizing in fall (and controlling for sex), $\beta = .268$, $b = .336$, S.E. = .239, ns. Student’s perceived control in fall, however, and strategizing in fall were strongly correlated ($r(348) = 761$, $p < .01$), suggesting possible collinearity between the predictors. Strategizing was moderately but not significantly stable over time, β = .362, b = .446, S.E. = .233, $p < .10$. Again, however, the strong correlation between strategizing in fall and perceived control in fall suggests the possibility of collinearity between the predictors. Biological sex was not a significant predictor in this model (see Table 3.9).

Perceived control in fall did not significantly predict self-encouragement in spring, controlling for self-encouragement in fall (and controlling for sex), β = .148, b = .180, S.E. = .346, ns. Student's perceived control in fall, however, and self-encouragement in fall were strongly correlated ($r(348) = 749$, $p < .01$), suggesting possible collinearity between the predictors. Self-encouragement was moderately but not significantly stable over time, β = .479, b = .578, S.E. = .438, ns. Again, however, the strong correlation between self-encouragement in fall and perceived control in fall suggests the possibility of collinearity between the predictors. Biological sex was not a significant predictor in this model (see Table 3.9).

Hypothesis 1a3. The level of perceived control in the fall negatively predicts total maladaptive coping in spring, controlling for total maladaptive coping in fall.

Hypothesis 1a3 was not supported. An autoregressive longitudinal model was tested to investigate the relationship between perceived control in fall and change in total maladaptive coping from fall to spring. Total maladaptive coping was modeled as a second-order factor with five components (confusion, escape, concealment, projection, self-pity). The chi-square value was significant ($\chi2$ (1,401) = 1,927.054, $p < .01$), suggesting poor fit to the data. Although CFI, a relative fit index, did not indicate acceptable fit (CFI = .899), two absolute fit indices (RMSEA = .033, 90% CI [.029 .036], SRMR = .061) did indicate acceptable fit. Research suggests that CFI may be biased downward in large and complex models (Shi et al., 2019). Overall, model fit appears to be adequate.

Perceived control in fall did not significantly predict total maladaptive coping in spring, controlling for total maladaptive coping in fall (and controlling for sex), β = -.101, b = -.181, S.E. = .145, ns. Total maladaptive coping was highly stable over time, β = .755, b = 1.357, S.E. = .210, $p < .01$. Biological sex significantly negatively predicted total maladaptive coping in spring, controlling for total maladaptive coping in fall, β = -.090, b = -.327 S.E. = .164, $p < .05$, indicating that increases in total maladaptive coping across the year were greater, or decreases smaller, for boys than for girl.

Hypothesis 1a4. The level of perceived control in the fall negatively predicts each specific way of maladaptive coping (projection and self-pity) in spring, controlling for that way of maladaptive coping in fall.

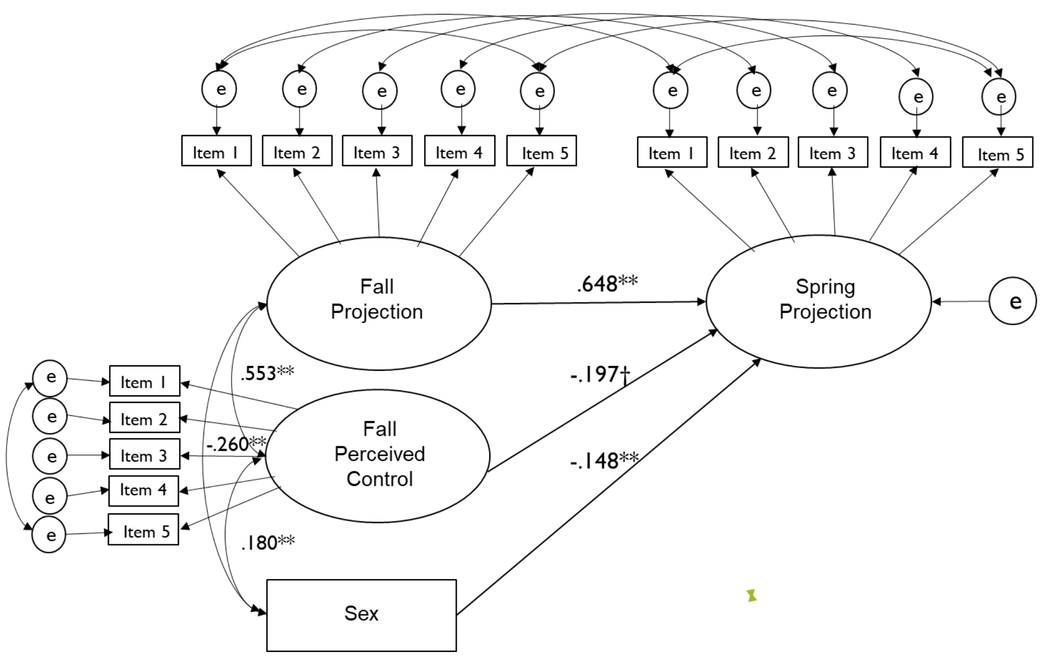
Hypothesis 1a4 was partly (for projection coping only) marginally supported. Autoregressive longitudinal models were tested to investigate the relationships between perceived control in fall and changes in projection and in self-pity from fall to spring. See Figure 3.2 for a path model illustrating the results for projection. The chi-square values for projection ($\chi 2$ (89) = 85.868, ns), and for self-pity ($\chi 2$ (91) = 109.306, ns) were nonsignificant, indicating good fit to the data in both models. Alternative fit indices also indicated acceptable fit in the model for projection (CFI = 1.000, RMSEA = .000, 90% CI [.000 .027], SRMR = .037), and the model for self-pity (CFI = .985, RMSEA = .024, 90% CI [.000 .039], SRMR = .042).

Perceived control in fall marginally significantly predicted projection in spring, controlling for projection in fall (and controlling for sex), β = -.197, b = -.346, S.E. = .193, $p < .10$. Projection was highly stable over time, β = .648, b = 1.120, S.E. = .265, $p < .01$. Biological sex significantly negatively predicted projection in spring, controlling for projection in fall (and controlling for perceived control), β = -.148, b = -.531, S.E. = .211, $p < .05$.

Perceived control in fall did not significantly predict self-pity in spring, controlling for self-pity in fall (and controlling for sex), β = -.020, b = -.032, S.E. = .128, ns. Self-pity was highly stable over time, β = .788, b = 1.315, S.E. = .237, $p < .01$. Biological sex was not a significant predictor in this model (see Table 3.9).

Figure 3.1

Perceived Control in Fall Predicting Projection in Spring when Controlling for Projection in Fall (N = 348)



†$p < .10$. *$p < .05$. **$p < .01$.

Table 3.9

Perceived Control in Fall Predicting Spring Coping when Controlling for Fall Coping (N = 348)

	Total Adaptive				Strategizing				Self-Encouragement			
Predictor	β	b	S.E.	*p*	β	b	S.E.	*p*	β	b	S.E.	*p*
Fall Perceived Control	.071	.101	.188	.590	.268	.336	.239	.160	.148	.180	.346	.602
Fall Coping	.666**	.927	.215	.000	.362†	.446	.233	.056	.479	.578	.438	.186
Sex	.013	.037	.158	.812	.088	.225	.170	.186	-.061	-.152	.211	.471
<u>Model Fit</u>												
Chi-Square(df) *p*	1,763.795(1407) .000				117.621(89) .023				119.367(89) .0175			
CFI	.905				.959				.937			
RMSEA [.90]	.027 [.023 031]				.030 [.012 .044]				.031 [.014 .045]			
SRMR	.059				.048				.051			
	Total Maladaptive				Projection				Self-Pity			
Predictor	β	b	S.E.	*p*	β	b	S.E.	*p*	β	b	S.E.	*p*
Fall Perceived Control	-.101	-.181	.145	.213	-.197†	-.346	.193	.072	-.020	-.032	.128	.801
Fall Coping	.755**	1.357	.210	.000	.648**	1.120	.265	.000	.788**	1.315	.237	.000
Sex	-.090*	-.327	.164	.046	-.148*	-.531	.211	.012	-.054	-.181	.166	.277
<u>Model Fit</u>												
Chi-Square(df) *p*	1,927.054(1401) .000				85.868(89) .574				109.306(91) .093			
CFI	.899				1.000				.985			
RMSEA [.90]	.033 [.029 .036]				.000 [.000 .027]				.024 [.000 .039]			
SRMR	.061				.037				.042			

†$p < .10$. *$p < .05$. **$p < .01$.

Research Question 1b - Perceived Control – Change-to-Change

RQ1b. Change-to-change. Are changes in perceived control from fall to spring associated with changes in academic coping from fall to spring?

Results for question 1b, investigating the relationship between change in perceived control from fall to spring and change in academic coping, using bivariate two-wave latent change score models (2W-LCS), are shown in Table 3.10. Models were separately estimated for each subpart of the research question to investigate the relationship between change in perceived control and change in ways of academic coping: total adaptive, total maladaptive, and four separate ways of coping. Biological sex was used as a control variable in all models.

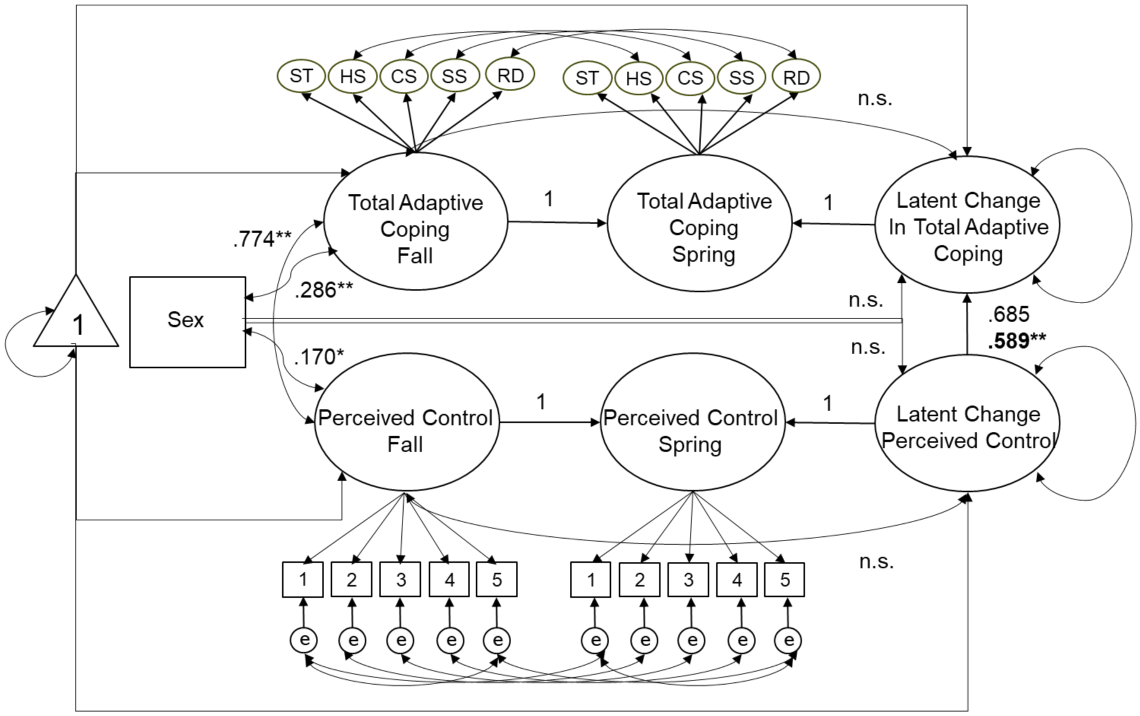
Hypothesis 1b1. Change in perceived control from fall to spring is positively associated with change in total adaptive coping from fall to spring.

Hypothesis 1b1 was supported. A bivariate 2W-LCS model was tested to investigate the relationship between change in perceived control and change in total adaptive coping from fall to spring. Total adaptive coping was modeled as a second-order factor with five components (strategizing, help-seeking, comfort-seeking, self-encouragement, and commitment). See Figure 3.2 for a path model that diagrams the results of Hypothesis 1b2 for change in perceived control predicting change in total adaptive coping. The chi-square value was significant ($\chi 2$ (1,684) = 2,177.138, $p < .01$), suggesting poor fit to the data. Although CFI, a relative fit index, did not indicate acceptable fit (CFI = .883), two absolute fit indices (RMSEA = .028, 90% CI [.025 .032], SRMR = .066) did indicate acceptable fit. Research suggests that CFI may be biased downward in large and complex models (Shi et al., 2019). Overall, model fit appears to be adequate.

Latent change in perceived control from fall to spring significantly positively predicted latent change in total adaptive coping from fall to spring (controlling for sex), such that higher increases in perceived control were associated with higher increases or lower decreases in total adaptive coping, and higher decreases in perceived control were associated with higher decreases or lower increases in total adaptive coping, $\beta = .589$, $b = .685$, S.E. = .236, $p < .01$. Biological sex was not a significant predictor of change in perceived control or change in total adaptive coping (see Table 3.10).

Figure 3.2

Latent Change in Perceived Control Predicting Latent Change in Total Adaptive Coping (N = 348)



*p < .05. **p < .010

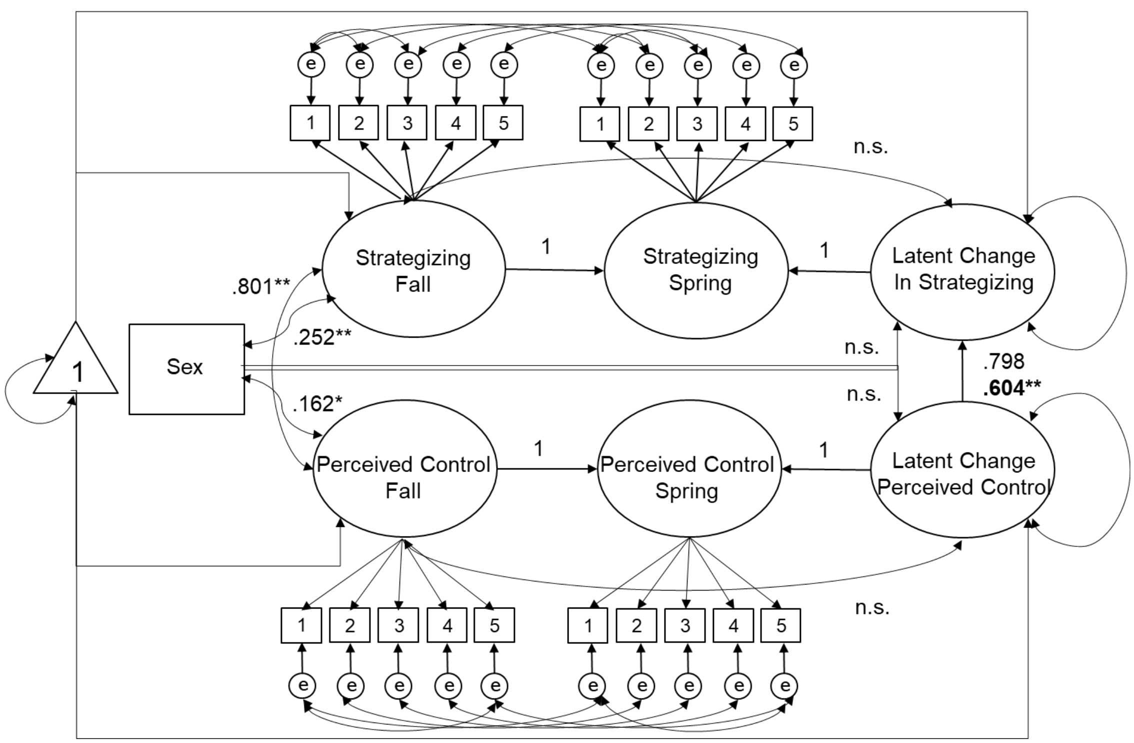
Hypothesis 1b2. Change in perceived control from fall to spring is positively associated with change in each specific way of adaptive coping (strategizing and self-encouragement), from fall to spring.

Hypothesis 1b2 was supported. Bivariate 2W-LCS models were tested to investigate the relationship between change in perceived control and changes in strategizing and in self-encouragement from fall to spring. See Figure 3.3 for a path model that diagrams the results of Hypothesis 1b2 for change in perceived control predicting change in strategizing, and Figure 3.4 for change in perceived control predicting change in self-encouragement. The chi-square values for the models for strategizing and for self-encouragement were significant ($\chi2$ (164) = 205.990, $p < .05$ for strategizing; $\chi2$ (166) = 250.395, $p < .01$ for self-encouragement), suggesting poor fit to the data. CFI, a relative fit index, indicated acceptable fit for the model for strategizing (CFI = .958), but unacceptable fit for the model for self-encouragement (CFI = .893). Two absolute fit indices did indicate acceptable fit both for strategizing (RMSEA = .026, 90% CI [.013 .037], SRMR = .049), and for self-encouragement (RMSEA = .037, 90% CI [.027 .046], SRMR = .056). As described in the Measures section, some items in the measure of self-encouragement have less than desirable loadings (see Appendix X1.7). Additionally, research suggests that CFI may be biased downward in large and complex models (Shi et al., 2019). Overall, model fit appears to be adequate for strategizing, but remains somewhat ambiguous for self-encouragement.

Latent change in perceived control from fall to spring significantly positively predicted latent change in strategizing from fall to spring (controlling for sex), $\beta = .604$, b = .798, S.E. = .229, $p < .01$, and also significantly positively predicted latent change in self-encouragement from fall to spring (controlling for sex), β = .648, b = .578, S.E. = .294, $p < .05$. Higher increases in perceived control were associated with higher increases or lower decreases in strategizing and in self-encouragement, and higher decreases in perceived control were associated with higher decreases or lower increases in strategizing and in self-encouragement. Biological sex was not a significant predictor of change in perceived control or change in strategizing or in self-encouragement (see Table 3.10).

Figure 3.3

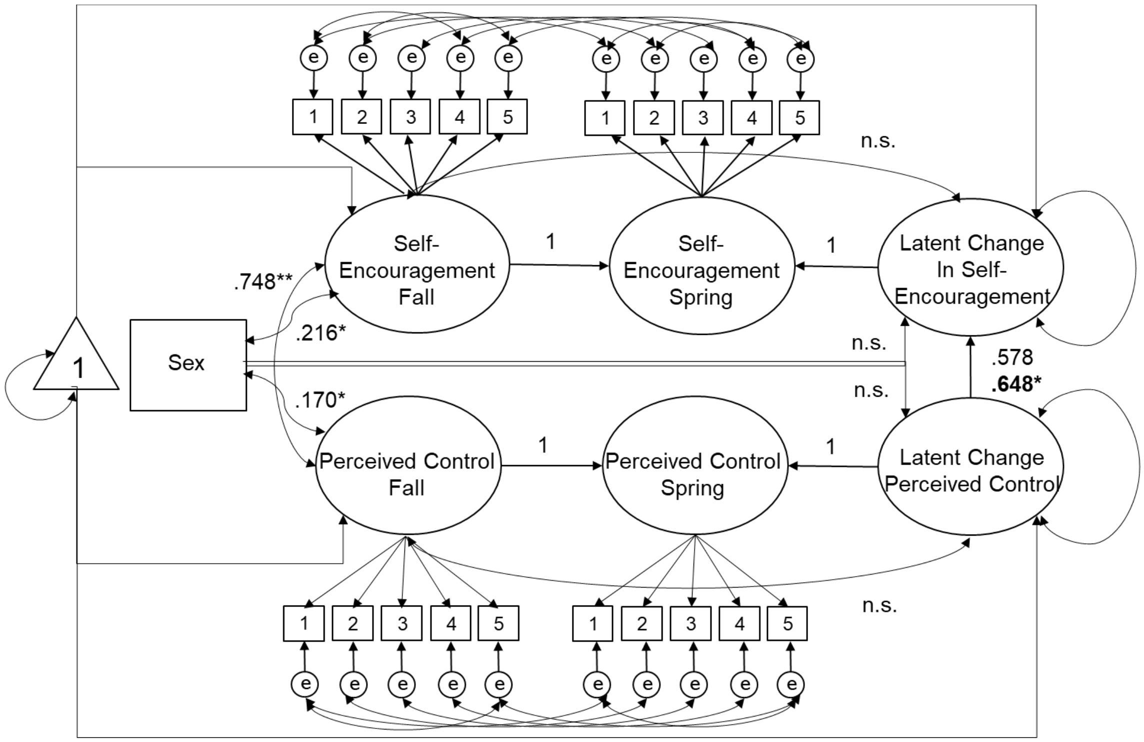
Latent Change in Perceived Control Predicting Latent Change in Strategizing (N = 348)



*p < .05. **p < .01.

Figure 3.4

Latent Change in Perceived Control Predicting Latent Change in Self-Encouragement (N = 348)



*p < ,05, **p < ,01

Hypothesis 1b3. Change in perceived control from fall to spring is negatively associated with change in total maladaptive coping from fall to spring.

Hypothesis 1b3 was not supported. A bivariate 2W-LCS model was tested to investigate the relationship between change in perceived control and change in total maladaptive coping from fall to spring. Total maladaptive coping was modeled as a second-order factor with five components (confusion, escape, concealment, projection, and self-pity). The chi-square value was significant ($\chi 2$ (1,678) = 2,310.819, $p < .01$), suggesting poor fit to the data. Although CFI, a relative fit index, did not indicate acceptable fit (CFI = .887), two absolute fit indices (RMSEA = .032, 90% CI [.029 .035], SRMR = .064) did indicate acceptable fit. Research suggests that CFI may be biased downward in large and complex models (Shi et al., 2019). Overall, model fit appears to be adequate.

Latent change in perceived control from fall to spring did not significantly predict latent change in total maladaptive coping from fall to spring (controlling for sex), β = -.080, b = -.068, S.E. = .118, ns. Biological sex was not a significant predictor of change in perceived control or change in total maladaptive coping (see Table 3.10).

Hypothesis 1b4. Change in perceived control from fall to spring is negatively associated with change in each specific way of maladaptive coping (projection and self-pity), from fall to spring.

Hypothesis 1b4 was not supported. Bivariate 2W-LCS models were tested to investigate the relationship between change in perceived control and changes in projection and in self-pity from fall to spring. The chi-square values for the models for projection and for self-pity were significant ($\chi 2$ (168) = 200.528, $p < .05$ for projection;

$\chi 2$ (168) = 203.909, $p < .05$ for self-pity), suggesting poor fit to the data. CFI, a relative fit index, however, indicated acceptable fit for the model for projection (CFI = .971), and for the model for self-pity (CFI = .976). Two absolute fit indices also indicate acceptable fit for projection (RMSEA = .023, 90% CI [.004 .034], SRMR = .047), and for self-pity (RMSEA = .024, 90% CI [.008 .035], SRMR = .048).

Latent change in perceived control from fall to spring did not significantly predict latent change in projection from fall to spring (controlling for sex), β = -.277, b = -.356, S.E. = .271, ns, and did not significantly predict latent change in self-pity from fall to spring (controlling for sex), β = -.146, b = -.171, S.E. = .180, ns. Biological sex was not a significant predictor of change in perceived control or change in projection or in self-pity (see Table 3.10).

Table 3.10

Latent Change in Perceived Control Predicting Latent Change in Coping (N = 348)

	Total Adaptive				Strategizing				Self-Encouragement			
Predictor	β	b	S.E.	*p*	β	b	S.E.	*p*	β	b	S.E.	*p*
Change in Control	.589**	.685	.236	.004	.604**	.798	.229	.000	.648*	.578	.294	.049
Sex pred *d* Coping	-.026	-.023	.071	.748	.016	.016	.091	.859	-.083	-.050	.062	.423
Sex pred *d* Control	.036	.027	.068	.692	.039	.031	.069	.655	.049	.033	.067	.620
Model Fit												
Chi-Square(*df*) *p*	2,177.138(1684) .000				205.990(164) .015				250.385(166) .000			
CFI	.883				.958				.893			
RMSEA [.90]	.028 [.025 .032]				.026 [.013 .037]				.037 [.027 .046]			
SRMR	.060				.049				.056			

	Total Maladaptive				Projection				Self-Pity			
Predictor	β	b	S.E.	*p*	β	b	S.E.	*p*	β	b	S.E.	*p*
Change in Control	-.080	-.068	.118	.567	-.277	-.356	.271	.188	-.146	-.171	.180	.342
Sex pred *d* Coping	-.125	-.067	.045	.131	-.060	-.048	.083	.565	-.089	-.068	.063	.280
Sex pred *d* Control	-.011	-.007	.064	.914	-.003	-.002	.063	.975	.011	.007	.066	.914
Model Fit												
Chi-Square(*df*) *p*	2,310.819(1678) .000				200.528(168) .044				203.909(168) .031			
CFI	.887				.971				.976			
RMSEA [.90]	.032 [.029 .035]				.023 [.004 .034]				.024 [.008 .035]			
SRMR	.064				.047				.048			

†$p < .10$. *$p < .05$. **$p < .01$.

Research Question 2 – Autonomous Motivation

RQ2. Autonomous motivation. Does autonomous motivation predict changes in academic coping across the first year of middle school?

Research Question 2 investigated the relationship between autonomous motivation and change in student's coping. Part "a" looked at the relationship between student's level of autonomous motivation in fall and change in various ways of coping across the academic year, modeled using autoregressive longitudinal models. Part "b" looked at the relationship between change in student's autonomous motivation across the year and change in student's various ways of academic coping across the year, modeled using two-wave bivariate latent change score models.

Research Question 2a – Autonomous Motivation – Levels-to-Change.

RQ2a. Level-to-change. Does level of autonomous motivation in the fall predict academic coping in spring, controlling for academic coping in fall?

Results for Question 2a, investigating the relationships between students' autonomous motivation in fall and changes in ways of academic coping, using autoregressive longitudinal models, are shown in Table 3.11. Structural equation models were separately estimated for each subpart of the research question to investigate the relationship between levels of autonomous motivation in fall and change in ways of academic coping from fall to spring: total adaptive, total maladaptive, and four separate ways of coping. Biological sex was included as a control variable in all models.

Hypothesis 2a1. The level of autonomous motivation in the fall positively predicts total adaptive coping in spring, controlling for total adaptive coping in fall.

Hypothesis 2a1 was not supported. An autoregressive longitudinal model was tested to investigate the relationships between autonomous motivation in fall and change in total adaptive coping from fall to spring. Total adaptive coping was modeled as a second-order factor with five components (strategizing, help-seeking, comfort-seeking, self-encouragement, and commitment).The chi-square value was significant ($\chi2$ (1406) = 1,832.481, $p < .01$), suggesting poor fit to the data. Although CFI, a relative fit index, did not indicate acceptable fit (CFI = .893), two absolute fit indices did indicate acceptable fit (RMSEA = .030, 90% CI [.026 .033], SRMR = .060). Research suggests that CFI may be biased downward in large and complex models (Shi et al., 2019). Overall, model fit appears adequate.

Autonomous motivation in fall did not significantly predict total adaptive coping in spring, controlling for total adaptive coping in fall (and controlling for sex), $\beta = .152$, b = .215, S.E. = .227, ns. Total adaptive coping in fall, however, was strongly correlated with autonomous motivation in fall ($r(348) = .864$, $p < .01$), suggesting possible collinearity between the predictors. Total adaptive coping was moderately and significantly stable over time (controlling for autonomous motivation in fall and controlling for sex), $\beta = .595$, b = .836 S.E. = .255, $p < .01$. Biological was not a significant predictor in this model (Table 3.11).

Hypothesis 2a2. The level of autonomous motivation in the fall positively predicts each specific way of adaptive coping (strategizing and self-encouragement) in spring, controlling for that way of adaptive coping in fall.

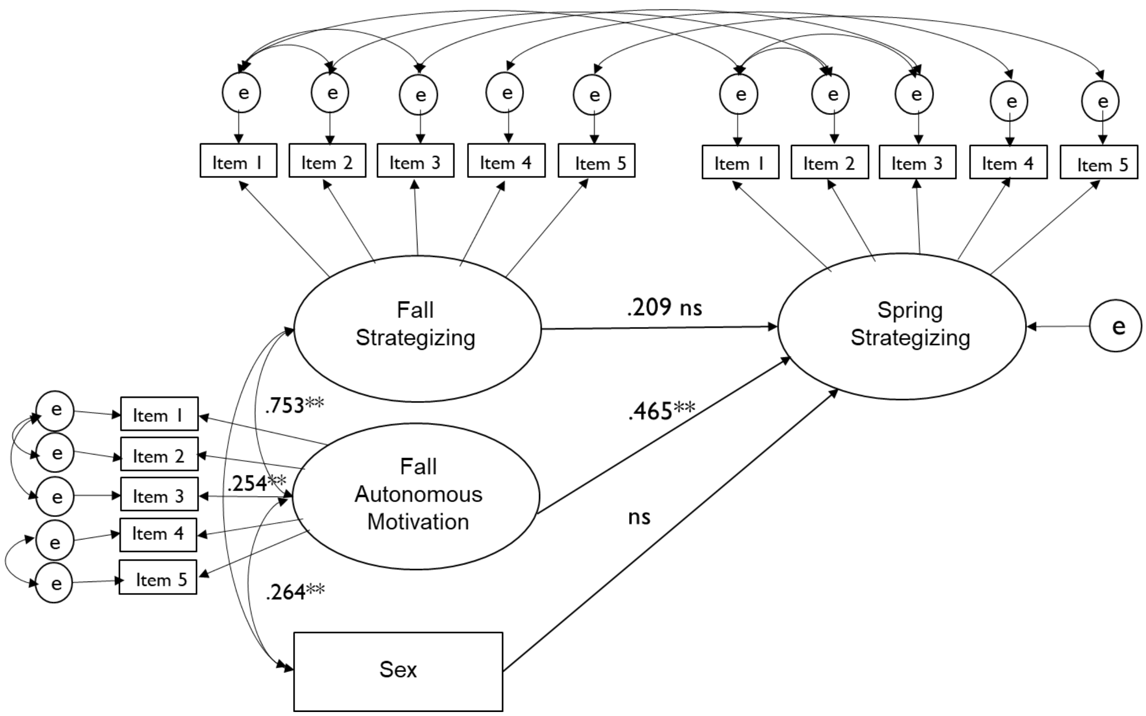
Hypothesis 2a2 was supported. Autoregressive longitudinal models were tested to investigate the relationship between autonomous motivation in fall and changes in strategizing and in self-encouragement from fall to spring. See Figure 3.5 for a path model illustrating the results for strategizing. The chi-square values for strategizing ($\chi 2$ (87) = 142.598, p < .01), and for self-encouragement ($\chi 2$ (87) = 116.335, p < .05) were significant, suggesting poor fit to the data in both models. CFI, a relative fit index, however, approached acceptable fit in the strategizing model (CFI = .938), and indicated acceptable fit in the self-encouragement model (CFI = .954). Two absolute fit indices indicated acceptable fit both for strategizing (RMSEA = .043, 90% CI [.030 .055], SRMR = .052), and for self-encouragement (RMSEA = .031, 90% CI [.013 .045], SRMR = .045). Overall, model fit appears to be adequate.

Autonomous motivation in fall significantly predicted strategizing in spring, controlling for strategizing in fall (and controlling for sex), $\beta = .465$, b = .596, S.E. = .222, $p < .01$. Strategizing was not significantly stable over time (controlling for autonomous motivation in fall and controlling for sex), $\beta = .209$, b = .269 S.E. = .200, ns. Strategizing in fall, however, was strongly correlated with autonomous motivation in fall ($r(348) = .753$, $p <$,01), suggesting possible collinearity between the predictors. Biological sex was not a significant predictor in this model (see Table 3.11).

Autonomous motivation in fall marginally significantly predicted self-encouragement in spring, controlling for self-encouragement in fall (and controlling for sex), $\beta = .339$, b = .423, S.E. = .233, $p < .10$. Self-encouragement was not significantly stable over time (controlling for autonomous motivation in fall and controlling for sex), $\beta = .403$, b = .519, S.E. = .345, ns. Self-encouragement in fall, however, was strongly correlated with autonomous motivation in fall ($r(348) = .618$, $p < .01$), suggesting possible collinearity between the predictors. Biological sex was not a significant predictor in this model (see Table 3.11).

Figure 3.5

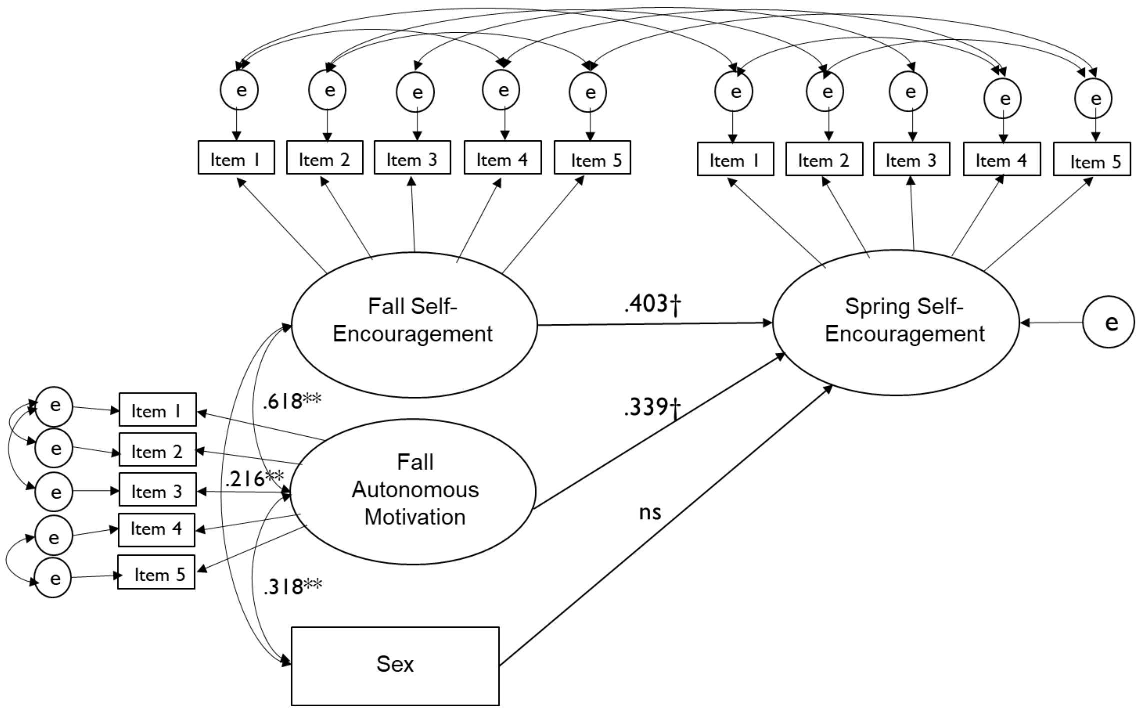
Autonomous Motivation in Fall Predicting Strategizing in Spring when Controlling for Strategizing in Fall (N = 348)



*p < ,05, **p < ,01

Figure 3.6

Autonomous Motivation in Fall Predicting Self-Encouragement in Spring when Controlling for Self-Encouragement in Fall (N = 348)



†*p* < .10, *p < ,05, **p < ,01

Hypothesis 2a3. The level of autonomous motivation in the fall negatively predicts total maladaptive coping in spring, controlling for total maladaptive coping in fall.

Hypothesis 2a3 was not supported. An autoregressive longitudinal model was tested to investigate the relationship between autonomous motivation in fall and change in total maladaptive coping from fall to spring. Total maladaptive coping was modeled as a second-order factor with five components (confusion, escape, concealment, projection, self-pity). The chi-square value was significant ($\chi 2$ (1,400) = 2,023.211, $p < .01$), suggesting poor fit to the data. Although CFI, a relative fit index, did not indicate acceptable fit (CFI = .885), two absolute fit indices did indicate acceptable fit (RMSEA = .036, 90% CI [.032 .039], SRMR = .067). Research suggests that CFI may be biased downward in large and complex models (Shi et al., 2019). Overall, model fit appears to be adequate.

Autonomous motivation in fall did not significantly predict total maladaptive coping in spring, controlling for total maladaptive coping in fall (and controlling for sex), $\beta = .033$, b = .058, S.E. = .127, ns. Total maladaptive coping was highly stable over time (controlling for autonomous motivation in fall and controlling for sex), $\beta = .826$, b = 1.470, S.E. = .219, $p < .01$. Biological sex significantly negatively predicted total maladaptive coping in spring, controlling for total maladaptive coping in fall, β = .-103, b = -.371 S.E. = .161, $p < .05$, indicating that increases in total maladaptive coping across the year were larger, or decreases smaller, for boys than for girl across the year.

Hypothesis 2a4. The level of autonomous motivation in the fall negatively predicts each specific way of maladaptive coping (projection and self-pity) in spring, controlling for that way of maladaptive coping in fall.

Hypothesis 2a4 was not supported. Autoregressive longitudinal models were tested to investigate the relationship between autonomous motivation in fall and changes in projection and in self-pity from fall to spring. The chi-square values for projection ($\chi2$ (90) = 137.097, p < .01), and for self-pity ($\chi2$ (90) = 145.048, p < .01) were significant, suggesting poor fit to the data in both models. Alternative fit indices, however, indicated acceptable fit in the model for projection (CFI = .953, RMSEA = .039, 90% CI [.025 .051], SRMR = .050), and in the model for self-pity (CFI = .960, RMSEA = .042, 90% CI [.029 .054], SRMR = .053).

Autonomous motivation in fall did not significantly predict projection in spring, controlling for projection in fall (and controlling for sex), β = -.045, b = -.075, S.E. = .143, ns. Projection was highly stable over time (controlling for autonomous motivation in fall and controlling for sex), β = .743, b = 1.242, S.E. = .276, $p < .01$. Biological sex significantly negatively predicted projection in spring, controlling for projection in fall, β = .-144, b = -.501 S.E. = .203, $p < .05$, indicating that increases in total projection across the year were greater, or decreases smaller, for boys than for girl.

Autonomous motivation in fall did not significantly predict self-pity in spring, controlling for self-pity in fall (and controlling for sex), β = .027, b = .044, S.E. = .108, ns. Self-pity was highly stable over time (controlling for autonomous motivation in fall and controlling for sex), β = .803, b = 1.340, S.E. = .232, $p < .01$. Biological sex was not a significant predictor in this model (see Table 3.11).

Table 3.11

Autonomous Motivation in Fall Predicting Spring Coping when Controlling for Fall Coping (N = 348)

	Total Adaptive				Strategizing				Self-Encouragement			
Predictor	β	b	S.E.	*p*	β	b	S.E.	*p*	β	b	S.E.	*p*
Fall Autonomous Mot.	.152	.215	.227	.343	.465**	.596	.222	.007	.339†	.423	.233	.069
Fall Coping	.595**	.836	.255	.001	.209	.269	.200	.179	.403	.519	.345	.132
Sex	.004	.011	.155	.942	.060	.160	.169	.344	-.099	-.261	.206	.206
<u>Model Fit</u>												
Chi-Square(*df*) *p*	1,832.481(1406) .000				142.598(87) .000				116.335(87) .020			
CFI	.893				.938				.954			
RMSEA[.90]	.030 [.026 .033]				.043 [.030 .055]				.031 [.013 .045]			
SRMR	.060				.052				.045			
	Total Maladaptive				Projection				Self-Pity			
Predictor	β	b	S.E.	*p*	β	b	S.E.	*p*	β	b	S.E.	*p*
Fall Autonomous Mot.	.033	.058	.127	.649	-.045	-.075	.143	.602	.027	.044	.108	.681
Fall Coping	.826**	1.470	.219	.000	.743**	1.242	.276	.000	.803**	1.340	.232	.000
Sex	-.103*	-.371	.161	.021	-.144*	-.501	.203	.014	-.061	-.206	.161	.202
<u>Model Fit</u>												
Chi-Square(*df*) *p*	2,023.211(1400) .000				137.097(90) .0010				145.048(90) .000			
CFI	.885				.953				.960			
RMSEA[.90]	.036 [.032 .039]				.039 [.025 .051]				.042 [.029 .054]			
SRMR	.067				.050				.053			

†$p < .10$. *$p < .05$. **$p < .01$.

Research Question 2b – Autonomous Motivation – Change-to-Change

RQ2b. Change-to-change. Are changes in autonomous motivation from fall to spring associated with changes in academic coping from fall to spring?

Results for question 2b, investigating the relationship between change in autonomous motivation from fall to spring and change in academic coping, using bivariate two-wave latent change score models (2W-LCS), are shown in Table 3.12. Models were separately estimated for each subpart of the research question to investigate the relationship between change in autonomous motivation and change in ways of academic coping: total adaptive, total maladaptive, and four separate ways of coping. Biological sex was used as a control variable in all models.

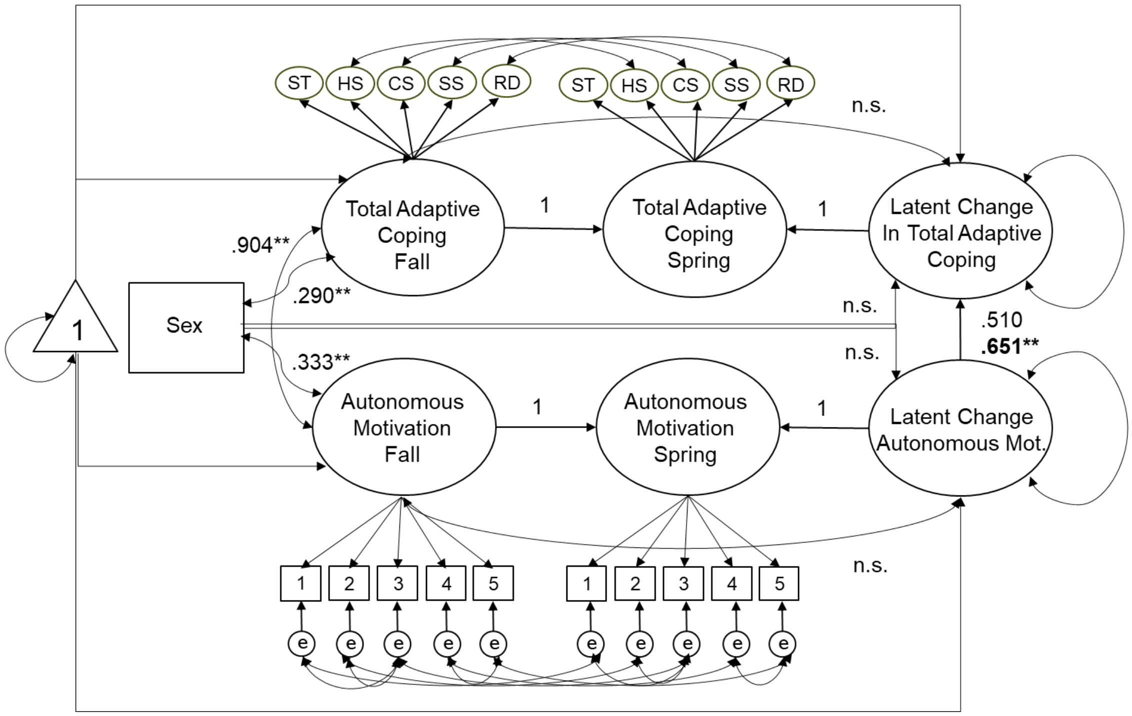
Hypothesis 2b1. Change in autonomous motivation from fall to spring is positively associated with change in total adaptive coping from fall to spring.

Hypothesis 2b1 was supported. A bivariate 2W-LCS model was tested to investigate the relationship between change in autonomous motivation and change in total adaptive coping from fall to spring. Total adaptive coping was modeled as a second-order factor with five components (strategizing, help-seeking, comfort-seeking, self-encouragement, and commitment). See Figure 3.7 for a path model that diagrams the results of the model for change in autonomous motivation predicting change in total adaptive coping. The chi-square value was significant ($\chi 2$ (1,680) = 2,211.254, $p < .01$), suggesting poor fit to the data. Although CFI, a relative fit index, did not indicate acceptable fit (CFI = .883), two absolute fit indices did indicate acceptable fit (RMSEA = .029, 90% CI [.026 .033], SRMR = .062). Research suggests that CFI may be biased downward in large and complex models (Shi et al., 2019). Overall, model fit appears to be adequate.

Latent change in autonomous motivation from fall to spring significantly positively predicted latent change in total adaptive coping from fall to spring (controlling for sex), such that higher increases in autonomous motivation were associated with higher increases or lower decreases in total adaptive coping, and higher decreases in autonomous motivation were associated higher decreases or lower increases in total adaptive coping, $\beta = .651$, $b = .521$ S.E. = .145, $p < .01$. Biological sex was not a significant predictor of change in autonomous motivation or change in total adaptive coping (see Table 3.12).

Figure 3.7

Latent Change in Autonomous Motivation Predicting Latent Change in Total Adaptive Coping (N = 348)



*$p < .05$. **$p < .01$

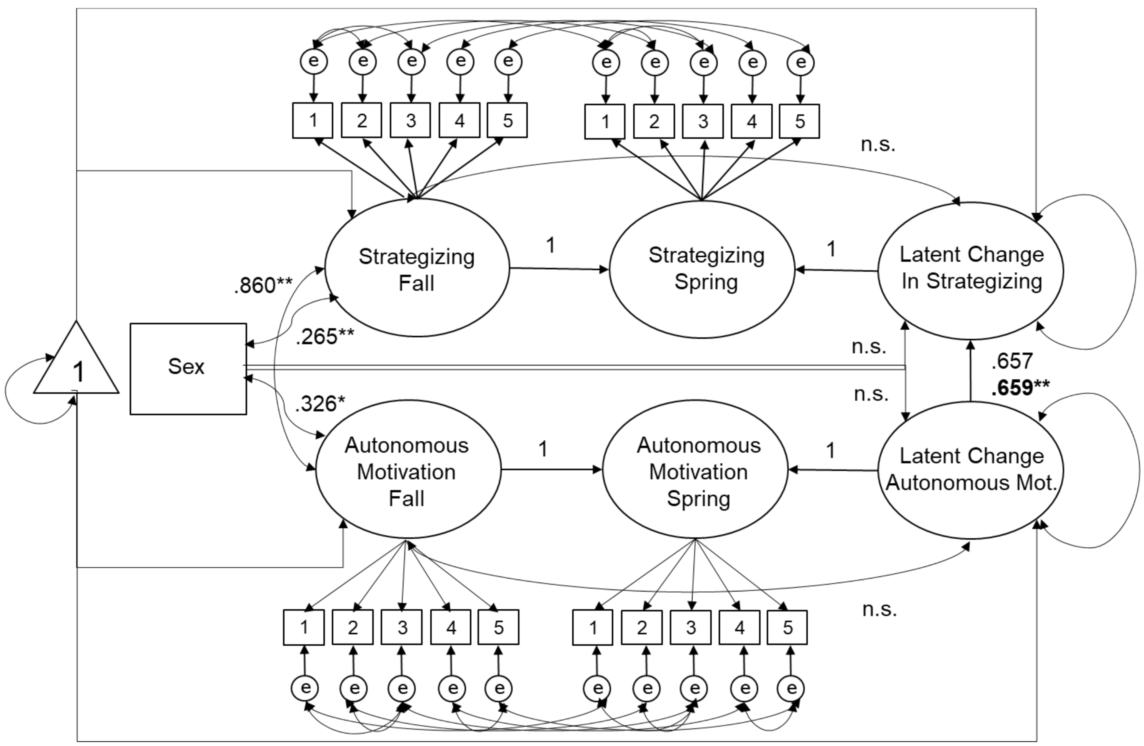
Hypothesis 2b2. Change in autonomous motivation from fall to spring is positively associated with change in each specific way of adaptive coping (strategizing and self-encouragement), from fall to spring.

Hypothesis 2b2 was supported. Bivariate 2W-LCS models were tested to investigate the relationship between change in autonomous motivation and changes in strategizing and in self-encouragement from fall to spring. See Figure 3.8 for a path model that diagrams the results of Hypothesis 2b2 for change in autonomous motivation predicting change in strategizing, and Figure 3.9 for change in self-encouragement. The chi-square values for the models for strategizing and for self-encouragement were significant ($\chi 2$ (160) = 251.054, $p < .01$ for strategizing; $\chi 2$ (162) = 209.779, $p < .01$ for self-encouragement), suggesting poor fit to the data. CFI, a relative fit index, however, approached acceptable fit for the model for strategizing (CFI = .932), and for self-encouragement (CFI = .953). Two absolute fit indices, however, indicated acceptable fit both for strategizing (RMSEA = .039, 90% CI [.030 .049], SRMR = .060), and for self-encouragement (RMSEA = .028, 90% CI [.016 .039], SRMR = .056). Research suggests that CFI may be biased downward in large and complex models (Shi et al., 2019). Overall, model fit appears to be adequate.

Latent change in autonomous motivation from fall to spring significantly positively predicted latent change in strategizing from fall to spring (controlling for sex), $\beta = .659$, b = .657 S.E. = .167, $p < .01$, and also significantly positively predicted latent change in self-encouragement from fall to spring (controlling for sex), $\beta = .443$, b = .212, S.E. = .095, $p < .05$. Higher increases in autonomous motivation were associated with higher increases or lower decreases in strategizing and in self-encouragement, and higher decreases in autonomous motivation were associated with higher decreases or lower increases in strategizing and in self-encouragement. Biological sex was not a significant predictor of change in autonomous motivation or change in strategizing or in self-encouragement (see Table 3.12).

Figure 3.8

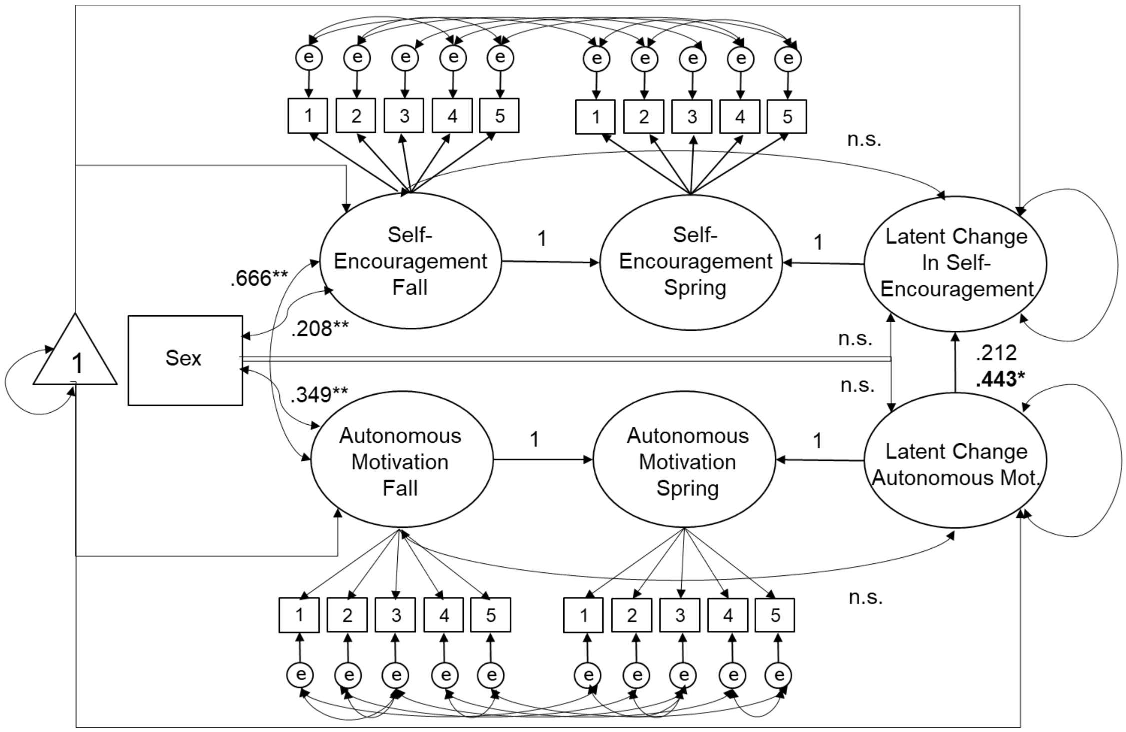
Latent Change in Autonomous Motivation Predicting Latent Change in Strategizing (N = 348)



*$p < .05$. **$p < .01$.

Figure 3.9

Latent Change in Autonomous Motivation Predicting Latent Change in Self-Encouragement (N = 348)



*$p < .05$. **$p < .01$.

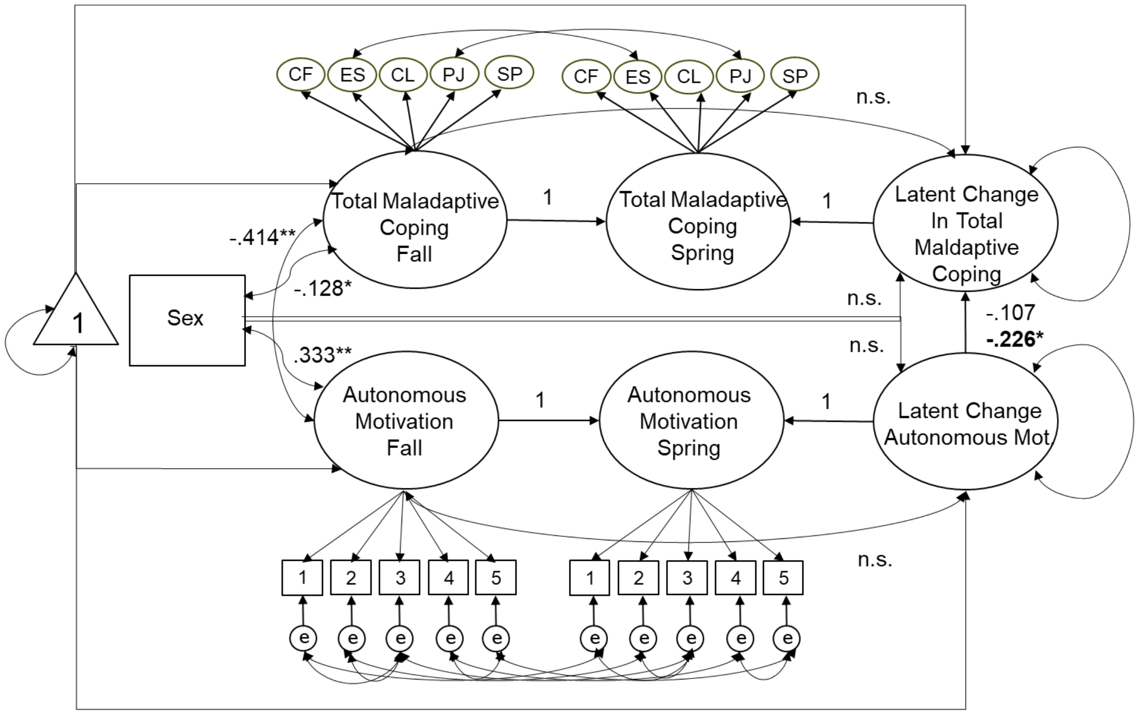
Hypothesis 2b3. Change in autonomous motivation from fall to spring is negatively associated with change in total maladaptive coping from fall to spring.

Hypothesis 2b3 was supported. A bivariate 2W-LCS model was tested to investigate the relationship between change in autonomous motivation and change in total maladaptive coping from fall to spring. Total maladaptive coping was modeled as a second-order factor with five components (confusion, concealment, escape, projection, self-pity). See Figure 3.8 for a path model that diagrams the results of Hypothesis 2b3 for change in autonomous motivation predicting change in total maladaptive coping. The chi-square value was significant ($\chi 2$ (1,674) = 2,442.639, $p < .01$), suggesting poor fit to the data. Although CFI, a relative fit index, did not indicate acceptable fit (CFI = .872), two absolute fit indices did indicate acceptable fit (RMSEA = .035, 90% CI [.032 .038], SRMR = .071). Research suggests that CFI may be biased downward in large and complex models (Shi et al., 2019). Overall, model fit appears to be adequate.

Latent change in autonomous motivation from fall to spring significantly negatively predicted latent change in total maladaptive coping from fall to spring (controlling for sex), such that higher increases in autonomous motivation were associated with lower increases or higher decreases in total maladaptive coping, and higher decreases in autonomous motivation were associated with lower decreases or higher increases in total maladaptive coping, $\beta = -.226$, b = -.107, S.E. = .053, $p < .05$. Biological sex was not a significant predictor of change in autonomous motivation or change in total maladaptive coping (see Table 3.12).

Figure 3.10

Latent Change in Autonomous Motivation Predicting Latent Change in Total Maladaptive Coping (N = 348)



*$p < .05$. **$p < .01$.

Hypothesis 2b4. Change in autonomous motivation from fall to spring is negatively associated with change in each specific way of maladaptive coping (projection and self-pity), from fall to spring.

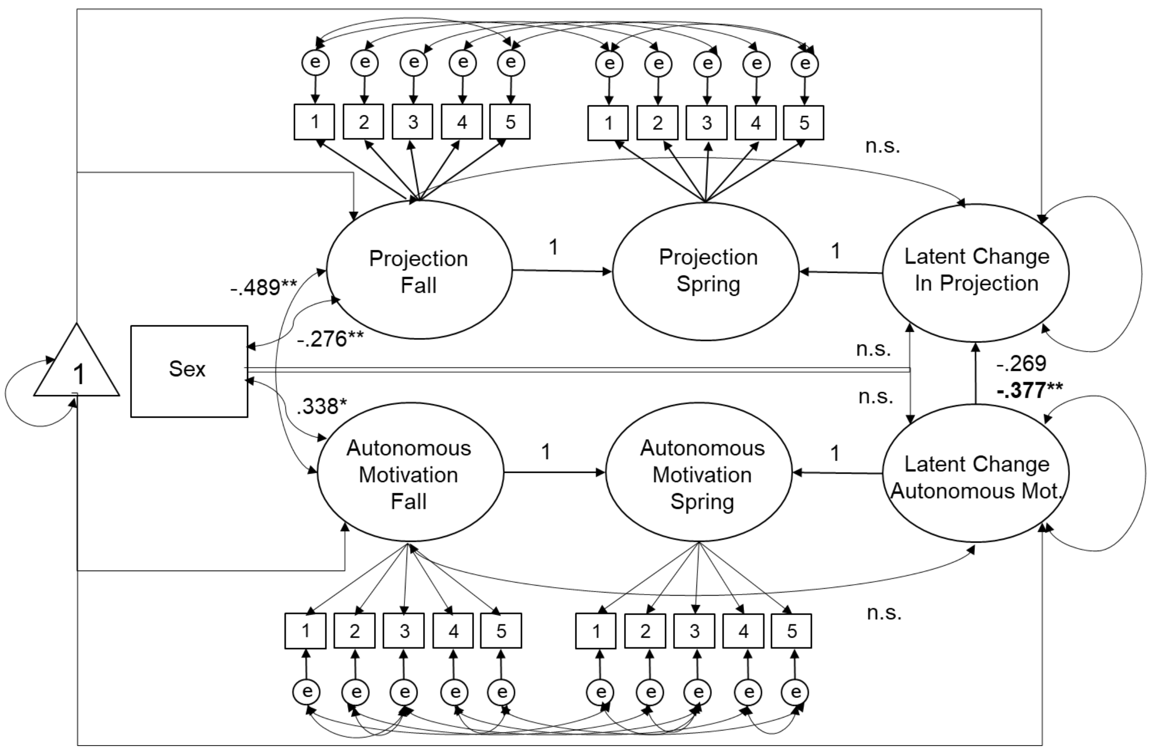
Hypothesis 2b4 was supported for projection coping. It was also supported for self-pity, but at only a marginal level of significance ($p < 10$). Bivariate 2W-LCS model were tested to investigate the relationship between change in autonomous motivation and changes in projection and in self-pity from fall to spring. See Figure 3.11 for a path model that diagrams the results of Hypothesis 2b4 for change in autonomous motivation predicting change in projection, and Figure 3.12 for change in self-pity. The chi-square values for the models for projection and self-pity were significant ($\chi2$ (164) = 217.529, $p < .01$, for projection; $\chi2(162) = 216.085$, $p < .01$, for self-pity), suggesting poor fit to the data. Alternative fit indices, however, indicated acceptable fit for projection (CFI = .962, RMSEA = .030, 90% CI [.018 .040], SRMR = .051), and for self-pity (CFI = .969, RMSEA = .030, 90% CI [.018 .040], SRMR = .060).

Latent change in autonomous motivation from fall to spring significantly negatively predicted latent change in projection from fall to spring (controlling for sex), $\beta = -.377$, b = -.269 S.E. = .089, $p < .01$, such that higher increases in autonomous motivation were associated with higher decreases, or lower increases, in projection, and higher decreases in autonomous motivation were associated with higher increases, or lower decreases, in projection. Biological sex was not a significant predictor of change in autonomous motivation or change in projection (see Table 3.12).

Latent change in autonomous motivation from fall to spring marginally significantly negatively predicted latent change in self-pity from fall to spring (controlling for sex), β = -.239, b = -.145 S.E. = .087, $p < .10$, such that higher increases in autonomous motivation were associated with higher decreases, or lower increases, in self-pity, and higher decreases in autonomous motivation were associated with higher increases, or lower decreases, in self-pity. Biological sex was not a significant predictor of change in autonomous motivation or change self-pity (see Table 3.12).

Figure 3.11

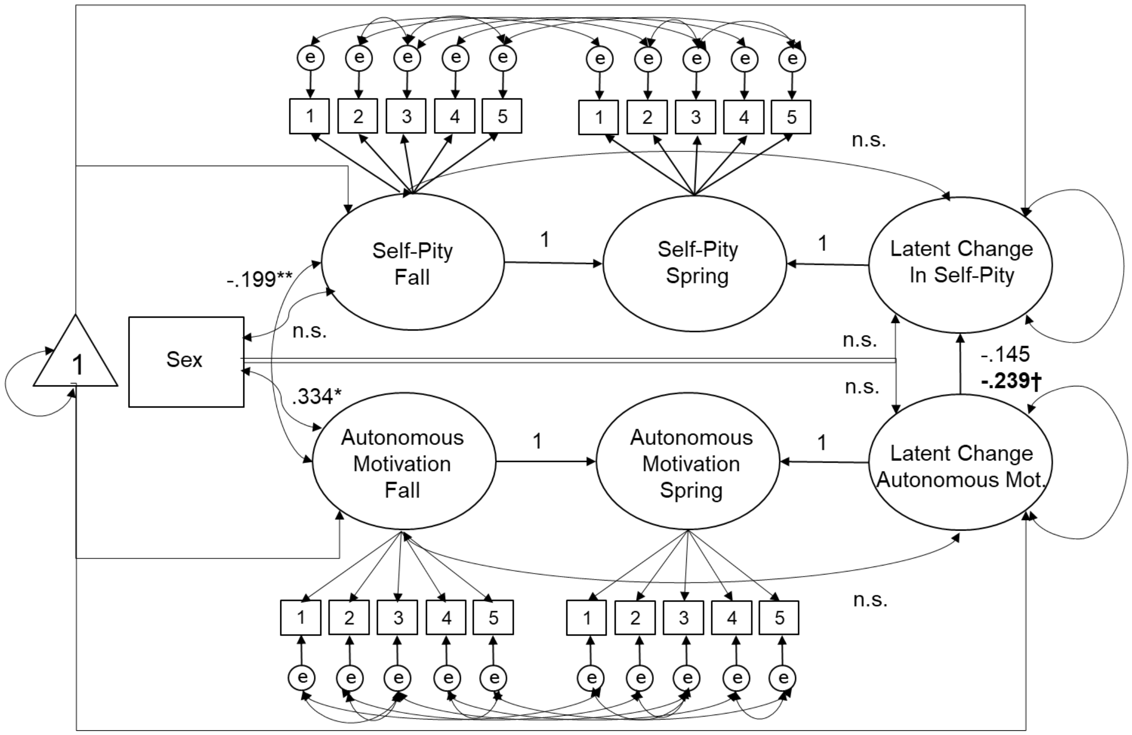
Latent Change in Autonomous Motivation Predicting Latent Change in Projection (N = 348)



*p < .05. **p < .01.

Figure 3.12

Latent Change in Autonomous Motivation Predicting Latent Change in Self-Pity (N = 348)



*p < .05. **p < .01.

Table 3.12

Latent Change in Autonomous Motivation Predicting Latent Change in Coping (N = 348)

	Total Adaptive				Strategizing				Self-Encouragement			
Predictor	β	b	S.E.	*p*	β	b	S.E.	*p*	β	b	S.E.	*p*
Change in Aut. Mot.	.651**	.521	.145	.000	.659**	.657	.167	.000	.443*	.212	.095	.025
Sex pred *d* Coping	-.069	-.059	.062	.348	-.031	-.031	.083	.709	-.140	-.077	.055	.161
Sex pred *d* Aut. Mot.	.084	.089	.097	.362	.100	.101	.096	.292	.050	.057	.102	.575
Model Fit:												
Chi-Square(*df*) *p*	2,211.254(1680) .000				251.054(160) .000				209.779(162) .007			
CFI	.883				.932				.953			
RMSEA[.90]	.029 [.026 .033]				.039 [.030 .049]				.028 [.016 .039]			
SRMR	.062				.060				.056			
	Total Maladaptive				Projection				Self-Pity			
Predictor	β	b	S.E.	*p*	β	b	S.E.	*p*	β	b	S.E.	*p*
Change in Aut. Mot.	-.226*	-.107	.053	.042	-.377**	-.269	.089	.003	-.239†	-.145	.087	.097
Sex pred *d* Coping	-.119	-.064	.042	.129	-.056	-.044	.081	.592	-.115	-.077	.063	.221
Sex pred *d* Aut. Mot.	.021	.023	.110	.833	.007	.008	.107	.941	.022	.024	.112	.827
Model Fit												
Chi-Square(*df*) *p*	2,442.639(1674) .000				217.529(164) .003				216.085(162) .003			
CFI	.872				.962				.969			
RMSEA[.90]	.035 [.032 .038]				.030 [.018 .040]				.030 [.018 .040]			
SRMR	.071				.051				.060			

†$p < .10$. *$p < .05$. **$p < .01$.

Research Question 3 - Catastrophizing

RQ3. Catastrophizing. Does catastrophizing predict changes in academic coping across the first year of middle school?

Research Question 3 investigated the relationship between catastrophizing and change in student's coping. Part "a" looked at the relationship between student's level of catastrophizing in fall and change in various ways of coping across the academic year, modeled using autoregressive longitudinal models. Part "b" looked at the relationship between change in student's catastrophizing across the year and change in student's various ways of academic coping across the year, modeled using two-wave bivariate latent change score models.

Research Question 3a: - Catastrophizing – Levels-to-Change

RQ3a. Level-to-change. Does level of catastrophizing in the fall predict academic coping in spring, controlling for academic coping in fall?

Results for question 3a, investigating the relationships between students' catastrophizing in fall and changes in ways of academic coping, using autoregressive longitudinal models, are shown in Table 3.13. Structural equation models were separately estimated for each subpart of the research question to investigate the relationship between levels of catastrophizing in fall and change in ways of academic coping from fall to spring: total adaptive, total maladaptive, and four separate ways of coping. Biological sex was included as a control variable in all models.

Hypothesis 3a1. The level of catastrophizing in the fall negatively predicts total adaptive coping in spring, controlling for total adaptive coping in fall.

Hypothesis 3a1 was not supported. An autoregressive longitudinal model was tested to investigate the relationship between catastrophizing in fall and change in total adaptive coping from fall to spring. Total adaptive coping was modeled as a second-order factor with five components (strategizing, help-seeking, comfort-seeking, self-encouragement, and commitment). The chi-square value was significant ($\chi 2$ (1,630) = 2,102.523, $p < .01$), suggesting poor fit to the data. CFI, a relative fit index, did not indicate acceptable fit (CFI = .893). Two absolute fit indices, however, did indicate acceptable fit (RMSEA = .029, 90% CI [.025 .032], SRMR = .065). Research suggests that CFI may be biased downward in large and complex models (Shi et al., 2019). Overall, model fit appears to be adequate.

Catastrophizing in fall did not significantly predict total adaptive coping in spring, controlling for total adaptive coping in fall (and controlling for sex), $\beta = .008$, b = .011, S.E. = .090, ns. Total adaptive coping was highly stable over time (controlling for catastrophizing in fall and controlling for sex), $\beta = .730$, b = 1.023 S.E. = .155, $p < .01$. Biological sex was not a significant predictor in this model (see Table 3.13).

Hypothesis 3a2. The level of catastrophizing in the fall negatively predicts each specific way of adaptive coping (strategizing and self-encouragement) in spring, controlling for that way of adaptive coping in fall.

Hypothesis 3a2 was not supported. Autoregressive longitudinal models were tested to investigate the relationships between catastrophizing in fall and changes in strategizing and in self-encouragement from fall to spring. The chi-square values for strategizing ($\chi 2$ (152) = 254.498, p =< .01) and self-encouragement ($\chi 2$ (152) = 211.533, p < .01) were significant, suggesting poor fit to the data. CFI, a relative fit index, however, approached acceptable fit in the strategizing model (CFI = .921) and in the self-encouragement model (CFI = .944). Two absolute fit indices did indicate acceptable fit for the strategizing model (RMSEA = .044 90% CI [.034 .053], SRMR = .069) and the self-encouragement model (RMSEA = .034, 90% CI [.022 .044], SRMR = .058). Overall, model fit appears to be adequate.

Catastrophizing in fall did not significantly predict strategizing in spring, controlling for strategizing in fall (and controlling for sex), $\beta = .058$, $b = .070$, S.E. = .109, ns. Strategizing was highly stable over time (controlling for catastrophizing in fall and controlling for sex), $\beta = .558$, $b = .664$, S.E. = .138, $p < .01$. Biological sex was not a significant predictor in this model (see Table 3.13).

Catastrophizing in fall did not significantly predict self-encouragement in spring, controlling for self-encouragement in fall (and controlling for sex), $\beta = -.104$, $b = -.126$, S.E. = .143, ns. Self-encouragement was highly stable over time (controlling for catastrophizing in fall and controlling for sex), $\beta = .543$, $b = .650$, S.E. = .265, $p < .05$ for self-encouragement. Biological sex was not significant predictor in this model.

Hypothesis 3a3. The level of catastrophizing in the fall positively predicts total maladaptive coping in spring, controlling for total maladaptive coping in fall.

Hypothesis 3a3 was not supported. An autoregressive longitudinal model was tested to investigate the relationship between catastrophizing in fall and change in total maladaptive coping from fall to spring. Total maladaptive coping was modeled as a second-order factor with five components (confusion, escape, concealment, projection, self-pity), each with five observed variable indicators. The chi-square value was significant ($\chi 2$ (1622) = 2,406.682, $p < .01$), suggesting poor fit to the data. CFI, a relative fit index, did not indicate acceptable fit (CFI = .877). Two absolute fit indices, however, did indicate acceptable fit (RMSEA = .037, 90% CI [.034 .040], SRMR = .064). Research suggests that CFI may be biased downward in large and complex models (Shi et al., 2019). Overall, model fit appears to be adequate.

Catastrophizing did not significantly predict total maladaptive coping in spring, controlling for total maladaptive coping in fall (and controlling for sex), $\beta = .177$, b = .319, S.E. = .402, ns. Catastrophizing in fall, however, was strongly correlated with total maladaptive coping in fall ($r(348) = .950$, $p < .01$) suggesting possible collinearity between the predictors. Total maladaptive coping was highly stable over time, $\beta = .646$, b = 1.161 S.E. = .421, $p < .01$. Biological sex significantly negatively predicted total maladaptive coping in spring, controlling for total maladaptive coping in fall, $\beta = .-130$, b = -.471 S.E. = .216, $p < .05$, indicating that increases in total maladaptive coping across the year were larger, or decreases smaller, for boys than for girl.

Hypothesis 3a4. The level of catastrophizing in the fall positively predicts each specific way of maladaptive coping (projection and self-pity) in spring, controlling for that way of maladaptive coping in fall.

Hypothesis 3a4 was not supported. Autoregressive longitudinal models were tested to investigate the relationships between catastrophizing in fall and changes in projection and in self-pity from fall to spring. The chi-square values for projection ($\chi2$ (154) = 246.009, p =< .01) and self-pity ($\chi2$ (154) = 234.643, p < .01) were significant, suggesting poor fit to the data. CFI, a relative fit index, however, approached acceptable fit in the projection model (CFI = .942) and indicated acceptable fit in the self-pity model (CFI = .962). Two absolute fit indices also indicated acceptable fit for both the projection model (RMSEA = .041, 90% CI [.031 .051], SRMR = .059). and the self-pity model (RMSEA = .039, 90% CI [.028 .048], SRMR = .041). Overall, model fit appears to be adequate.

Catastrophizing in fall did not significantly predict projection in spring, controlling for projection in fall (and controlling for sex), β = .004, b = .007, S.E. = .202, ns. Projection was highly stable over time (controlling for catastrophizing in fall and controlling for sex), β = .764, b = 1.277, S.E. = .349, $p < .01$. Biological sex significantly negatively predicted projection in spring, controlling for projection in fall (β = -.144, b = -.501, S.E. = .220, $p < .05$) indicating that increases in total maladaptive coping across the year were greater, or decreases smaller, for boys than for girl.

Catastrophizing in fall did not significantly predict self-pity in spring, controlling for self-pity in fall (and controlling for sex), β = .227, b = .392, S.E. = .841, ns. Self-pity was moderately, but not significantly stable over time (controlling for catastrophizing in fall and controlling for sex), β = .594, b = 1.032, S.E. = .908, ns. Self-pity in fall, however, was strongly correlated with catastrophizing in fall ($r(348) = .960$, $p < .01$), suggesting possible collinearity between the predictors. Biological sex was not a significant predictor in this model (see Table 3.13).

Table 3.13

Catastrophizing in Fall Predicting Spring Coping when Controlling for Fall Coping (N = 348)

	Total Adaptive				Strategizing				Self-Encouragement			
Predictor	β	b	S.E.	*p*	β	b	S.E.	*p*	β	b	S.E.	*p*
Fall Catastrophizing	.008	.011	.090	.902	.058	.070	.109	.517	-.104	-.126	.143	.375
Fall Coping	.730**	1.023	.155	.000	.558**	.664	.138	.000	.543*	.650	.265	.014
Sex	.005	.014	.155	.928	.083	.204	.167	.223	-.027	-.066	.224	.768
<u>Model Fit</u>												
Chi-Square(*df*) *p*	2,102.523(1630) .000				254.498(152) .000				211.533(152) .001			
CFI	.893				.921				.944			
RMSEA [.90]	.029 [.025 .032]				.044 [.034 .053]				.034 [.022 .044]			
SRMR	.065				.069				.058			

	Total Maladaptive				Projection				Self-Pity			
Predictor	β	b	S.E.	*p*	β	b	S.E.	*p*	β	b	S.E.	*p*
Fall Catastrophizing	.177	.319	.402	.428	.004	.007	.202	.971	.227	.392	.841	.642
Fall Coping	.646**	1.161	.421	.006	.764**	1.277	.349	.000	.594	1.032	.908	.256
Sex	-.130*	-.471	.216	.029	-.144*	-.501	.220	.023	-.089	-.309	.251	.217
<u>Model Fit</u>												
Chi-Square(*df*) *p*	2,406.683(1622) .000				246.009(154) .000				234.643(154) .000			
CFI	.877				.942				.962			
RMSEA [.90]	.037 [.034 .040]				.041 [.031 .051]				.039 [.028 .048]			
SRMR	.064				.059				.041			

†$p < .10$. *$p < .05$. **$p < .01$.

Research Question 3b - Catastrophizing – Change-to-change

RQ3b. Change-to-change. Are changes in catastrophizing from fall to spring associated with changes in academic coping from fall to spring?

Results for question 3b, investigating the relationship between change in catastrophizing and change in academic coping from fall to spring, using bivariate two-wave latent change score models (2W-LCS), are shown in Table 3.14. Models were separately estimated for each subpart of the research question to investigate the relationship between change in catastrophizing and change in ways of academic coping: total adaptive, total maladaptive, and four separate ways of coping. Biological sex was used as a control variable in all models.

Hypothesis 3b1. Change in catastrophizing from fall to spring is negatively associated with change in total adaptive coping from fall to spring.

Hypothesis 3b1 was not supported. A bivariate 2W-LCS model was tested to investigate the relationship between change in catastrophizing and change in total adaptive coping from fall to spring. Total adaptive coping was modeled as a second-order factor with five components (strategizing, help-seeking, comfort-seeking, self-encouragement, and commitment). The chi-square value was significant ($\chi2$ (2,182) = 2,966.932, $p < .01$), suggesting poor fit to the data. CFI, a relative fit index, did not indicate acceptable fit (CFI = .863). Two absolute fit indices, however, did indicate acceptable fit (RMSEA = .031, 90% CI [.028 .034], SRMR = .074). Research suggests that CFI may be biased downward in large and complex models (Shi et al., 2019). Overall, model fit appears to be adequate.

Latent change in catastrophizing from fall to spring did not significantly predict latent change in total adaptive coping from fall to spring (controlling for sex), β = -.072, b = -.102, S.E. = .190, ns. Biological sex marginally significantly negatively predicted change in catastrophizing, β = -.150, b = -.088, S.E. = .051, $p < .10$, such that increases in catastrophizing were smaller, or decreases larger, for girls than for boys across the year. Biological sex was not a significant predictor of change in total adaptive coping (see Table 3.14).

Hypothesis 3b2. Change in catastrophizing from fall to spring is negatively associated with change in each specific way of adaptive coping (strategizing and self-encouragement), from fall to spring.

Hypothesis 3b2 was not supported. Bivariate 2W-LCS models were tested to investigate the relationship between change in catastrophizing and change in strategizing and on change in self-encouragement from fall to spring. The chi-square values for the models for strategizing and for self-encouragement were significant ($\chi2$ (342) = 521.217, $p < .01$ for strategizing; $\chi2$ (344) = 470.050, $p < .01$ for self-encouragement), suggesting poor fit to the data. CFI, a relative fit index, however, approached acceptable fit for strategizing (CFI = .922), and for self-encouragement (CFI = .930). Two absolute fit indices did indicate acceptable fit both for strategizing (RMSEA = .038, 90% CI [.031 .044], SRMR = .076), and for self-encouragement (RMSEA = .032, 90% CI [.024 ,039], SRMR = .061). Research suggests that CFI may be biased downward in large and complex models (Shi et al., 2019). Overall, model fit appears to be adequate.

Latent change for catastrophizing from fall to spring did not significantly predict latent change in strategizing from fall to spring (controlling for sex), β = .080, b = .146, S.E. = .322, ns, and did not significantly predict latent change in self-encouragement from fall to spring (controlling for sex), β =-.149, b = -.152 S.E. = .186, ns. Biological sex was not a significant predictor of latent change in strategizing or in self-encouragement (see Table 3.14). In the model for self-encouragement, but not in the model for strategizing, biological sex marginally significantly negatively predicted latent change in catastrophizing, β =-.150, b = -.089 S.E. = .051, $p < .10$, such that increases in catastrophizing were smaller, or decreases larger, for girls than for boys across the year.

Hypothesis 3b3. Change in catastrophizing from fall to spring is positively associated with change in total maladaptive coping from fall to spring.

It was not possible to complete the test of Hypothesis 3a3. A bivariate 2W-LCS model was specified to investigate the relationship between change in catastrophizing and change in total maladaptive coping from fall to spring. Total maladaptive coping was modeled as a second-order factor with five components (confusion, escape, concealment, projection, self-pity). The correlation between catastrophizing and maladaptive coping was high ($r(316) = .820$, $p < .01$ in fall; $r(257) = .783$, $p < .01$ in spring), suggesting possible collinearity, and model estimation using structural equation modeling was not successful.

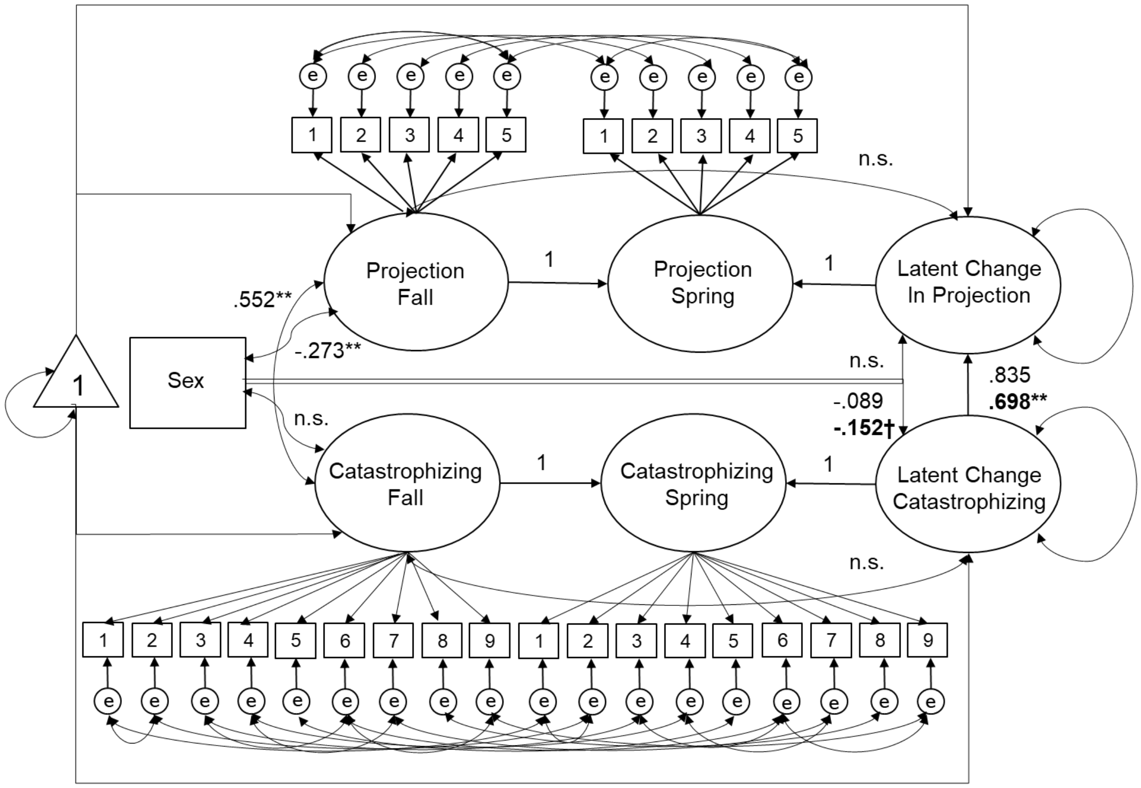
Hypothesis 3b4. Change in catastrophizing from fall to spring is positively associated with change in each specific way of maladaptive coping (projection and self-pity), from fall to spring.

Hypothesis 3b4 was supported for projection. It was not possible to complete the test of the hypothesis for self-pity. The correlation between catastrophizing and self-pity was high ($r(300) = .789$, $p < .01$ in fall; $r(239) = .800$, $p < .01$ in spring), suggesting possible collinearity, and estimation of the model for self-pity using structural equation modeling did not converge on an acceptable covariance matrix. For projection, however, a bivariate 2W-LCS model was tested successfully to investigate the relationships between change in catastrophizing and change in projection from fall to spring. The chi-square values for the model for projection was significant ($\chi2$ (346) = 550.181, $p < .01$), suggesting poor fit to the data. CFI, a relative fit index, however, approached acceptable fit for the projection model (CFI = .923). Two absolute fit indices indicated acceptable fit (RMSEA = .040, 90% CI [.034 .046], SRMR = .071). Research suggests that CFI may be biased downward in large and complex models (Shi et al., 2019). Overall, model fit appears to be adequate.

Latent change in catastrophizing from fall to spring significantly positively predicted latent change in projection from fall to spring (controlling for sex), $\beta = .698$, b = .835, S.E. = .205, $p < .01$, such that higher increases in catastrophizing were associated with higher increases, or lower decreases, in projection, and higher decreases in catastrophizing were associated with higher decreases, or lower increases, in projection. Biological sex marginally significantly negatively predicted latent change in catastrophizing, $\beta =-.152$, b = -.089 S.E. = .050, $p < .10$, such that increases in catastrophizing were smaller, or decreases larger, for girls than for boys across the year. Biological sex was not a significant predictor of latent change in projection (see Table 3.14).

Figure 3.13

Latent Change in Catastrophizing Predicting Latent Change in Projection (N = 348)



†p < .10, *p < ,05, **p < ,01

Table 3.14

Latent Change in Catastrophizing Predicting Latent Change in Coping (N = 348)

	Total Adaptive				Strategizing				Self-Encouragement			
Predictor	β	b	S.E.	*p*	β	b	S.E.	*p*	β	b	S.E.	*p*
Change in Catastroph.	-.072	-.102	.190	.590	.080	.146	.322	.649	-.149	-.152	.186	.413
Sex pred *d* Coping	-.013	-.011	069	.875	.040	.043	.099	.660	-.128	-.077	.070	.271
Sex pred *d* Catastroph.	-.150†	-.088	.051	.086	-.144	-.086	.053	.104	-.150†	-.089	.051	.079
<u>Model Fit</u>												
Chi-Square(*df*) *p*	2,966.936(2182) .000				521.217(342) .000				470.050(344) .000			
CFI	.863				.922				.939			
RMSEA [.90]	.031 [.028 .034]				.038 [.031 .044]				.032 [.024 .039]			
SRMR	.074				.076				.061			
	Total Maladaptive				Projection				Self-Pity			
Predictor	β	b	S.E.	*p*	β	b	S.E.	*p*	β	b	S.E.	*p*
Change in Catastroph.	Error.				.698**	.835	.205	.000	Error.			
Sex pred *d* Coping	Model estimation				.008	.006	.087	.949	Model estimation			
Sex pred *d* Catastroph.	failed to converge.				-.152†	-.089	.050	.071	failed to converge.			
<u>Model Fit</u>												
Chi-Square(*df*) *p*					550.181(346) .000							
CFI					.923							
RMSEA [.90]					.040 [.034 .046]							
SRMR					.071							

†*p* < .10. **p* < .05. ***p* < .01.

Research Question 4 – Unique Effects

RQ4. Unique effects (levels-to-change). Do perceived control, autonomous motivation, and catastrophizing each uniquely predict coping in spring, controlling for academic coping in fall?

Research Question 4 investigated the unique relationships of each of the three motivation variables, perceived control, autonomous motivation, and catastrophizing, to changes in student's ways of coping across the academic year, using autoregressive longitudinal models. Structural equation models were estimated for each subpart of the research question to investigate the unique longitudinal relationships of the three predictors in fall and change in ways of academic coping from fall to spring for total adaptive, total maladaptive, and four separate ways of coping. Biological sex was included as a control variable in all models. Results for question 4 are shown in Table 3.15.

Hypothesis 4a. The levels of perceived control, autonomous motivation, and catastrophizing in the fall each uniquely predicts total adaptive coping in spring, controlling for total adaptive coping in fall, and controlling for the other two of these three variables.

Hypothesis 4a was not supported. An autoregressive longitudinal model was tested to investigate the unique effects of the three motivational variables, perceived control, autonomous motivation, and catastrophizing on change in total adaptive coping from fall to spring. Total adaptive coping was modeled as a second-order factor with five components (strategizing, help-seeking, comfort-seeking, self-encouragement, and commitment). The chi-square value was significant ($\chi 2$ (2253) = 3,052.170, p < .01), suggesting poor fit to the data. CFI, a relative fit index, did not indicate acceptable fit (CFI = .857). Two absolute fit indices, however, did indicate acceptable fit (RMSEA = .032, 90% CI [.029 .035], SRMR = .065). Research suggests that CFI may be biased downward in large and complex models (Shi et al., 2019). Overall, model fit appears to be adequate.

None of the motivational variables significantly predicted spring total adaptive coping, controlling for fall adaptive coping: $\beta = .064$, b = .093, S.E. = .222, ns for perceived control; $\beta = .165$, b = .235, S.E. = .233, ns for autonomous motivation; $\beta = .038$, b = .056, S.E. = .108, ns for catastrophizing. Total adaptive coping was significantly stable over time (controlling for three motivational variables in fall and controlling for sex), $\beta = .541$, b = .763 S.E. = .304, $p < .05$. Biological sex was not a significant predictor in this model (see Table 3.15).

Hypothesis 4b. The levels of perceived control, autonomous motivation, and catastrophizing in the fall each uniquely predicts each specific way of adaptive coping (strategizing and self-encouragement) in spring, controlling for that way of adaptive coping in fall, and controlling for the other two of these three variables.

Hypothesis 4b was partially supported. Autoregressive longitudinal models were tested to investigate the unique effects of the three motivational variables, perceived control, autonomous motivation, and catastrophizing on change in two ways of adaptive coping, strategizing and self-encouragement, from fall to spring. The chi-square value was significant in the model for strategizing ($\chi 2$ (375) = 588.880, $p < .01$) and in the model for self-encouragement ($\chi 2$ (374) = 519.798, $p < .01$), suggesting poor fit to the data. CFI, a relative fit index, did not indicate acceptable fit (CFI = .901 for strategizing, CFI = .921 for self-encouragement). Two absolute fit indices, however, did indicate acceptable fit for the model for strategizing (RMSEA = .040, 90% CI [.034 .047], SRMR = .066), and the model for self-encouragement (RMSEA = .033, 90% CI [.026 .040], SRMR = .060). Research suggests that CFI may be biased downward in large and complex models (Shi et al., 2019). Overall, model fit appears to be adequate.

Perceived control was not a significant predictor of spring strategizing, controlling for fall strategizing, β = .238, b = .321, S.E. = .267, ns. Autonomous motivation positively significantly predicted spring strategizing, controlling for fall strategizing, β = .409, b = .541, S.E. = .226, $p < .05$. Catastrophizing marginally significantly positively predicted spring strategizing, controlling for fall strategizing, β = .183, b = 249, S.E. = .131, $p < .10$. The coefficient for stability (fall strategizing predicting spring strategizing) was nonsignificant, β = .109, b = .145, S.E. = .280, ns. Student's fall strategizing, however, was strongly correlated with fall perceived control ($r(348) = .760$, $p < .01$) and with fall autonomous motivation ($r(348) = .786$, $p < .01$). Student's fall perceived control was also strongly correlated with fall autonomous motivation ($r(348) = .726$). These correlations between predictors suggest possible collinearity between the variables. Biological sex was not a significant predictor in this model.

None of the motivational variables significantly predicted spring self-encouragement, controlling for fall self-encouragement: β = -.191, b = -.248, S.E. = .486, ns for perceived control; β = .407, b = .511, S.E. = .314, ns for autonomous motivation; β = -.101, b = -.133, S.E. = .165, ns for catastrophizing. In addition, the estimated coefficient for stability (fall self-encouragement predicting spring self-encouragement) was nonsignificant, $\beta = .460$, $b = .591$, S.E. = .505, ns. Student's fall self-encouragement, however, was strongly correlated with fall perceived control ($r(348) = .763$, $p < .01$) and fall autonomous motivation ($r(348) = .633$, $p < 01$). Student's fall perceived control was also strongly correlated with fall autonomous motivation ($r(348) = 732$, $p < .01$). These correlations suggest possible collinearity between the predictors. Biological sex was not a significant predictor in this model (see Table 3.15).

Hypothesis 4c. The levels of perceived control, autonomous motivation, and catastrophizing in the fall each uniquely predicts total maladaptive coping in spring, controlling for total maladaptive coping in fall, and controlling for the other two of these three variables.

Hypothesis 4c was not supported. An autoregressive longitudinal model was tested to investigate the unique effects of the three motivational variables, perceived control, autonomous motivation, and catastrophizing on change in total maladaptive coping from fall to spring. Total maladaptive coping was modeled as a second-order factor with five components (confusion, escape, concealment, projection, self-pity). The chi-square value was significant ($\chi 2$ (2247) = 3,323.652, $p < .01$), suggesting poor fit to the data. CFI, a relative fit index, did not indicate acceptable fit (CFI = .854). Two absolute fit indices, however, did indicate acceptable fit (RMSEA = .037, 90% CI [.034 .040], SRMR = .069). Research suggests that CFI may be biased downward in large and complex models (Shi et al., 2019). Overall, model fit appears to be adequate.

None of the motivational variables significantly predicted spring total maladaptive coping, controlling for fall maladaptive coping: $\beta = -.191$, $b = -.342$, S.E. = .230, ns for perceived control; $\beta = .072$, $b = .127$, S.E. = .228, ns for autonomous motivation; $\beta = .231$, b = .419, S.E. = .361, ns for catastrophizing. Total maladaptive coping was significantly stable over time (controlling for three motivational variables in fall and controlling for sex), $\beta = .509$, b = .919, S.E. = .416, $p < .05$. Biological sex significantly negatively predicted spring total maladaptive coping, controlling for fall total maladaptive coping, $\beta = -.144$, b = -.525, S.E. = .192, $p < .01$, indicating that increases in total maladaptive coping were smaller, or decreases larger, for girls than for boys across the year.

Hypothesis 4d. The levels of perceived control, autonomous motivation, and catastrophizing in the fall each uniquely predicts each specific way of maladaptive coping (projection and self-pity) in spring, controlling for that way of maladaptive coping in fall, and controlling for the other two of these three variables.

Hypothesis 4d was not supported. Autoregressive longitudinal models were tested to investigate the unique effects of three motivational variables, perceived control, autonomous motivation, and catastrophizing on change in two ways of maladaptive coping, projection and self-pity, from fall to spring. The chi-square value was significant in the model for projection ($\chi2$ (377) = 563.022, $p < .01$) and in the model for self-pity ($\chi2$ (377) = 563.022, $p < .01$), suggesting poor fit to the data. CFI, a relative fit index, approached acceptable fit (CFI = .919 for strategizing, CFI = .938 for self-encouragement). Two absolute fit indices did indicate acceptable fit for the model for projection (RMSEA = .038, 90% CI [.031 .044], SRMR = .059), and the model for self-pity (RMSEA = .037, 90% CI [.030 .043], SRMR = .054). Research suggests that CFI may be biased downward in large and complex models (Shi et al., 2019). Overall, model fit appears to be adequate.

None of the motivational variables significantly predicted spring projection, controlling for fall projection: β = -.279, b = -.493, S.E. = .349, ns, for perceived control; β = .135, b = .234, S.E. = .305, ns, for autonomous motivation; β = -.044, b = -.080, S.E. = .221, ns for catastrophizing. Projection was significantly stable over time (fall projection predicting spring projection), β = .697, b = 1.208, S.E. = .370, $p < .01$. Biological sex significantly negatively predicted spring projection controlling for fall projection β = -.142, b = -.512, S.E. = .239, $p < .05$, indicating that increases in projection were smaller, or decreases larger, for girls than for boys across the year.

None of the motivational variables significantly predicted spring self-pity, controlling for fall self-pity: β = -.082, b = -.142, S.E. = .228, ns for perceived control; β = .083, b = .140, S.E. = .198, ns for autonomous motivation; β = .192, b = .336, S.E. = .861, ns for catastrophizing. Self-pity was not significantly stable over time, β = .613, b = 1.076, S.E. = .953, ns. Self-pity in fall, however, was highly correlated with catastrophizing in fall, ($r(348) = .961$, $p < .01$), suggesting collinearity between the predictors. Biological sex was not a significant predictor of spring self-pity controlling for fall self-pity.

Table 3.15

Unique Effects of Perceived Control, Autonomous Motivation, and Catastrophizing Predicting Spring Coping when Controlling for Fall Coping (N = 348)

	Total Adaptive				Strategizing				Self-Encouragement			
Predictor	β	b	S.E.	*p*	β	b	S.E.	*p*	β	b	S.E.	*p*
Fall Control	.064	.093	.222	.677	.238	.321	.267	.228	-.191	-.248	.486	.610
Fall Autonomous Mot.	.165	.235	.233	.314	.409*	.541	.226	.017	.407	.511	.314	.104
Fall Catastrophizing	.038	.056	.108	.604	.183†	.249	.131	.057	-.101	-.133	.165	.421
Fall Coping	.541*	.763	.304	.012	.109	.145	.280	.605	.460	.591	.505	.242
Sex	.002	.006	.150	.969	.039	.106	.172	.537	-.106	-.281	.226	.215
Model Fit:												
Chi-Square(*df*) *p*	3,052.170(2253) .000				588.880(375) .000				519.798(374) .000			
CFI	.857				.901				.921			
RMSEA [.90]	.032 [.029 .035]				.040 [.034 .047]				.033 [.026 .040]			
SRMR	.065				.066				.060			
	Total Maladaptive				Projection				Self-Pity			
Predictor	β	b	S.E.	*p*	β	b	S.E.	*p*	β	b	S.E.	*p*
Fall Control	-.191	-.342	.230	.137	-.279	-.493	.349	.158	-.082	-.142	.228	.535
Fall Autonomous Mot.	.072	.127	.228	.577	.135	.234	.305	.443	.083	.140	.198	.477
Fall Catastrophizing	.231	.419	.361	.246	-.044	-.080	.221	.719	.192	.336	.861	.696
Fall Coping	.509*	.919	.416	.027	.697**	1.208	.370	.001	.613	1.076	.953	.259
Sex	-.144**	-.525	.192	.006	-.142*	-.512	.239	.032	-.090	-.318	.249	.203
Model Fit:												
Chi-Square(*df*) *p*	3,323.652(2247) .000				563.022(377) .000				554.123(377) .000			
CFI	.854				.919				.938			
RMSEA [.90]	.037 [.034 .040]				.038 [.031 .044]				.037 [.030 .043]			
SRMR	.069				.059				.054			

†$p < .10$. *$p < .05$. **$p < .01$.x

Discussion of Study 1

Study 1 investigated the relationship between three motivational variables and changes in several key ways of academic coping across the first year of middle school, using two different methodological approaches to the study of changes in coping. Autoregressive longitudinal "launch" models showed few effects of levels of the motivational variables in fall on change in ways of coping from fall to spring. Latent change score models, however, revealed that changes in motivational variables were associated with changes in many of these ways of coping, suggesting a close relationship between each of the three predictors and several ways of academic coping.

Each of the three motivational variables seems to have a unique, but important role in predicting change in students' ways of academic coping in this age group. Evidence of a connection between the three predictors and ways of coping was suggested by their intercorrelations in the preliminary analyses. Each predictor, perceived control, autonomous motivation, and catastrophizing, was significantly, sometimes strongly correlated with at least some of the ways of coping. Correlations at fall, at spring, and between fall and spring all showed that perceived control was significantly positively associated with adaptive ways of coping and significantly negatively associated with maladaptive ways of coping. Autonomous motivation was also significantly positively correlated with adaptive ways of coping and significantly negatively correlated with maladaptive ways of coping at both time points, but the negative correlations with maladaptive ways were weaker than those for perceived control. Catastrophizing showed a contrasting pattern, with moderate to strong significant positive correlations with maladaptive ways of coping at both time points but nonsignificant, or only weak but significant, negative correlations with adaptive ways of coping.

The correlations are only suggestive, and don't provide information about the dynamic relationships of the variables over time. These correlations could be consistent with a causal relationship running from the motivational variables to coping, from coping to the motivational variables, or maybe in both directions. It's also possible that both the motivational variables and academic coping are involved in one or more larger processes that include other variables. These "third variables" could offer alternative explanations for the associations between the motivational variables and academic coping. Academic engagement, for example, is related to both motivation and to coping and may play a role but was not investigated in the current study. Study 1 did investigate relationships between the motivational variables and ways of academic coping over time. For each of the three motivational variables, analyses were conducted using two different approaches to modeling change, levels-to-change models and change-to-change models, looking for clarity about relationships between the three predictors and the various ways of academic coping. A fourth research question was posed as to unique effects of the three predictors for each coping variable. This question was investigated using levels-to-change models.

Levels-to-Change Models

The first research question for each of the three variables used autoregressive longitudinal models to investigate whether the relationships suggested in the correlations were accompanied by significant relationships over time, with fall levels of motivational variables predicting change in ways of coping from fall to spring. These were the "levels-to-change" or "launch" models. Autoregressive longitudinal models test the relationships between a predictor at the first time point and change in the target outcome variable by estimating the regression coefficient of the predictor variable at Time 1 predicting the outcome at Time 2, controlling for the level of the outcome at Time 1.

Based on the correlations of fall levels of the motivational variables and spring levels of ways of coping, it was hypothesized that the levels of each of the motivational variables at the beginning of the year would predict changes in each of the ways of academic coping across the year. The results for the levels-to-change models, however, generally did not show significant relationships of the motivational variables with change in academic coping over time. There were only two exceptions. Autonomous motivation in the fall did significantly positively predict change in strategizing from fall to spring, and marginally significantly predicted change in self-encouragement, but did not significantly predict change in the other ways of coping tested (see Table 3.11). Perceived control in the fall, contrary to the hypotheses, did not significantly predict change in any of the ways of coping tested (see Table 3.10). Catastrophizing in the fall, contrary to the hypotheses, did not significantly predict change in any of the ways of coping tested (see Table 3.12).

There are several possible explanations for why many of the research hypotheses relating to the levels-to-change models were not confirmed, some methodological in nature and others more substantive. First, high correlations between the motivational predictors and coping variables at the first time point suggested possible collinearities in some of the models which may have affected the ability to detect some relationships between variables. Results of the model for perceived control predicting change in strategizing, for example, produced a standardized regression coefficient (β =.268), which did not reach significance in this sample (p = .160). In this model the predictor, perceived, was strongly correlated with fall strategizing (r(348) = .761, p < .01). This suggests possible collinearity between predictors which could have affected the results. Similar strongly correlated predictors suggesting collinearities were associated with nonsignificant regression coefficients for fall coping predicting spring coping in the models for perceived control predicting change in self-encouragement, autonomous motivation predicting change in total adaptive coping, strategizing, and self-encouragement, as well as for catastrophizing predicting change in total maladaptive coping and self-pity.

Second, the analyses may have lacked adequate power as a function of the relationships between the sample size, effect sizes, and complexity of the models. Structural equation modeling generally requires large sample sizes, and the current sample may not have been large enough to detect some effects. Third, the variables for the various ways of coping tested were relatively stable over time, with correlations generally above .50 between fall and spring levels. With high stability in coping, effects of predictors on change in coping are likely to be small over a period of under one calendar year.

Third, the measures selected may have impacted results. The measure of perceived control, as described in the section on “Research Design and Methods,” included only positively worded items from the questionnaire, which would not capture an aspect of perceived control that may be more strongly related to the maladaptive ways of coping. Also, raw coping scores were used instead of allocation scores, a popular way to adjust coping variables, as described above under measures. Results may have differed using allocation scores.

Finally, it is also possible the hypotheses did not adequately take into account the specificity of the relationships between each of the three motivational variables and the various ways of coping. Catastrophizing, for example, was not strongly correlated with adaptive coping. It may have been unreasonable to hypothesize that fall catastrophizing would predict decreases in adaptive ways of coping across the year. There also appears to be specificity in the relationships of the predictors, not just with adaptive coping versus maladaptive coping, but with each of the specific ways of adaptive coping or maladaptive coping. Perceived control, for example, is more strongly correlated with strategizing than it is with self-encouragement.

The other category of possible explanations for hypotheses not being confirmed in Study 1 involves a more theoretical or substantive aspect of the relationships investigated. There may be, in some cases, causal links between the motivational variables and various ways of coping that were not detected because of the limited time window used for the study. This becomes apparent when the dynamics of developmental change are considered in relation to the specific developmental time period selected for the study. Although latent change score models indicated changes in several ways of coping were associated with change in motivational variables, many of the autoregressive models did not show levels of the motivational variables in fall to be significant predictors of changes in coping. Setting aside the methodological issue of correlated predictors at fall, there is another possible explanation for these results.

The students in this sample had five previous years of elementary school previous to the year of this study. During that time their levels of perceived control, autonomous motivation, and catastrophizing had five years to develop and to interact with student's coping preferences and relative uses of different ways of coping. Over this stretch of time the motivational variables and the ways of coping may have stabilized to some extent and the relationships between the motivational variables and ways of coping may have attained a stable or equilibrium relationship. Although perceived control, for example, is positively associated with adaptive coping, it cannot produce unlimited increases in adaptive coping, because there is a ceiling to the amount of adaptive coping that is possible. The dynamic relationship over time is constrained by the limits to change. This might be expected to produce some degree of stability in the long run, an equilibrium between the variables, unless something was to change that would disrupt the situation. The beginning of middle school, coinciding with early adolescence, is a time of change, with cognitive advances, social reorientation, and new features of schools happening all at once. This leads to the second part of each research question, addressing whether *change* in the motivational variables is associated with change in students' ways of academic coping.

Change-to-Change Models

The second research question for each of the three motivational variables used latent change score models to investigate whether change in each motivational antecedent from fall to spring was associated with change in ways of coping from fall to spring. These questions were posed to examine other predictors of changes in coping besides initial levels of target variables. While autoregressive longitudinal models indicate whether a fall level of the motivational antecedent predicts change in a way of coping, the latent change score models indicate whether both variables are changing at the same time, whether in the same direction, increasing or decreasing, or in different directions, one increasing while the other is decreasing. The change-to-change models also indicate the *relative strength* of the correlation between changes in the motivational variables and changes in the ways of coping from fall to spring, with a standardized regression coefficient between the latent changes closer to 1 or to -1 indicating stronger relationships.

The pattern of relationships revealed in the latent change score model results resembles the pattern seen in the correlations between difference scores of the motivational variables and difference scores of the coping variables. Change in perceived control was primarily linked to changes in adaptive ways of coping, but autonomous motivation was linked to changes in both adaptive and maladaptive ways of coping, while catastrophizing was primarily linked to changes in maladaptive ways of coping.

Change in perceived control was significantly positively associated with change in total adaptive coping, strategizing, and self-encouragement. Contrary to hypotheses, change in perceived control was not significantly associated with change in total maladaptive coping, projection, or self-pity. Change in autonomous motivation was significantly positively associated with change in total adaptive coping, strategizing, and self-encouragement, and was significantly negatively associated with change in total maladaptive coping and projection, and marginally significantly negatively associated with change in self-pity. Change in catastrophizing was not significantly associated with change in total adaptive coping, strategizing, or self-encouragement, but was significantly positively associated with change in projection. It was not possible to estimate structural models for the association between change in catastrophizing or change in self-pity because of the very strong correlations between the variables at fall and at spring, suggesting collinearity.

There are several possible explanations for why these hypotheses were not confirmed. First, the analyses may have lacked adequate power to detect some effects, as a function of the relationships between the sample size, effect sizes, and complexity of the models. Results may also have been impacted by high correlations between the latent variables at the first time point, which suggested possible collinearity. Results of the model that investigated the relationship between change in perceived control and change in strategizing, for example, showed a standardized regression coefficient of β =-.277 between change in the two constructs, but this relatively large coefficient was not found to be significantly different from zero in the analysis (p = .188).

Second, as discussed in the section on "Measures," only positively worded items from the questionnaire were used in the assessment of perceived control. This could reduce the possibility of detecting relationships between perceived control and maladaptive ways of coping that may involve the aspects of perceived control captured by the negatively worded items.

Finally, a third possible explanation for why some hypotheses were not confirmed is that the hypotheses may not have adequately considered the specificity of the relationships between each of the motivational variables and each of the academic coping variables. It may not have been reasonable, for example, to expect changes in catastrophizing to predict changes in adaptive ways of coping, given the relatively weak correlations between the difference scores of these variables.

Unique Effects

Hypotheses that fall levels of the motivational variables would show unique effects when tested in combination as predictors of change in models for the various ways of coping were not supported. The autoregressive longitudinal models used to test these hypotheses generally did not find significant effects for the motivational variables predicting change in coping. Only in the autoregressive model for change in strategizing were any of the three motivational variables significant predictors above and beyond the other two. Autonomous motivation was a significant predictor of spring strategizing, controlling for fall strategizing (β = .409, p < .05).

The general absence of significant results for unique effects of the individual motivation variables likely reflects three limitations of the study. First, in the separate levels-to-change models tested in Part "a" of Research Questions 1, 2, and 3, the motivational variables were not significant predictors of change in ways of coping when tested individually, except for the effects of perceived control predicting change in projection, autonomous motivation predicting change in strategizing, and autonomous motivation predicting change in self-encouragement. Second, as described above in the section on levels-to-change models, high correlations between motivational predictors at fall and ways of coping at fall in several models suggested possible multicollinearity. Third, effect sizes may have been small, and with all three predictors included in these models, the sample size may not have been large enough to provide adequate power to detect the effects. With generally high levels of stability in coping across the academic year, effects of fall levels of the motivational variables are likely to be small over this relatively short time period .

Conclusion

While the investigation of the relationships between perceived control, autonomous motivation, and catastrophizing, on the one hand, and ways of academic coping, on the other hand, using the two approaches to modeling change, levels-to-change and change-to-change, revealed important relationships between the variables. These models, however, did not involve one other important aspect of students' learning activity, the social context involving the quality of relationships with their major social partners in learning activity, parents, teachers, and peers. The relevance of parents and teachers to motivation, engagement, and academic coping is well established. Peers, however, are an understudied factor in learning activity. They appear to be an especially influential part of students' social world during early adolescence. Study 2 was conducted to investigate the role of peers at school in relation to the same three motivational variables considered as predictors of academic coping in Study 1.

Chapter 4. Study 2 – Peer Influence

The social context has a powerful influence on academic motivation. Much of the research on contextual influences has focused on parents and teachers, but peers are also an important part of students' social worlds and relevant to academic motivation and outcomes (Wentzel, 1998; Furrer & Skinner, 2003; Skinner et al., 2022; Wentzel, 2017). Study 2 was conducted to broaden the understanding of peers' role in learning activities by investigating for the first time potential effects of peers' levels of three motivational variables, namely, perceived control, autonomous motivation, and catastrophizing. The analysis of changes in academic coping during the first year of middle school, focusing on the role of these three motivational variables in predicting academic coping, which was begun in Study 1, was expanded in Study 2 to consider the role of students' peer groups as a potential influence involving these variables and academic coping over the first year of middle school.

Aim and Research Questions

Study 1 revealed that changes in each of these three important motivational variables were associated with changes in students' specific ways of academic coping. In Study 2, effects of peer group levels of each of the variables were investigated using autoregressive predictive models. Peer group averages were tested as predictors of students' own levels of the same variable. Additionally, peer group averages for the motivational variables were tested as predictors of changes in students' academic coping. Effects of peer group averages were investigated separately for each of the motivational variables, perceived control, autonomous motivation, and catastrophizing.

The literature review revealed that peer influence is most likely for observable beliefs, attitudes, or behaviors. These attributes are susceptible to processes of socialization, including reinforcement, observation, and discussion. Among the motivational variables, students’ perceived control is most visible and most likely to be susceptible to socialization. Autonomous motivation and catastrophizing, on the other hand, are more personal and more stable across time, and less likely to be shifted by socialization. Following this logic, it is hypothesized that motivational attributes of students’ groups of affiliated peers will predict change across the year in motivational attributes or in academic coping for perceived control, but not for autonomous motivation or for catastrophizing.

Research Question 1 – Perceived Control

The following research questions and hypotheses were investigated for perceived control:

RQ1. Perceived control. Do peer group levels of perceived control in the fall predict changes in student’s own perceived control and academic coping from fall to spring in the first year of middle school?

Research Question 1a – Peers’ Perceived Control and Individual Perceived Control

RQ1a. Peers’ and individual perceived control. Does peer group level of perceived control in the fall predict student’s level of perceived control in the spring, controlling for student’s perceived control in the fall?

Hypothesis 1a. Peer group level of perceived control in the fall positively predicts student’s level of perceived control in the spring, controlling for student’s level of perceived control in the fall.

Research Question 1b – Peers Perceived Control and Individual Academic Coping

RQ1b. Peers' perceived control and individual coping. Does peer group level of perceived control in the fall predict student's level of academic coping in the spring, controlling for student's level of academic coping in the fall and controlling for student's perceived control in the fall?

Hypothesis 1b1. Peer group level of perceived control in the fall positively predicts student's level of total adaptive coping in the spring, controlling for student's level of total adaptive coping in the fall and controlling for student's perceived control in the fall.

Hypothesis 1b2. Peer group level of perceived control in the fall positively predicts student's level of each specific way of adaptive coping (strategizing and self-encouragement) in the spring, controlling for student's level of that way of adaptive coping in the fall and controlling for student's perceived control in the fall.

Hypothesis 1b3. Peer group level of perceived control in the fall negatively predicts student's level of total maladaptive coping in the spring, controlling for student's level of total maladaptive coping in the fall and controlling for student's perceived control in the fall.

Hypothesis 1b4. Peer group level of perceived control in the fall negatively predicts student's level of each specific way of maladaptive coping (projection and self-pity) in the spring, controlling for student's level of that way of maladaptive coping in the fall and controlling for student's perceived control in the fall.

Research Question 2 – Autonomous Motivation

The following research questions and hypotheses were investigated for autonomous motivation:

RQ2. Autonomous motivation. Do peer group levels of autonomous motivation in the fall predict changes in student's own autonomous motivation and academic coping from fall to spring in the first year of middle school?

Research Question 2a – Peers' Autonomous Motivation and Individual Autonomous Motivation

Hypothesis 2a. Peer group level of autonomous motivation in the fall positively predicts student's level of autonomous motivation in the spring, controlling for student's level of autonomous motivation in the fall.

Research Question 2b – Peers Autonomous Motivation and Individual Academic Coping

RQ2b. Peer effect on individual coping. Does peer group level of autonomous motivation in the fall predict student's level of academic coping in the spring, controlling for student's level of academic coping in the fall and controlling for student's level of autonomous motivation in the fall?

Hypothesis 2b1. Peer group level of autonomous motivation in the fall positively predicts student's level of total adaptive coping in the spring, controlling for student's level of total adaptive coping in the fall and controlling for student's autonomous motivation in the fall.

Hypothesis 2b2. Peer group level of autonomous motivation in the fall positively predicts student's level of each specific way of adaptive coping (strategizing and self-encouragement) in the spring, controlling for student's level of that way of adaptive coping in the fall and controlling for student's autonomous motivation in the fall.

Hypothesis 2b3. Peer group level of autonomous motivation in the fall negatively predicts student's level of total maladaptive coping in the spring, controlling for student's level of total maladaptive coping in the fall and controlling for student's autonomous motivation in the fall.

Hypothesis 2b4. Peer group level of autonomous motivation in the fall negatively predicts student's level of each specific way of maladaptive coping (projection and self-pity) in the spring, controlling for student's level of that way of maladaptive coping in the fall and controlling for student's autonomous motivation in the fall.

Research Question 3 - Catastrophizing

The following research questions and hypotheses were investigated for catastrophizing:

RQ3. Catastrophizing. Do peer group levels of catastrophizing in the fall predict changes in student's own catastrophizing and academic coping from fall to spring in the first year of middle school?

Research Question 3a – Peers' Catastrophizing and Individual Catastrophizing

RQ3a. Peers' and individual catastrophizing. Does peer group level of catastrophizing in the fall predict student's level of catastrophizing in the spring, controlling for student's levels of catastrophizing in the fall?

Hypothesis 3a. Peer group level of catastrophizing in the fall positively predicts student's level of catastrophizing in the spring, controlling for student's level of catastrophizing in the fall.

Research Question 3b – Peers' Catastrophizing and Individual Academic Coping

RQ3b. Peers' catastrophizing and individual coping. Does peer group level of catastrophizing in the fall predict student's level of academic coping in the spring, controlling for student's level of academic coping in the fall and controlling for student's catastrophizing in the fall?

Hypothesis 3b1. Peer group level of catastrophizing in the fall negatively predicts student's level of total adaptive coping in the spring, controlling for student's level of total adaptive coping in the fall and controlling for student's catastrophizing in the fall.

Hypothesis 3b2. Peer group level of catastrophizing in the fall negatively predicts student's level of each specific way of adaptive coping (strategizing and self-encouragement) in the spring, controlling for student's level of that way of adaptive coping in the fall and controlling for student's catastrophizing in the fall.

Hypothesis 3b3. Peer group level of catastrophizing in the fall positively predicts student's level of total maladaptive coping in the spring, controlling for student's level of total maladaptive coping in the fall and controlling for student's catastrophizing in the fall.

Hypothesis 3b4. Peer group level of catastrophizing in the fall positively predicts student's level of each specific way of maladaptive coping (projection and self-pity) in the spring, controlling for student's level of that way of maladaptive coping in the fall and controlling for student's catastrophizing in the fall.

Research Design and Methods

The data for Study 2 come from the existing dataset used in Study 1, which includes two time points, fall and spring, for an entire cohort of sixth graders in the only public middle school in a town in the northeastern United States. Data collection was completed during the 1990-1991 academic year. At the time of the study, approvals were in place from the school Principal and teachers, as well as the University of Rochester. The current study was conducted pursuant to notification from the Human Subjects Review Board of Portland State University, verifying that reapproval was not needed.

Participants.

The sample consisted of 366 sixth graders enrolled at the school. The sample is 48% female. Ethnicity and socioeconomic status data were not collected. The town, however, was predominately (over 90%) European American by descent, and largely lower middle to middle class. 87% of the adult population had at least a high school degree.

The data collection was organized around the students' homerooms. Each student had one homeroom teacher and had a class in their homeroom once a day. All 13 sixth grade homeroom teachers in the school participated in the study, allowing the collection of data from students in their class.

Procedure

Data collection took place at two time points, October and May, of sixth grade, the students' first year in middle school. Students completed self-report questionnaires containing items assessing each of the study variables. Teachers were not present in the classroom during completion of questionnaires by students. In addition to the self-report questionnaires of study variables, students completed questionnaires to provide data about peer groups. Students were asked to provide lists of students whom they regularly observe to "hang out together," regardless of whether the group included the student reporters themselves or not. Students were asked to provide this information on a form with room for up to twenty groups that they observed interacting frequently, each group having spaces for up to twenty members. None of the students exhausted the space provided on the form. They were encouraged to list as many groups as they could think of, including dyads. This method allows students to be placed into more than one group. At the fall time point, 280 participants completed the peer group questionnaire.

Measures

Student-report measures were used to assess perceived control, autonomous motivation, catastrophizing, and ways of coping. See study 1 for descriptions of the measures, reliabilities, descriptive statistics, confirmatory factor analyses and tests of measurement invariance. All these measures use 4-point Likert scales. In addition, peer group averages were computed for each variable for each student's peer group, and each student's peer group size was computed. To determine students' peers group memberships, data were collected for students' peer affiliations, consisting of lists completed by students of those students who "hang out together." These data were analyzed using Kindermann's variant of Social Cognitive Mapping (SCM, Cairns et al., 1985; Kindermann, 1996; see Analysis Plan). Trained research assistants monitored and assisted in the data collection.

Peer group size, assessed as the count of the number of members in each student's group of significantly affiliated peers, not counting the individual student has been used as a control variable in previous studies involving the investigation of peers in relation to academic engagement (Kindermann, 2007). Peer group size was tested as a covariate in tests of all research hypotheses for Study 2, but not found to be a significant predictor in any of the models. This variable was deleted from all models and is not included in any of the reported results.

Peer group average scores for perceived control, autonomous motivation, and catastrophizing were computed by taking the arithmetic mean of the scores for each peer on a student's list of significantly affiliated peers. For example, if student A has a peer group of significantly affiliated peers including student B, C, D, and E, with scores for perceived control of 3, 4, 4, and 3, respectively, then student A's peer group average perceived control score would be 3.5.

Analysis Plan

Analyses of longitudinal data to test the research hypotheses for Study 2 were conducted using structural equation modeling (SEM; Kline, 2023). SEM has several advantages over ordinary least squares regression, as described in Chapter 3 concerning Study 1. SEM models were estimated using full information maximum likelihood (FIML) in Mplus version 8.9 software (Muthén & Muthén, 2023). In general, FIML was used to handle missing data. Since FIML cannot compensate of data missing for individual peers included within the peer group averages, missing data for peer group data were handled using an alternative approach. Missing values for individual students were imputed using the fully conditional specification in SPSS (Markov chain Monte Carlo). Multiple imputation produced five imputed datasets and values were then averaged across the five datasets to create a new dataset. for use in computation of the peer group averages. Measurement models were not used for the peer group averages. Instead, each student's scale average for the items in each scale was computed from the imputed dataset, and these scale values for each member of each student's group of significantly affiliated peers were then averaged to obtain a peer group average of each variable for each student.

Peer Group Affiliations Using Social Cognitive Mapping

Before computing peer group averages, each student's group of significantly affiliated peers was determined. Students were used as "observers" of peer affiliations and asked to complete lists of those students who "hang out together." Peer groups for each student were determined using Kindermann's variant of Social Cognitive Mapping (SCM, Cairns et al., 1985; Kindermann, 1996). From the student-completed peer group questionnaires, lists of each student's significantly affiliated peer group members were identified using a multiple step procedure (Kindermann, 1993, 1996). First, the frequency of co-nominations for each pair of students was entered into a co-occurrence matrix. Next, binomial *z*-tests were used to determine whether an individual was more likely to be co-nominated as a group member with another individual than would be expected by chance. (For an illustration of this step, see the subset of a co-occurrence matrix in Table 4.1 and the example included there.) In a final step, to avoid problems associated with low expected cell frequencies in the co-occurrence matrix for many participants, Fisher's exact test (Stirling's approximation, von Eye, 1990) was used in conjunction with the binomial *z*-test. Network connections that were significant at the $p = .01$ level using both tests were entered into each student's list of significantly affiliated peers (Kindermann, 2007).

Table 4.1

Subset of a Co-occurrence Matrix of Girls in Sixth Grade (Kindermann, 2007)

	KER	RYB	DAL	COD	SUO	ROM	STQ	CHR	KAA	KAW	ELT	JEP	Total Nom's.
KER	-	28	23	12	10	3	3	0	0	0	0	0	36
RYB	28	-	20	11	12	3	4	0	0	0	0	0	32
DAL	23	20	-	10	9	4	2	0	0	0	0	0	28
COD	12	11	10	-	19	8	13	0	0	0	0	0	29
SUO	10	12	9	19	-	9	10	0	0	0	0	0	29
ROM	3	3	4	8	9	-	4	0	0	0	0	0	11
STQ	3	4	2	13	10	4	-	0	0	0	0	0	17
CHR	0	0	0	0	0	0	0	-	10	10	9	10	14
KAA	0	0	0	0	0	0	0	10	-	13	13	12	16
KAW	0	0	0	0	0	0	0	10	13	-	13	10	17
ELT	0	0	0	0	0	0	0	9	13	13	-	10	18
JEP	0	0	0	0	0	0	0	10	`1	10	10	-	13
LIP	0	0	0	0	0	0	0	0	0	0	0	0	24
No. of Informants													280
Total Nominations													3,047
Groups Generated													694

Figure 4.1. Example of Application of the Binomial Z-test to the Co-occurrence Matrix

Consider the two students KER and RYB. KER was reported to be observed as belonging to a group a total of 36 times, and RYB was reported to be observed as belonging to the same group 28 times. RYB was reported to be observed as belonging to a group a total of 32 times. There was a grand total of 694 groups listed by all informants.

The conditional probability of observing RYB as a member of a group, given that KER was a member of one of those groups, is computed (28/36=.78) and compared to the unconditional probability that RYB belonged to any group (32/694=.05) using a binomial z-test. The significant z-score resulting from this comparison (z=21.47, p < .01), indicates that the two are significantly affiliated. RYB is a member of KER's peer group.

Peer Influence Analysis Using Autoregressive Longitudinal Models.

Relationships hypothesized for Research Question 1 and Research Question 2 were tested using autoregressive longitudinal models. Separate analyses were conducted for each part of each research hypothesis, investigating the relationships for each predictor for each outcome variable. Autoregressive longitudinal models were used because they are a well-established approach to the investigation of development change involving multiple predictors.

Tests of Assumptions

Prior to analysis of structural models to test hypotheses for the research questions, the possibility of violation of underlying assumptions of structural equation modeling was considered (Kline, 2023). The following assumptions were investigated:

1. *Missing Data Analysis*: whether there was systematic missingness in the data and implications of missingness for the estimation of structural models.

2. *Collinearity*: whether study variables were independent and the implications of any potential collinearities for results of the analyses.

3. *Normality of Distributions*: whether study variables were normally and multivariate normally distributed and the implications of any potential nonnormality for results of the analyses.

4. *Measurement Invariance*: whether study variables were assessed without changes in measurement properties across time and the implications of any potential variance in measurement properties for results of the analyses.

Missing Data Analysis

Patterns of missing data were investigated, as described in Study 1. Logistic regression models were tested with teacher-reported engagement and biological sex as predictors of missingness for each of 10 ways of coping and each of three motivational variables at fall and spring. Results suggested that at least some variables had missingness related to the variable. To compensate for possible effects of missingness, the structural equation models for Study 2 were estimated using full information maximum likelihood estimate (FIML), a suitable method when data missingness is missing at random (MAR) (Enders & Bandalos, 2001). In addition, items from the teacher-reported engagement scale, which has different patterns of missingness than the student-reported items used in the study, were used as auxiliary variables in estimation of the models, to further reduce potential bias due to missingness not MAR (Collins et al., 2001).

Collinearity

As described in Study 1, strong correlations exist between catastrophizing and total maladaptive coping and self-pity, suggesting the possibility of collinearity between these variables. Peer catastrophizing, however, was not correlated with individual catastrophizing, or with individual total maladaptive coping or individual self-pity. Individual catastrophizing was not a predictor in any of the models in Study 2. None of the predictors in any of the models in Study 2 were strongly correlated with each other.

Normality of Distributions

Normality and multivariate normality of study variables were investigated in Study 1, as described in that study. In Study 2, normality of variables computed as peer group averages was investigated by consideration of statistics for skewness and kurtosis (see Table 4.1). No substantial departures from normality were observed.

Measurement Invariance

Measurement invariance was investigated as described in Study 1. Strong invariance was found for all motivational antecedent and coping variables, except strategizing and total maladaptive coping, for which only weak measurement invariance was found. Results of hypotheses tests in Study 2 (hypotheses 1b2. 1b3, 2b2, 2b3, 3b2, 3b3) containing these variables are limited to the extent that results may be impacted by limited measurement invariance.

Descriptive Statistics

Descriptive statistics, including means and standard deviations, and measurement properties, for students' own levels of all variables were computed for Study 1. Descriptives statistics for individual variables are shown in Table 3.1. For Study 2, descriptive statistics were computed for peer group averages of motivational variables. Table 4.1 shows means, standard deviations, range, skewness, and kurtosis, computed using SPSS software. Table 4.2 shows correlations of fall peer group averages of the three motivational variables with spring levels of students' individual motivational variables and coping variables. Peer group perceived control was only marginally significantly correlated with student total adaptive coping (r = .122, p < .10), and marginally significantly correlated with student total maladaptive coping (r = -.128, p <.10). Peer group autonomous motivation was not significantly correlated with student adaptive coping or maladaptive coping. Likewise, peer group catastrophizing was not significantly correlated with student adaptive coping or maladaptive coping levels.

Table 4.2

Summary of Descriptive Statistics – Peer Group Averages

	n	*M* (SD)	Min	Max	Skew	Kurtosis
Perceived Control	290	3.30 (.32)	1.60	4.00	-1.05	2.80
Autonomous Motivation	290	3.04 (.35)	1.40	4.00	-.58	2.15
Catastrophizing	290	2.12 (.35)	1.00	3.83	.59	2.36
Peer Group Size	294	6.96 (4.39)	1.00	20.00	.55	-.45

Table 4.3

Correlations Between Peer Group Averages and Individual Variables of Interest

	Fall Peer Group Average			*Peer*
Individual Variable	Perceived Control	Autonomous Motivation	*Catastro-phizing*	*Group Size*
Perceived Control Fall	.128*	.107†	-.*047*	*.041*
Autonomous Motivation Fall	.116†	.165*	*.055*	*.031†*
Catastrophizing Fall	-.035	.013	*.118†*	-.*004*
Adaptive Coping Spring	.122†	.067	*.014*	*.139**
Strategizing Spring	.100	.037	*.015*	*.110*
Self-encouragement Spring	-.046	-.049	*.036*	*.015*
Maladaptive Coping Spring	-.128†	-.072	*.084*	*.068*
Projection Spring	-.190*	-.073	*.041*	-.*087*
Self-Pity Spring	-.098	.049	*.069*	-.*006*

†$p < .10$. *$p < .05$.

Results of Study 2

Structural equation models were separately estimated for each part of each research question to investigate the relationship between the average levels within students' peer groups of the three motivational variables, perceived control, autonomous motivation, and catastrophizing, with changes in students own levels of those variables and on students' ways of academic coping: total adaptive, total maladaptive, and four separate ways of coping. Biological sex was used as a control variable in all models.

Each of the three research questions had two parts. The first part involved possible effects of peer group average level of the motivational variable in fall on change in the student's level of the variable from fall to spring, investigated using autoregressive longitudinal models. The second part involved possible effects of peer group average level of the motivational variable in fall on change in the student's level of each way of coping from fall to spring, also investigated using autoregressive longitudinal models. For the second part of each research question, hypotheses were tested covering the six coping measures used in the study (total adaptive, specific adaptive ways of strategizing and self-encouragement, total maladaptive, and specific maladaptive ways of projection and self-pity).

Research Question 1 - Perceived control

RQ1. Perceived control. Do peer group levels of perceived control in the fall predict changes in student's own perceived control and academic coping from fall to spring in the first year of middle school?

Research Question 1 investigated the relationships between peer group perceived control and changes in individual perceived control and individual coping across the academic year. Part “a” concerned the relationship between peer group perceived control and change in student’s own perceived control across the year. Part “b” concerned the relationship between peer perceived control and changes in student’s ways academic coping across the year.

Research Question 1a: Peer Perceived Control Predicting Individual Perceived Control

RQ1a. Peer and individual perceived control. Does peer group level of perceived control in the fall predict student’s level of perceived control in the spring, controlling for student’s perceived control in the fall?

Results for question 1a, investigating the relationship between peer group average levels of perceived control in fall and change in students’ own perceived control from fall to spring, using autoregressive longitudinal models, are shown in Table 4.4.

Hypothesis 1a. Peer group level of perceived control in the fall positively predicts student’s level of perceived control in the spring, controlling for student’s level of perceived control in the fall.

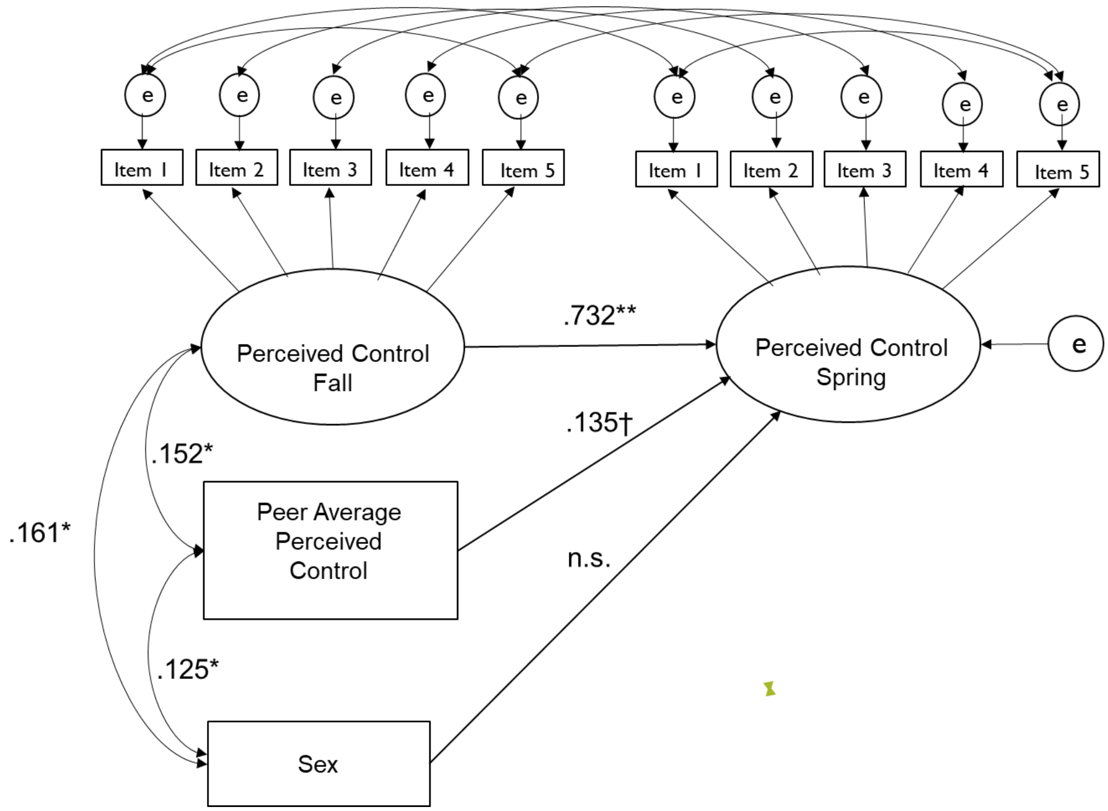
Hypothesis 1a1 was supported at a marginal level of significance ($p < .10$). An autoregressive longitudinal model was tested to investigate the relationship between peer group average level of perceived control in fall and change in students’ own perceived control from fall to spring. A path model that diagrams the results for Hypothesis 1a1 is shown in Figure 4.2. The chi-square value was significant ($\chi 2$ (43) = 62.060, $p < .05$), suggesting poor fit to the data. Because chi-square is sensitive to sample size and several other conditions, however, alternative fit indices were also examined to determine whether the fit was adequate. CFI, a relative fit index, indicated acceptable fit (CFI =

.952), as did two absolute fit indices (RMSEA = .035, 90% CI [.011 .053], SRMR = .043), according to standards suggested by Hu and Bentler (1999).

Peer group average perceived control in fall marginally significantly (*alpha* level of .10) positively predicted individual perceived control in spring controlling for individual perceived control in fall (and controlling for biological sex), $\beta = .128$, $b = .622$, S.E. = .361, $p < .10$. Individual perceived control was highly stable over time, $\beta = .735$, $b = 1.155$, S.E. = .278, $p < .01$. Biological sex was not a significant predictor in this model (see Table 4.5).

Figure 4.2

Peer Perceived Control in Fall Predicting Student Perceived Control in Spring when Controlling for Student Perceived Control in Fall (N = 348)



†$p < .10$. *$p < .05$. **$p < .01$.

Table 4.4

Predictors of Spring Motivational Antecedents when Controlling for Fall Motivational Antecedents (N = 348)

Predictor	Spring Perceived Control			
	β	b	S.E.	*p*
Peers' Average Fall Perceived Control	.128†	.622	.361	.085
Individual Fall Perceived Control	.735**	1.155	.278	.000
Sex	.025	.078	.187	.675
<u>Model Fit</u>				
Chi-Square(*df*) *p*	62.060(43) .030			
CFI	.952			
RMSEA [.90]	.035 [.011 .053]			
SRMR	.043			

Predictor	Spring Autonomous Motivation			
	β	b	S.E.	*p*
Peers' Average Fall Autonomous Motivation	.029	.111	.321	.729
Individual Fall Autonomous Motivation	.626**	.842	.193	.000
Sex	.091	.245	.208	.238
<u>Model Fit</u>				
Chi-Square(*df*) *p*	78.702(41) .000			
CFI	.947			
RMSEA [.90]	.050 [.033 .067]			
SRMR	.050			

Predictor	Spring Catastrophizing			
	β	b	S.E.	*p*
Peers' Average Fall Catastrophizing	-.063	-.365	.301	.226
Individual Fall Catastrophizing	.881**	1.801	.281	.000
Sex	-.074	-.305	.205	.137
<u>Model Fit</u>				
Chi-Square(*df*) *p*	214.239(158) .000			
CFI	.953			
RMSEA [.90]	.038 [.028 .047]			
SRMR	.045			

†$p < .10$. *$p < .05$. **$p < .01$.

Research Question 1b: Peer Perceived Control Predicting Individual Coping

RQ1b. Peers perceived control and individual coping. Does peer group level of perceived control in the fall predict student's level of academic coping in the spring, controlling for student's level of academic coping in the fall and controlling for student's perceived control in the fall?

Results for question 1b, investigating the relationship between peer groups average level of perceived control in fall and changes in students' academic coping across the academic year, are shown in Table 4.5. Autoregressive longitudinal models were estimated for each subpart of the research question to investigate the relationships between peer group average perceived control and changes in student's ways of academic coping, comprising six separate models: total adaptive coping, total maladaptive coping, strategizing, self-encouragement, projection, and self-pity. Individual perceived control and biological sex were entered as control variables in all models.

Hypothesis 1b1. Peer group level of perceived control in the fall positively predicts student's level of total adaptive coping in the spring, controlling for student's level of total adaptive coping in the fall and controlling for student's perceived control in the fall.

Hypothesis 1b1 was not supported. See Table 4.5. An autoregressive longitudinal model was tested to investigate the relationship between peer group average level of perceived control in fall and change in students' total adaptive coping from fall to spring. The chi-square value was significant ($\chi 2(1459) = 1{,}847.872$, $p < .01$) suggesting poor fit to the data. CFI, a relative fit index, did not indicate acceptable fit (CFI = .898). Two absolute fit indices, however, did indicate acceptable fit (RMSEA = .027, 90% CI [.023

.031], SRMR = .060). Research suggests that CFI may be biased downward in large and complex models (Shi et al., 2019). Overall, model fit appears to be adequate.

Peer group average perceived control in fall did not significantly predict total adaptive coping in spring controlling for total adaptive coping in fall (and controlling for individual perceived control in fall and controlling for biological sex), β = .095, b = .431, S.E. = .317, ns. Total adaptive coping was highly stable over time (β = .675, b = .990, S.E. = .231, $p < .01$). Neither student's individual perceived control in fall nor biological sex were significant predictors in this model (see Table 4.5).

Hypothesis 1b2. Peer group level of perceived control in the fall positively predicts student's level of each specific way of adaptive coping (strategizing and self-encouragement) in the spring, controlling for student's level of that way of adaptive coping in the fall and controlling for student's perceived control in the fall.

Hypothesis 1b2 was not supported. See Table 4.5. Autoregressive longitudinal models were tested to investigate the relationships between peer group average level of perceived control in fall and changes in student's strategizing coping and in student's self-encouragement coping from fall to spring. The chi-square values were significant for strategizing ($\chi2(99) = 127.422$, $p <$ 05) and for self-encouragement ($\chi2(101) = 136.721$, $p < .05$) suggesting poor fit to the data. CFI, a relative fit index, indicated acceptable fit for strategizing (CFI = .961) and approached acceptable fit for self-encouragement (CFI = .929). Two absolute fit indices indicated acceptable fit both in the model for strategizing (RMSEA = .028, 90% CI [.010 .041], SRMR = .046), and in the model for self-encouragement (RMSEA = .031, 90% CI [.016 .044], SRMR = .052). Overall, model fit appears to be adequate.

Peer group average perceived control in fall did not significantly predict strategizing in spring controlling for strategizing in fall (and controlling for individual perceived control in fall and for biological sex), β = .094, b = .373, S.E. = .323, ns. Student's individual perceived control in fall did not significantly predict spring strategizing, controlling for fall strategizing β = .142, b = .182, S.E. = .300, ns. Student's perceived control in fall, however, was strongly correlated with student's strategizing in fall ($r(348) = .814$, $p < .01$), suggesting possible problematic levels of multicollinearity between the predictors that would inflate standard errors. Strategizing was moderately but only marginally significantly stable from fall to spring, β = .466, b = .600, S.E. = .318, $p < .10$. Again, however, student's strategizing in fall was strongly correlated with student's perceived control in fall, suggesting possible problematic levels of multicollinearity between the predictors. Biological sex was not a significant predictor in this model.

Peer group average perceived control in fall did not significantly predict self-encouragement in spring controlling for self-encouragement in fall (and controlling for individual perceived control in fall and for biological sex), β = -.024, b = -.091, S.E. = .366, ns. Student's individual perceived control in fall did not significantly predict spring self-encouragement, controlling for fall self-encouragement, β = .167, b = .206, S.E. = .370, ns. Student's perceived control in fall, however, was strongly correlated with student's self-encouragement in fall ($r(348) = .761$, $p < .01$), suggesting possible problematic levels of multicollinearity between the predictors. Self-encouragement was not significantly stable from fall to spring, β = .461, b = .569, S.E. = .462, ns. Again, however, student's self-encouragement in fall was strongly correlated with student's perceived control in fall, suggesting possible suggesting possible problematic levels of multicollinearity between the predictors. Biological sex was not a significant predictor in this model (see Table 4.5).

Hypothesis 1b3. Peer group level of perceived control in the fall negatively predicts student's level of total maladaptive coping in the spring, controlling for student's level of total maladaptive coping in the fall and controlling for student's perceived control in the fall.

Hypothesis 1b3 was not supported. See Table 4.5. An autoregressive longitudinal model was tested to investigate the relationship between peer group average level of perceived control in fall and change in student's total maladaptive coping from fall to spring. The chi-square value was significant ($\chi 2(1453) = 1{,}999.614$, $p < .01$) suggesting poor fit to the data. CFI, a relative fit index, did not indicate acceptable fit (CFI = .896). Two absolute fit indices, however, did indicate acceptable fit (RMSEA = .032, 90% CI [.029 .035], SRMR = .061). Research suggests that CFI may be biased downward in large and complex models (Shi et al., 2019). Overall, model fit appears to be adequate.

Peer group average perceived control in fall did not significantly predict total maladaptive coping in spring controlling for total maladaptive coping in fall (and controlling for individual perceived control in fall and controlling for biological sex), $\beta = -.024$, b = -.136, S.E. = .248, ns. Total maladaptive coping was highly stable over time ($\beta = .755$, b = 1.369, S.E. = .211, $p < .01$). Biological sex significantly negatively predicted spring total maladaptive coping in spring controlling for total maladaptive coping in fall ($\beta = -.089$, b = -.322, S.E. = .163, $p <.05$), indicating that increases in total maladaptive coping across the year were smaller, or increases larger, for girls than for boys. Student's individual perceived control in fall was not a significant predictor in this model (see Table 4.5).

Hypothesis 1b4. Peer group level of perceived control in the fall negatively predicts student's level of each specific way of maladaptive coping (projection and self-pity) in the spring, controlling for student's level of that way of maladaptive coping in the fall and controlling for student's perceived control in the fall.

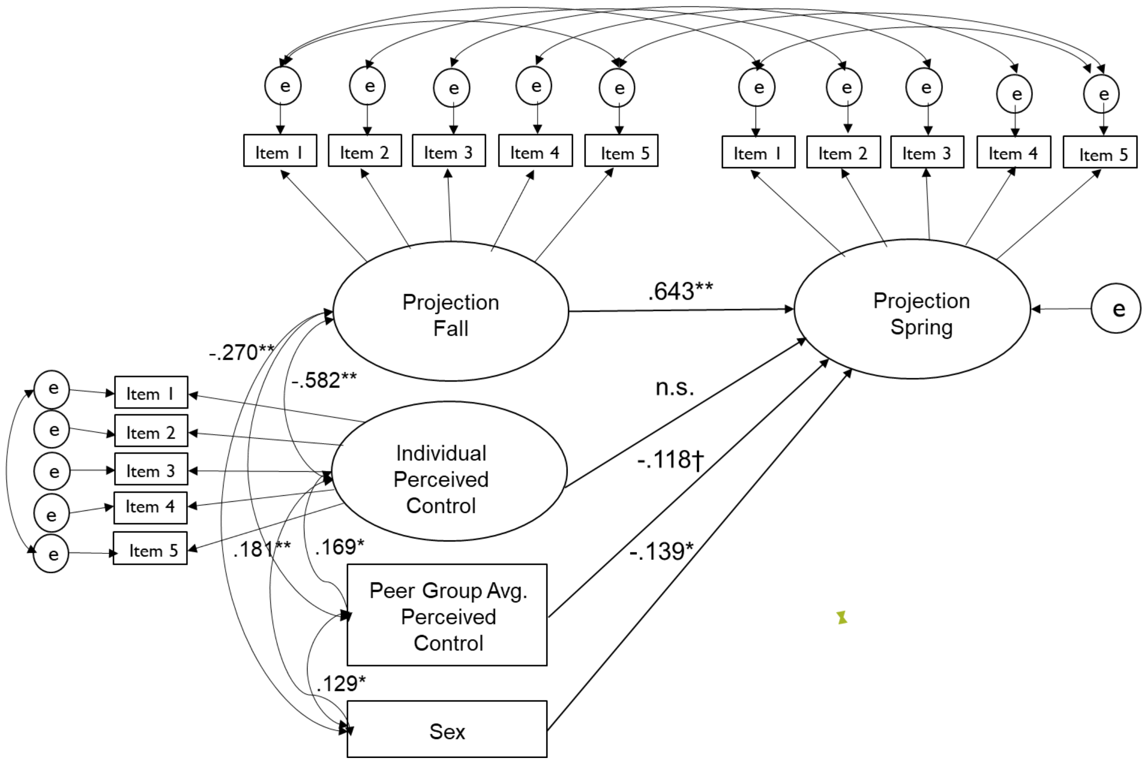
Hypothesis 1b4 was partially marginally supported, for projection coping. See Table 4.5. Autoregressive longitudinal models were tested to investigate the relationships between peer group average level of perceived control in fall and changes in student's projection coping in student's self-pity coping from fall to spring. A path model that diagrams the results for Hypothesis 1b4 for projection coping is shown in Figure 4.3. The chi-square value for projection was non-significant ($\chi 2(103) = 114.785$, ns) indicating good fit to the data. The chi-square value for self-pity was significant ($\chi 2(104) = 131.685$, $p < .05$) suggesting poor fit to the data. CFI, a relative fit index, however, indicated acceptable fit for projection (CFI = .987) and for self-pity (CFI = .979), as did two absolute fit indices in the model for projection (RMSEA = .018, 90% CI [.000 .033], SRMR = .042), and the model for self-pity (RMSEA = .027, 90% CI [.008 .040], SRMR = .044). Overall, model fit appears to be adequate.

Peer group average perceived control in fall marginally significantly negatively predicted projection in spring controlling for projection in fall (and controlling for individual perceived control in fall and for biological sex), $\beta = -.118$, b = -.664, S.E. = .353, $p < .10$. Student's individual perceived control in fall was not a significant predictor in this model (see Table 4.5). Projection was highly stable over time, $\beta = .643$, b = 1.167, S.E. = .294, $p < .01$. Biological sex significantly negatively predicted spring projection controlling for fall projection (β = -.139, b = -.506, S.E. = .209, $p <.05$), indicating that increases in projection were smaller, or decreases larger, for girls than for boys across the year.

Peer group average perceived control in fall did not significantly predict self-pity in spring, controlling for self-pity in fall (and controlling for biological sex and for individual perceived control in fall), β = -.050, b = -.257 S.E. = .249, ns. Self-pity was highly stable over time, β = .786, b = 1.319, S.E. = .235, $p < .01$. Neither student's individual perceived control in fall nor biological sex were significant predictors in the model for self-pity (see Table 4.5).

Figure 4.3

Peer Perceived Control in Fall Predicting Student Projection in Spring when Controlling for Student Projection in Fall and Controlling for Student Perceived Control (N = 348)



†p < .10. *p < .05. **p < .01.

Table 4.5

Peers' and Individual Perceived Control Predicting Spring Coping when Controlling for Fall Coping (N = 348)

	Total Adaptive				Strategizing				Self-Encouragement			
Predictor	β	b	S.E.	*p*	β	b	S.E.	*p*	β	b	S.E.	*p*
Peers' Perceived Control	.095	.431	.317	.174	.094	.373	.323	.247	-.024	-.091	.366	.803
Individual Coping	.675**	.990	.231	.000	.466†	.600	.318	.060	.461	.569	.462	.218
Ind. Perceived Control	.047	.068	.204	.737	.142	.182	.300	.543	.167	.206	.370	.579
Sex	.006	.017	.155	.915	.071	.182	.171	.287	-.058	-.144	.211	.497
<u>Model Fit:</u>												
Chi-Square(*df*) *p*	1,847.872(1459) .000				127.422(99) .029				136.721(101) .010			
CFI	.898				.961				.929			
RMSEA [.90]	.027[.023 .031]				.028 [.010 .041]				.031 [.016 .044]			
SRMR	.060				.046				.052			

	Total Maladaptive				Projection				Self-Pity			
Predictor	β	b	S.E.	*p*	β	b	S.E.	*p*	β	b	S.E.	*p*
Peers' Perceived Control	-.024	-.136	.248	.584	-.118†	-.665	.353	.060	-.050	-.257	.249	.301
Individual Coping	.755**	1.369	.211	.000	.643**	1.167	.294	.000	.786**	1.319	.235	.000
Ind. Perceived Control	-.097	-.176	.148	.234	-.169	-.307	.203	.131	-.018	-.030	.127	.811
Sex	-.089*	.322	.163	.049	-.139*	-.506	.209	.015	-.051	-.171	.166	.305
<u>Model Fit:</u>												
Chi-Square(*df*) *p*	1,999.614(1453) .000				114.785(103) .201				131.685(104) .035			
CFI	.896				.987				.979			
RMSEA [.90]	.032 [.029 .035]				.018 [.000 .033]				.027 [.008 .040]			
SRMR	.061				.042				.044			

†$p < .10$. *$p < .05$. **$p < .01$.

Research Question 2: Autonomous Motivation

RQ2. Autonomous motivation. Do peer group levels of autonomous motivation in the fall predict changes in student's own autonomous motivation and academic coping from fall to spring in the first year of middle school?

Research Question 2 investigated the relationship between peer group autonomous motivation and changes in individual autonomous motivation and academic coping across the academic year. Part "a" concerned the relationship between peer autonomous motivation and change in student's own autonomous motivation across the year. Part "b" concerned the relationship between peer autonomous motivation and changes in student's ways of academic coping across the year.

Research Question 2a: Peer Autonomous Motivation Predicting Individual Autonomous Motivation

RQ2a. Peer effect on individual autonomous motivation. Does peer group level of autonomous motivation in the fall predict student's level of autonomous motivation in the spring, controlling for student's level of autonomous motivation in the fall?

Results for Question 2a, investigating the relationship between peer group average levels of autonomous motivation in fall and change in students' own autonomous motivation from fall to spring, using autoregressive longitudinal models, are shown in Table 4.4.

Hypothesis 2a. Peer group level of autonomous motivation in the fall positively predicts student's level of autonomous motivation in the spring, controlling for student's level of autonomous motivation in the fall.

Hypothesis 2a was not supported. See Table 4.4. An autoregressive longitudinal model was tested to investigate the relationship between peer group average level of autonomous motivation in fall and change in students' own autonomous motivation from fall to spring. The chi-square value was significant ($\chi 2$ (41) = 78.702, $p < .01$), suggesting poor fit to the data. CFI, a relative fit index, however, approached acceptable fit (CFI = .947). Two absolute fit indices indicated acceptable fit (RMSEA = .050, 90% CI [.033 .067], SRMR = .050. Research suggests that CFI may be biased downward in large and complex models (Shi et al., 2019). Overall, model fit appears to be adequate.

Peer group average autonomous motivation in fall did not significantly predict individual autonomous motivation in spring controlling for individual autonomous motivation in fall (and controlling for biological sex), $\beta = .029$, b = .111, S.E. = .321, ns. Individual autonomous motivation was highly stable over time, $\beta = .626$, b = .842, S.E. = .193, $p < .01$. Biological sex was not a significant predictor in this model (see Table 4.4).

Research Question 2b. Peer Autonomous Motivation Predicting Individual Coping

RQ2b. Peer effect on individual coping. Does peer group level of autonomous motivation in the fall predict student's level of academic coping in the spring, controlling for student's level of academic coping in the fall and controlling for student's level of autonomous motivation in the fall?

Results for Question 2b, investigating the relationship between peer group average level of autonomous motivation and changes in students' academic coping across the academic year are shown in Table 4.6. Autoregressive longitudinal models were estimated for each subpart of the research question to investigate the relationship between peer group average autonomous motivation and changes in selected ways of academic coping, comprising six separate models: total adaptive coping, total maladaptive coping, strategizing, self-encouragement, projection, and self-pity. Student's individual autonomous motivation in fall and biological sex were entered as control variables in all models.

Hypothesis 2b1. Peer group level of autonomous motivation in the fall positively predicts student's level of total adaptive coping in the spring, controlling for student's level of total adaptive coping in the fall and controlling for student's autonomous motivation in the fall.

Hypothesis 2b1 was not supported. See Table 4.6. An autoregressive longitudinal model was tested to investigate the relationship between peer group average level of autonomous motivation and change in students' total adaptive coping from fall to spring. The chi-square value was significant ($\chi 2(1458) = 1{,}875.636$, $p < .01$) suggesting poor fit to the data. CFI, a relative fit index, did not indicate acceptable fit (CFI = .897). Two absolute fit indices, however, did indicate acceptable fit (RMSEA = .028, 90% CI [.024 .032], SRMR = .060). Research suggests that CFI may be biased downward in large and complex models (Shi et al., 2019). Overall, model fit appears to be adequate.

Peer group average autonomous motivation in fall did not significantly predict total adaptive coping in spring controlling for total adaptive coping in fall (and controlling for individual autonomous motivation in fall and controlling for biological sex), $\beta = .027$, b = .113, S.E. = .324, ns. Total adaptive coping was stable over time, $\beta = .551$, b = .812, S.E. = .330, $p < .01$. Student's individual autonomous motivation in fall did not significantly predict spring total adaptive coping, controlling for fall total adaptive coping and controlling for peer group average autonomous motivation, $\beta = .195$, b = .288, S.E. = .322, ns. Student's autonomous motivation in fall, however, was strongly correlated with student's total adaptive coping in fall ($r(348) = .896$, $p < .01$), suggesting possible problematic levels of multicollinearity between the predictors. Biological sex was not a significant predictor in this model (see Table 4.6).

Hypothesis 2b2. Peer group level of autonomous motivation in the fall positively predicts student's level of each specific way of adaptive coping (strategizing and self-encouragement) in the spring, controlling for student's level of that way of adaptive coping in the fall and controlling for student's autonomous motivation in the fall.

Hypothesis 2b2 was not supported. See Table 4.6. Autoregressive longitudinal models were tested to investigate the relationship between peer group average level of autonomous motivation in fall and changes in students' strategizing coping in students' self-encouragement coping from fall to spring. The chi-square value was significant for strategizing ($\chi2(98) = 150.202$, $p <$ 01), suggesting poor fit to the data, and nonsignificant for self-encouragement ($\chi2(100) = 131.283$, ns) indicating acceptable fit to the data. CFI, a relative fit index, approached acceptable fit for strategizing (CFI = .945) and indicated acceptable fit for self-encouragement (CFI = .954). Two absolute fit indices indicated acceptable fit both in the model for strategizing (RMSEA = .038, 90% CI [.025 .050], SRMR = .046), and in the model for self-encouragement (RMSEA = .029, 90% CI [.012 .042], SRMR = .047). Overall, model fit appears to be adequate.

Peer group average autonomous motivation in fall did not significantly predict strategizing in spring controlling for strategizing in fall (and controlling for individual autonomous motivation in fall and for biological sex), $\beta = -.005$, b = -.021, S.E. = .350, ns. Student's individual autonomous motivation in fall marginally significantly predicted student's strategizing in spring, controlling for strategizing in fall (and controlling for peer group average autonomous motivation), β = .503, b = .672, S.E. = .343, $p < .10$. Student's autonomous motivation in fall, however, was strongly correlated with student's strategizing in fall ($r(348) = .857$, $p <$ 01), suggesting possible problematic levels of multicollinearity between the predictors. Student's individual strategizing was not significantly stable over time (β = .165, b = .221, S.E. = .319, ns. Again, however, student's strategizing in fall was strongly correlated with individual autonomous motivation in fall, suggesting possible problematic levels of multicollinearity between the predictors. Biological sex was not a significant predictor in this model (see Table 4.6).

Peer group average autonomous motivation in fall did not significantly predict self-encouragement in spring controlling for self-encouragement in fall (and controlling for individual autonomous motivation in fall and for biological sex), β = -.005, b = -.021, S.E. = .350, ns. Student's individual autonomous motivation in fall did not significantly predict student's self-encouragement in spring, controlling for self-encouragement in fall (and controlling for peer group average autonomous motivation in fall), β = .319, b = .416, S.E. = .287, ns. Student's autonomous motivation in fall, however, was strongly correlated with student's self-encouragement in fall ($r(348) = .675$, $p < .01$), suggesting possible problematic levels of multicollinearity between the predictors. Student's individual self-encouragement was not significantly stable over time, β = .405, b = 528, S.E. = .380, ns. Again, however, student's self-encouragement in fall was strongly correlated with individual autonomous motivation in fall, suggesting possible problematic levels of multicollinearity between the predictors that would inflate standard errors. Biological sex was not a significant predictor in this model (see Table 4.6).

Hypothesis 2b3. Peer group level of autonomous motivation in the fall negatively predicts student's level of total maladaptive coping in the spring, controlling for student's level of total maladaptive coping in the fall and controlling for student's autonomous motivation in the fall.

Hypothesis 2b3 was not supported. See table 4.6. An autoregressive longitudinal model was tested to investigate the relationship between peer group average level of autonomous motivation in fall and change in student's total maladaptive coping from fall to spring. The chi-square value was significant ($\chi2(1452) = 2{,}100.007$, $p < .01$) suggesting poor fit to the data. CFI, a relative fit index, did not indicate acceptable fit (CFI = .883). Two absolute fit indices, however, did indicate acceptable fit (RMSEA = .035, 90% CI [.032 .038], SRMR = .067). Research suggests that CFI may be biased downward in large and complex models (Shi et al., 2019). Overall, model fit appears to be adequate.

Peer group average autonomous motivation in fall did not significantly predict total maladaptive coping in spring controlling for total maladaptive coping in fall (and controlling for individual autonomous motivation in fall and controlling for biological sex), $\beta = .031$, b = .158, S.E. = .252, ns. Total maladaptive coping was highly stable over time ($\beta = .824$, b = 1.480, S.E. = .226, $p < .01$). Biological sex significantly negatively predicted total maladaptive coping in spring, controlling for total maladaptive coping in fall, $\beta = -.113$, b = -.407, S.E. = .170, $p < .05$, such that increases in total maladaptive coping were smaller, or decreases larger, for girls than for boys across the year. Student's individual autonomous motivation in fall was not a significant predictor in this model (see Table 4.6).

Hypothesis 2b4. Peer group level of autonomous motivation in the fall negatively predicts student's level of each specific way of maladaptive coping (projection and self-pity) in the spring, controlling for student's level of that way of maladaptive coping in the fall and controlling for student's autonomous motivation in the fall.

Hypothesis 2b4 was not supported. See table 4.6. Autoregressive longitudinal models were tested to investigate the relationship between peer group average level of autonomous motivation and change in student's projection coping across the academic year, and between peer group average autonomous motivation and change in student's self-pity coping across the year. The chi-square values were significant for projection ($\chi2(119) = 175.956$, $p < .01$), and nonsignificant for self-pity ($\chi2(102) = 151.073$, $p < .01$) suggesting poor fit to the data. CFI, a relative fit index, however, approached acceptable fit for projection (CFI = .949) and indicated acceptable fit for self-pity (CFI = .966). Two absolute fit indices indicated acceptable fit both in the model for projection (RMSEA = .036, 90% CI [.024 .047], SRMR = .049), and the model for self-pity (RMSEA = .036, 90% CI [.023 .048], SRMR = .051). Overall model fit appears to be adequate.

Peer group average autonomous motivation in fall did not significantly predict projection in spring controlling for projection in fall (and controlling for individual autonomous motivation in fall and for biological sex), $\beta = .031$, b = .154, S.E. = .372, ns. Student's individual autonomous motivation in fall was not a significant predictor in this model (see Table 4.6). Projection coping was highly stable over time, $\beta = .763$, b = 1.319, S.E. = .297, $p < .01$. Biological sex significantly negatively predicted spring projection controlling for fall projection ($\beta = -.156$, b = -.538, S.E. = .219, $p <.05$), indicating that increases in projection were smaller, or decreases larger, for girls than for boys across the year.

Peer group average autonomous motivation in fall did not significantly predict self-pity in spring controlling for self-pity in fall (and controlling for individual autonomous motivation in fall and for biological sex), $\beta = .015$, $b = .070$ S.E. = .256, ns. Self-pity was highly stable over time, $\beta = .799$, $b = 1.333$, S.E. = .232, $p < .01$. Neither student's individual autonomous motivation in fall nor biological sex were significant predictors in this model (see Table 4.6).

Table 4.6

Peers' and Individual Autonomous Motivation Predicting Spring Coping when Controlling for Fall Coping (N = 348)

Predictor	β	b	S.E.	*p*	β	b	S.E.	*p*	β	b	S.E.	*p*
Peers' Aut. Mot.	.027	.113	.324	.727	.006	.024	.320	.940	-.005	-.021	.350	.953
Individual Coping	.551*	.812	.330	.014	.165	.221	.319	.489	.405	.528	.380	.164
Individual Aut. Mot.	.195	.288	.322	.371	.503*	.672	.343	.050	.319	.416	.287	.147
Sex	-.010	-.031	.162	.848	.032	.086	.180	.635	-.095	-.249	.218	.252
<u>Model Fit</u>												
Chi-Square(*df*) *p*	1,875.636(1458) .000				150.202(98) .001				131.283(100) .120			
CFI	.897				.945				.954			
RMSEA [.90]	.028 [.024 .032]				.038 [.025 .050]				.029 [.012 .042]			
SRMR	.060				.046				.047			
	Total Maladaptive				Projection				Self-Pity			
Predictor	β	b	S.E.	*p*	β	b	S.E.	*p*	β	b	S.E.	*p*
Peers' Aut. Mot.	.031	.158	.252	.531	.031	.154	.372	.679	.015	.070	.256	.784
Individual Coping	.824**	1.480	.226	.000	.763**	1.319	.297	.000	.799**	1.333	.232	.000
Individual Aut. Mot.	.028	.050	.149	.738	-.006	-.010	.169	.955	.014	.023	.124	.852
Sex	-.113*	-.407	.170	.017	-.156*	-.538	.219	.014	-.064	-.215	.174	.216
<u>Model Fit</u>												
Chi-Square(*df*) *p*	2,100.007(1452) .000				175.956(119) .001				151.073(102) .001			
CFI	.883				.949				.966			
RMSEA [.90]	.035 [.032 .038]				.036 [.024 .047]				.036 [.023 .048]			
SRMR	.067				.049				.051			

†$p < .10$. *$p < .05$. **$p < .01$.

Research Question 3: Catastrophizing

RQ3. Catastrophizing. Do peer group levels of catastrophizing in the fall predict changes in student's own catastrophizing and academic coping from fall to spring in the first year of middle school?

Research Question 3 investigated the relationships between peer group average catastrophizing and change in individual catastrophizing and change in individual coping across the academic year. Part "a" concerned the relationship between peer catastrophizing and change in student's own catastrophizing across the year. Part "b" concerned the relationship between peer catastrophizing and change in student's ways of academic coping across the year.

Research Question 3a: Peer Catastrophizing Predicting Individual Catastrophizing

RQ3a. Peers' and individual catastrophizing. Does peer group level of catastrophizing in the fall predict student's level of catastrophizing in the spring, controlling for student's levels of catastrophizing in the fall?

Results for question 3a, investigating the relationship between peer group average levels of catastrophizing in fall and change in students' own catastrophizing from fall to spring, using autoregressive longitudinal models, are shown in Table 4.5.

Hypothesis 3a. Peer group level of catastrophizing in the fall positively predicts student's level of catastrophizing in the spring, controlling for student's level of catastrophizing in the fall.

Hypothesis 3a was not supported. See Table 4.4. An autoregressive longitudinal model was tested to investigate the relationship between peer group average level of catastrophizing and students' own catastrophizing in spring controlling for students' catastrophizing in the fall. The chi-square value was significant ($\chi 2(158) = 214.239$, $p < .01$), suggesting poor fit to the data, CFI, a relative fit index, however, indicated acceptable fit (CFI = .953), and two absolute fit indices indicated acceptable fit (RMSEA = .038, 90% CI [.028 .047], SRMR = .045. Overall, model fit appeared to be adequate.

Peer group average catastrophizing in fall did not significantly predict individual catastrophizing in spring, controlling for individual catastrophizing in fall (and controlling for biological sex), $\beta = -.063$, b = -.365, S.E. = .301, ns. Individual catastrophizing was highly stable over time, $\beta = .881$, b = 1.801, S.E. = .281 $p < .01$. Biological sex was not a significant predictor in this model (see Table 4.4).

Research Question 3b: Peer Catastrophizing Predicting Individual Coping

RQ3b. Peers' catastrophizing and individual coping. Does peer group level of catastrophizing in the fall predict student's level of academic coping in the spring, controlling for student's level of academic coping in the fall and controlling for student's catastrophizing in the fall?

Results for question 3b, investigating the relationships peer groups average level of catastrophizing on students' academic coping in spring, controlling for academic coping in fall and controlling for individual catastrophizing in fall, are shown in Table 4.7. Autoregressive longitudinal models were estimated for each subpart of the research question to investigate the relationship between peer group average catastrophizing and change in selected ways of academic coping, comprising six separate models: total adaptive coping, total maladaptive coping, strategizing, self-encouragement, projection, and self-pity. Individual catastrophizing in fall and biological sex were entered as control variables in all models.

Hypothesis 3b1. Peer group level of catastrophizing in the fall negatively predicts student's level of total adaptive coping in the spring, controlling for student's level of total adaptive coping in the fall and controlling for student's catastrophizing in the fall.

Hypothesis 3b1 was not supported. See Table 4.7. An autoregressive longitudinal model was tested to investigate the relationship between peer group average level of catastrophizing and students' total adaptive coping in spring, controlling for students' total adaptive coping in the fall. The chi-square value was significant ($\chi 2(1686) = 2{,}168.426$, $p < .01$) suggesting poor fit to the data. CFI, a relative fit index, did not indicate acceptable fit (CFI = .892). Two absolute fit indices, however, did indicate acceptable fit (RMSEA = .028, 90% CI [.024 .031], SRMR = .065). Research suggests that CFI may be biased downward in large and complex models (Shi et al., 2019). Overall, model fit appears to be adequate.

Peer group average catastrophizing in fall did not significantly predict total adaptive coping in spring, controlling for total adaptive coping in fall (and controlling for individual catastrophizing in fall and controlling for biological sex), $\beta = -.069$, b = -.289, S.E. = .225, ns. Total adaptive coping was highly stable over time ($\beta = .730$, b = 1.072, S.E. = .164, $p < .01$). Neither student's individual catastrophizing in fall nor biological sex were significant predictors in this model (see Table 4.7).

Hypothesis 3b2. Peer group level of catastrophizing in the fall negatively predicts student's level of each specific way of adaptive coping (strategizing and self-encouragement) in the spring, controlling for student's level of that way of adaptive coping in the fall and controlling for student's catastrophizing in the fall.

Hypothesis 3b2 was not supported. See Table 4.7. Autoregressive longitudinal models were tested to investigate the relationship between peer group average level of catastrophizing in fall and changes in students' strategizing coping and self-encouragement coping across the year. The chi-square value was significant both for strategizing ($\chi2(166) = 264.394$, p < 01) and for self-encouragement ($\chi2(168) = 227.578$, $p < .01$), suggesting poor fit to the data. CFI, a relative fit index, however, approached acceptable fit for strategizing (CFI = .926) and approached acceptable fit for self-encouragement (CFI = .945). Two absolute fit indices indicated acceptable fit both in the model for strategizing (RMSEA = .040, 90% CI [.031 .049], SRMR = .065), and in the model for self-encouragement (RMSEA = .031, 90% CI [.020 .041], SRMR = .056). Research suggests that CFI may be biased downward in large and complex models (Shi et al., 2019). Overall, model fit appears to be adequate.

Peer group average catastrophizing in fall did not significantly predict strategizing in spring, controlling for strategizing in fall (and controlling for individual catastrophizing in fall and for biological sex), $\beta = .016$, b = .057, S.E. = .258, ns. Strategizing was stable over time, $\beta = .614$, b = .780, S.E. = .167, $p < .01$. Neither student's individual catastrophizing in fall nor biological sex were significant predictors in this model (see Table 4.7).

Peer group average catastrophizing in fall did not significantly predict self-encouragement in spring controlling for self-encouragement in fall (and controlling for individual catastrophizing in fall and for biological sex), $\beta = .072$, b = .251, S.E. = .316, ns. Self-encouragement was stable over time, $\beta = .530$, b = .647, S.E. = .271, $p < .05$.

Neither student's individual catastrophizing in fall nor biological sex were significant predictors in this model (see Table 4.7).

Hypothesis 3b3. Peer group level of catastrophizing in the fall positively predicts student's level of total maladaptive coping in the spring, controlling for student's level of total maladaptive coping in the fall and controlling for student's catastrophizing in the fall.

Hypothesis 3b3 was not supported. See Table 4.7. An autoregressive longitudinal model was tested to investigate the relationship between peer group average level of catastrophizing in fall and change in students' total maladaptive coping from fall to spring. The chi-square value was significant ($\chi 2(1680) = 2{,}495.942$ $p < .01$) suggesting poor fit to the data. CFI, a relative fit index, did not indicate acceptable fit (CFI = .873). Two absolute fit indices, however, did indicate acceptable fit (RMSEA = .036, 90% CI [.033 .039], SRMR = .064). Research suggests that CFI may be biased downward in large and complex models (Shi et al., 2019). Overall, model fit appears to be adequate.

Peer group average catastrophizing in fall did not significantly predict total maladaptive coping in spring controlling for total maladaptive coping in fall (and controlling for individual catastrophizing in fall and controlling for biological sex), $\beta = -.003$, b = -.018, S.E. = .304, ns. Individual catastrophizing in fall did not significantly predict student's total maladaptive coping in spring, controlling for total maladaptive coping in fall, $\beta = -.024$, b = -.044, S.E. = 2.712, ns. Student's individual catastrophizing in fall, however, was very strongly correlated with student's total maladaptive coping in fall ($r(348) = .973$, $p < 01$), suggesting possible problematic levels of multicollinearity between the predictors. Total maladaptive coping was not significantly stable over time, β

= .849, b = 1.560, S.E. = 2.740, ns. Again, however, the very strong correlation between student's total maladaptive coping in fall and individual catastrophizing in fall suggests possible multicollinearity between the predictors. Biological sex was not a significant predictor in this model (see Table 4.7).

Hypothesis 3b4. Peer group level of catastrophizing in the fall negatively predicts student's level of each specific way of maladaptive coping (projection and self-pity) in the spring, controlling for student's level of that way of maladaptive coping in the fall and controlling for student's catastrophizing in the fall.

Hypothesis 3b4 was supported. See Table 4.7. Autoregressive longitudinal models were tested to investigate the relationships between peer group average level of catastrophizing in fall and changes in student's projection coping and self-pity coping from fall to spring. The chi-square values were significant for projection ($\chi2(170) = 256.621$, $p < .01$), and significant for self-pity ($\chi2(170) = 248.829$, $p < .01$) suggesting poor fit to the data. CFI, a relative fit index, however, approached acceptable fit for projection (CFI = .946) and indicated acceptable fit for self-pity (CFI = .963). Two absolute fit indices indicated acceptable fit both in the model for projection (RMSEA = .037, 90% CI [.028 .046], SRMR = .057), and the model for self-pity (RMSEA = .036, 90% CI [.026 .045], SRMR = .040). Overall, model fit appears to be adequate.

Peer group average catastrophizing in fall did not significantly predict projection in spring controlling for projection in fall (and controlling for individual catastrophizing in fall and for biological sex), $\beta = .004$, b = .022, S.E. = .352, ns. fall (see Table 4.7). Biological sex significantly negatively predicted spring projection controlling for fall projection (β = -.146, b = -.507, S.E. = .225, p <.05), indicating that increases in projection were smaller, or decreases larger, for girls than for boys across the year.

Peer group average catastrophizing in fall did not significantly predict self-pity in spring controlling for self-pity in fall (and controlling for biological sex and for individual catastrophizing in fall), β = -.015, b = -.075 S.E. = .279, ns. Student's individual catastrophizing in fall was not a significant predictor of spring self-pity controlling for fall self-pity, β = .222, b = .387, S.E. = .866, ns. Student's self-pity in fall, however, was very strongly correlated with student's individual catastrophizing in fall ($r(348) = .951$, $p < .01$), suggesting possible problematic levels of multicollinearity between the predictors. Self-pity was not significantly stable over time, β = .600, b = 1.043, S.E. = .936, ns. Again, however, student's self-pity in fall was very strongly correlated with student's individual catastrophizing in fall suggesting possible multicollinearity between the predictors. Biological sex was not a significant predictor in the model for self-pity (see Table 4.7).

Table 4.7

Peers' and Individual Catastrophizing Predicting Spring Coping when Controlling for Fall Coping (N = 348)

	Total Adaptive				Strategizing				Self-Encouragement			
Predictor	β	b	S.E.	*p*	β	b	S.E.	*p*	β	b	S.E.	*p*
Peers' Catastrophizing	-	-.289	.225	.199	.016	.057	.258	.827	.072	.251	.316	.427
Individual Coping	.730**	1.072	.164	.000	.614**	.780	.167	.000	.530*	.647	.271	.017
Individual Cat.	.015	.022	.091	.806	.102	.129	.116	.264	-	-.142	.143	.321
Sex	.013	.039	.156	.801	.056	.142	.172	.410	-.036	-.089	.235	.706
Model Fit												
Chi-Square(*df*) *p*	2168.426(1686) .000				264.394(166) .000				227.578(168) .002			
CFI	.892				.926				.945			
RMSEA [.90]	.028 [.024 .031]				.040 [.031 .049]				.031 [.020 .041]			
SRMR	.065				.065				.056			

	Total Maladaptive				Projection				Self-Pity			
Predictor	β	b	S.E.	*p*	β	b	S.E.	*p*	β	b	S.E.	*p*
Peers' Catastrophizing	-	-.018	.304	.953	.004	.022	.352	.950	-	-.075	.279	.788
Individual Coping	.849	1.560	2.740	.569	.762**	1.323	.362	.000	.600	1.043	.936	.265
Individual Cat.	-	-.044	2.712	.987	.005	.009	.201	.963	.222	.387	.866	.655
Sex	-.090	-.331	.963	.731	-.146*	-.507	.225	.025	-.086	-.301	.268	.260
Model Fit												
Chi-Square(*df*) *p*	2495.942(1680) .000				256.621(170) .000				248.829(170) .000			
CFI	.873				.946				.963			
RMSEA [.90]	.036 [.033 .039]				.037 [.028 .046]				.036 [.026 .045]			
SRMR	.064				.057				.040			

†$p < .10$. *$p < .05$. **$p < .01$.

Discussion of Study 2

Building on the motivational model of academic coping (Skinner et al., 2013), and the results of Study 1 indicating that three specific motivational variables, perceived control, autonomous motivation, and catastrophizing, are relevant to the understanding of academic coping, Study 2 extends this research by focusing on the role of peers as social partners in learning activities. Study 2 builds out the frontier of research on peer influences on academic coping by incorporating into the story the relationships between peer group averages of the three motivational variables and students' academic coping. By testing the relationships between peer group levels of the three motivational constructs and students' own levels of these three variables, the potential influence of peers at school on these variables was investigated for the first time. In addition, the study investigated whether peer group levels of the three motivational variables predicted change in students' various ways of academic coping across the year. Although peer group levels of autonomous motivation and catastrophizing were not found to have significant effects on students' own motivational variables, or on their ways of academic coping across the year, there were some meaningful results for perceived control.

Peer Group Motivational Antecedents and Students' Motivational Antecedents

The most important finding for Study 1 was that peer group average perceived control marginally positively predicted students' own changes in perceived control, but the coefficient only approaches the traditional cutoff for significance. The standardized regression coefficient of .135 (p = .075) in the autoregressive longitudinal model indicates that higher peer group levels of perceived control predicted increases, or smaller decreases, in students' own perceived control, while lower peer group levels of perceived control predicted lower increases, or larger decreases in students' perceived control from fall to spring. Although not a strong relationship between the variables in terms of, this result is notable for a process of peer influence, where effects sizes are typically quite small (Gileta et al., 2021). This finding was consistent with the research hypothesis.

By contrast, peer group levels of autonomous motivation and catastrophizing did not significantly predict changes in students' autonomous motivation or catastrophizing. These findings were consistent with the research hypotheses. Peer influence tends to occur most readily with behaviors that are observable, or with attitudes that are referenced in verbal interactions and that are thereby susceptible to processes of imitation, approval, or disapproval (Grimes et al., n.d.). It may be that students' perceived control, a construct which captures students' expectations of their abilities to produce desirable and avoid undesirable academic outcomes, is more susceptible to peer influence than are autonomous motivation or catastrophizing. Perhaps it is more visible to other students, or more likely to be incorporated into social norms or shared attitudes. Perceived control might even be more malleable than autonomous motivation or catastrophizing in this age group. This possibility seems to be most likely with regard to catastrophizing.

Peer Group Motivational Antecedents and Students' Academic Coping

In research hypotheses for the investigation of effects of peer group levels of motivational antecedents on students' own *academic coping* across the year, it was hypothesized that effects would be found for perceived control, autonomous motivation, and catastrophizing. Contrary to expectations, significant effects were not found for relationships between peer group average levels of the three motivational variables and students' ways of coping, with one exception.

Peer group average perceived control at the beginning of the year negatively predicted students' change in projection, but this result was only marginally significant ($\beta = -.124$, $p < .10$). High levels of perceived control in the peer group predicted larger decreases or smaller increases in the use of projection, compared to low peer group levels of perceived control, which predicted larger increases or smaller decreases in the use of projection. Projection involves blaming others or circumstances for challenges and setbacks, and it may be that peers who have low perceived control, in the form of low expectations for attaining desirable academic outcomes, model or encourage the students they hang out with the use of this defensive strategy. Similarly, peers who are high in perceived control, with high expectations for their own ability to attain academic outcomes, may present a more positive example, or discourage the use of blaming. It is also possible, however, that the effect of the peer group level of perceived control is confounded with an effect of the average level of projection within the peer group. Additional analyses are needed to investigate this possibility.

It was surprising that peer group average perceived control did not significantly predict change in students' total adaptive coping or strategizing. There are several possible explanations for these results. One possibility is that the analyses were underpowered. There may have been small effects for peers' perceived control for some ways of coping that could not be detected with this sample in these analyses. The nonsignificant estimated regression coefficient for peers' perceived control in fall predicting students' total adaptive coping in spring controlling for total adaptive coping in fall was .095 (p = .174). The nonsignificant estimated regression coefficient for peers' perceived control in fall predicting students' strategizing in spring controlling for strategizing in fall was .094 (p = .247). Another concern is the high correlations between fall levels of each motivation variables and certain ways of coping, which suggests possible multicollinearity that could have impacted results, as discussed in Study 1. In the model for perceived control and strategizing, for example, students' individual perceived control in fall was strongly correlated with students' strategizing in fall ($r(348) = .814$, $p < .01$). It would be useful to test models omitting student's own individual level of the relevant motivational variable as a predictor in each of the models to see whether results would differ in the statistical significance of the relationships between peer group average of the motivational variables and changes in students' ways of coping. Finally, it is possible that the hypotheses did not adequately take into account the specificity of the relationships between peer group perceived control and some ways of coping for which social norms or behaviors are not relevant.

Students' relative preferences for different ways of coping emerge and develop over time in learning contexts where relationships and interactions with social partners play important roles. In early adolescence students are very interested in what their peers are doing and how peers feel about things. There is great variation in levels of academic engagement and in attitudes toward learning from peer group to peer group. But peers are not the only social partner, and social relationships, norms, and behaviors are not the only influence on students' learning activity. Students' own abilities, dispositions, histories, likes, and dislikes are at play as well. Study 2 has identified a small way in which peer group levels of motivational antecedents are part of the story.

Chapter 5. General Discussion

The two studies in this dissertation expand our understanding of the connections between students' motivation in learning activity and their ways of coping with challenges and obstacles encountered while completing learning tasks. Two longitudinal studies were conducted to investigate relationships between motivational antecedents and students' repertoires of ways of academic coping. Perceived control, autonomous motivation, and catastrophizing were identified as relevant motivational constructs. Each was found to play a part in the development of academic coping across the first year of middle school. The first study focused on the role of the three motivational variables in students' changing coping repertoires across the year. Some significant effects were found in each of two approaches to modeling change. The second study investigated the role of average peer group levels of the motivational variables in students' coping. In this study results were more modest, but peer average levels of one of the variables, perceived control, appears to play some role in the development of academic coping at this critical juncture in students' academic experience.

Contributions and Limitations

Taken together, these studies contribute to the literature on academic coping in several ways. Perhaps most importantly, they demonstrate the usefulness of a motivational approach to coping and begin to identify some potential ways that peers may be involved. Study 1 provides empirical support and clarification of the dynamic role of three motivational constructs in academic coping. The use of bivariate latent change score models in Study 1 was found to be a viable approach to the study of change in coping. The tentative findings in Study 2 draw attention to the importance of peers for motivation in addition to their role in the development of academic coping.

Motivational Model of Academic Coping

This research confirms the value of the motivational model of academic coping (Skinner & Wellborn, 1997) as a useful framework for understanding the development of academic coping. The motivational model links students' use of various ways of coping to their individual motivational processes and the kinds and amounts of support coming from social partners. The motivational model of academic coping rests on a foundation in the Self-System Model of Motivational Development (SSMMD, Connell & Wellborn, 1991). According to the self-system model, when needs for competence, autonomy, and relatedness are supported by relevant contextual factors, including social partners within a domain, motivation is high, engagement is high, and achievement and attainment follow. Simultaneously, because of the link between motivation and coping, students' coping with adverse situations and events reflects the focus and energy that accompanies their activity and contributes to positive outcomes. When students' competence, autonomy, and relatedness are thwarted, motivation and engagement are low, academic coping is less effective, and outcomes are less favorable.

Drawing on the motivational model and focusing on key aspects of self-system processes bore fruit in Study 1 to the extent that significant relationships between the motivational variables and changes in academic coping were found. Although a limited role for motivational antecedents as temporal precedents of change in coping was found in the autoregressive models, consistent and strong connections were found between change in the three variables and change in many ways of coping in the bivariate latent change models. These relatively strong interconnections open a door to further investigation. They suggest an avenue for future research looking at the mechanisms responsible for these interconnections. This important possibility would not have been apparent if only the results of the autoregressive models were considered.

The current research focused on specific aspects of the three self-system processes represented by the set of three motivational variables. Perceived control is a component of the competence process, and a marker of the satisfaction of the need for competence. Autonomous motivation is a component of the autonomy process and a marker of the satisfaction of the need for autonomy. Catastrophizing of competence is another component of the competence process. It is a personal characteristic or tendency that constrains the motivation that comes from a sense of competence. It is a marker of disruption or impairment in the pursuit of competence.

Competence and autonomy play key roles in learning activities, but relatedness is also relevant. Note that the status of relatedness as a motivational influence in learning activity was not addressed directly in this research, but future studies can investigate the role of relatedness, perhaps capitalizing on the methodological strategies for examining change used in the present research. The relatedness process is, however, part of the reason peers are important at school. Peers are a source of relatedness and might also affect coping, either directly, or indirectly, through competence and autonomy, as investigated in Study 2.

Development of Academic Coping

Academic coping undergoes its own developmental process. The development of coping was clarified in the current research by establishing the strong interconnection of the three focal motivational variables and several ways of coping. According to the motivational model, the development of coping reflects the variability in individual trajectories of motivational development, comprised of changes over time in the self-system processes of competence, autonomy, and relatedness. These changes play out across the years in relation to the contextual supports and impediments encountered, and students' lived experience within learning activities. The transition to middle school is a unique window of development and an opportune time to focus on these changes. Students' individual coping repertoires as they begin middle school reflect their cumulative experience with school over a period of years and the development of their motivation up to that point. Middle school students experience a suite of challenges that result from the lack of fit, or mismatch, between the developmental needs and capacities of early adolescence and the characteristics of school, as described in Stage-Environment Fit Theory (Eccles & Midgley, 1989).

Academic motivation and engagement normatively decline, on average, for students at this time (Ryan & Patrick, 2001). Numerous adverse situations and events occur because of the poor fit between schools and their students, activating coping repertoires in novel contexts. According to the motivational model of coping, coping responses are linked to the status of the self-system processes. The transition to middle school, coinciding with the beginning of adolescence, stimulates change and recalibration in the self-system processes. So, during the first year of middle school, the self is changing, motivation is changing, and coping repertoires are stimulated to change in turn. Study 1 helps to clarify how these changes unfold.

In early adolescence, changes in the self also involve, to an extent that is probably greater than at any other time in life, the influence of agemates. The role of peers has changed. Peers are a major force in early adolescent socialization and the development of identity. They provide a context for shared interests and shared activities, a brewpot for shared attitudes, and a sounding board for new ideas. Study 2 helps clarify how they impact the development of academic coping. The modest and marginally significant prediction of change in students' perceived control and change in students' use of projection as a way of coping, by their peers' average perceived control, suggest that perceived control is a visible characteristic in the social world of peers at school that can affect students coping through social influence or socialization. This adds to the existing knowledge that peers influence other aspects of motivation and engagement (Ryan & Shin, 2018; Kindermann, 2007), and draws attention to the importance of peers at school.

Contributions to Understanding Motivational Antecedents of Academic Coping

The findings of Study 1 demonstrate the importance of all three motivational antecedents in the development of students' academic coping. Each variable was differently associated with specific ways of coping. In these results, the role of perceived control and autonomous motivation were greatest in relation to adaptive ways of coping and the role of catastrophizing was greatest in relation to maladaptive ways of coping. In addition, Study 2 produced some modest support for the importance of students' groups of affiliated peers in the development of one of the three variables, students' perceived control.

The results regarding motivational variables expand the knowledge of motivational processes relevant to academic coping. Two of the variables, perceived control and catastrophizing, were investigated because of their role in the self-system process of competence. Autonomous motivation was chosen because of its centrality in the self-system process of autonomy. All three variables were found to be involved in the development of academic coping. The way the self-systems are changing and how those changes connect to academic coping depends on the characteristics of the early adolescent age group and their experience with the transition to middle school. The first year of middle school is a turning point for many students. Although average levels of motivation and engagement are declining, some students buck the trend, sustaining their motivation or even showing increases in their commitment to school. Perceived control and autonomous motivation can serve as resources, contributing to academic resilience. By stimulating adaptive coping, they help students resist the downward pressure on motivation and engagement. Catastrophizing, however, operates as a liability or risk factor. It is positively associated with maladaptive coping, with change in one correlated with change in the same direction in the other. Study 1 builds on or reinforces specific insights about each of the motivational variables, and also has limitations.

Perceived Control

Perceived control has long been of interest to educational researchers and for good reason. It has a robust connection to motivation and engagement and to coping (Skinner & Zimmer-Gembeck, 2011). The current research contributes insights into the operation of perceived control in learning activities by further clarifying its role in students' academic coping. Tests of the autoregressive models show that levels of perceived control at the beginning of the year modestly predict one way of academic coping, projection. Also, relationships between fall perceived control and changes in total adaptive coping and in strategizing were not detected, but because of strong correlations between the predictors the possibility of those relationships could not be ruled out. This is consistent with previous research that has found a role for perceived control in academic coping (Skinner & Zimmer-Gembeck, 2011). This is the first study, however, that has investigated the interconnection between changes in perceived control and changes in academic coping. Change in perceived control across the year was moderately to strongly associated with change in all three of the ways of adaptive coping tested. The relationships between change in perceived control and change in maladaptive ways of coping were not found to be significant in this study. This could be because of the way perceived control was operationalized, focusing on the positively worded items from the scale. Furthermore, the effect sizes could be too small to detect in this sample, as discussed at the end of Study 1. In sum, evidence was found that perceived control is consequential in the development of students' adaptive ways of academic coping, but during early adolescence this close connection to coping is more apparent when looking at the relationships between change in perceived control and change in ways of coping than when examining the relationships of initial levels of perceived control with changes in coping over the school year.

This dynamic interconnection between perceived control and adaptive coping may be interpreted in terms of the place of perceived control in the self-system process of competence. High perceived control reflects high satisfaction of the need for competence. When the need for competence is satisfied, motivation is focused and energetic, and engagement is high. This motivational strength is associated with persistence and reengagement and the positive appraisals (and absence of strong negative emotional reactivity) that underpin adaptive coping. A large body of research and interventions exists focusing on self-efficacy, a related concept, but one whose conceptualization is narrower in scope than perceived control. Self-efficacy in the academic domain involves students' expectancies regarding their capacity to do well at academic tasks. The multiple component model of perceived control (Skinner et al., 1988) provides a wider perspective on the structure and development of expectancies in relation to learning activity. Perceived control, a strong predictor engagement and achievement, may be the unsung hero of academic coping. The findings in Study 1 draw attention to the potential for educators to influence perceived control as a way to increase adaptive coping and resilience. It could be helpful to gain a better understanding of the variation in perceived control among students and the different factors that influence its development over the first year of middle school.

The study was limited in that it was unable to detect what may be small effects in the relationships of perceived control with changes in total adaptive coping and strategizing in the levels-to-change model. Theory suggests that the two are closely related (Skinner & Zimmer-Gembeck, 2011). The results, however, did not rise to a level of significance, even at alpha = .10. Some effects may be too small to detect with the available sample size in the complex SEM model tested in Study 1, especially given the strong correlations between perceived control in fall and fall levels of these ways of coping.

An additional limitation of the study was in the measure used for perceived control. The measure contained only positively worded items taken from only two of several subscales available to capture the multidimensional structure of perceived control.

This operationalization did not reveal relationships between perceived control and ways of maladaptive coping, but it is possible a different measure would have revealed some connection. There may be other ways in which other components of perceived control, such as specific or aggregated control, strategy, or capacity beliefs, are related to academic coping and its change across time, possibilities which can be followed up in further studies involving additional measures.

Autonomous Motivation

Autonomous motivation is an aspect of the self-system process of autonomy. Autonomous motivation directly captures the contribution of the autonomy process to the quality of academic motivation. Operationalized in this research as identified regulation from Self-Determination Theory (Ryan & Deci, 2020), this construct is related to students' valuing of learning activities (Finn, 1989). Identified regulation is known to be correlated with intrinsic motivation in groups with positive academic outcomes (Boiché & Stephan, 2014)**.** There is some existing research evidence for a positive relationship between autonomous motivation and academic coping (Doron et al., 2011; Skinner & Edge, 2002). This is the first study that has investigated the relationship between change in autonomous motivation and changes in ways of academic coping.

Study 1 results confirm the importance of autonomous motivation as a predictor of change in coping in two ways. First, in the levels-to-change models, the level of autonomous motivation in the fall significantly predicted change in strategizing, an effective way of coping with challenges and setbacks in learning activity. Fall levels also predicted change in self-encouragement, but at a marginally significant level ($p < .10$). Second, in the change-to-change models, change in autonomous motivation was significantly or marginally significantly associated with change in all six coping variables. The associations were moderate to strong in the models involving adaptive ways of coping and weak to moderate in the models involving maladaptive coping. These significant correlations between changes in the three motivational variables and changes in ways of coping are important because, although all these variables are relatively stable at this time of life, the mean level changes are typically in the unfavorable direction. Any insights into the mechanisms underlying these changes, including the roles of these other variables, is valuable to identify opportunities for intervention.

The relatively close connection between change in autonomous motivation and change in academic coping across both adaptive and maladaptive ways of coping, revealed primarily in the change-to-change models, is a valuable discovery. The importance of coping with academic adversity to success in school has already been established. It now becomes clear that greater attention to autonomous motivation and autonomy support (Reeve & Cheon, 2021) could be a productive avenue to explore as researchers look for ways to better promote positive and effective academic coping.

At the same time, these important findings concerning autonomous motivation and academic coping are limited in scope and application. For example, the sample size may have limited the ability to detect some effects, and the narrow demographics of the sample limits the generalizability of the results. Additionally, it is not entirely clear why the relatively strong relationships between autonomous motivation and ways of coping indicated in the change-to-change models were not apparent in the levels-to-change models. This situation could possibly be related to the strong correlations between each of the motivational variables and some of the ways of coping, but more information is needed about the respective processes of change, their relationships, and their characteristics during the time window of early adolescence.

Catastrophizing

The crippling burden of negative expectations and self-doubt has been of interest to academic motivation researchers for decades (Harlow & Cantor, 1985). Catastrophizing of competence, the tendency to entertain negative interpretations and expectations in the face of academic adversity, looms as a potential liability for students in their pursuit of learning activity, especially during those periods, like middle school, when academic challenges are increasing. Relatively little empirical research has investigated the relationships between catastrophizing and academic coping. This was the first study to investigate the relationship between catastrophizing and academic coping in a longitudinal design modeling the connection between change in one and change in the other. In this research indications were found that catastrophizing plays a role in coping, but only in relation to maladaptive ways.

Catastrophizing is not entirely incompatible with engagement and achievement. It seems likely that some students with high engagement and achievement are prone to catastrophizing but are stimulated to activity rather than debilitated by their negative thoughts. As a result, catastrophizing may co-occur with adaptive coping in some students, while with other students who are high in catastrophizing there may be relatively low levels of adaptive coping. Catastrophizing can act like a silent killer, lurking in the background until susceptible students face challenges and setbacks that shake their confidence. It arouses feelings of doubt, followed by thoughts involving exaggerated negative interpretations and expectations. The close link found between changes in catastrophizing and changes in maladaptive coping should awaken concern and encourage practical actions to address this unfavorable, persistent, but potentially malleable pattern of emotional and cognitive reactions to adversity, and its connection to coping responses and re-engagement.

The value of the study in illuminating catastrophizing is limited in certain ways. In the autoregressive models in Study 1, the levels of catastrophizing in the fall did not predict change in any of the ways of coping across the year. In the bivariate latent change score models, however, the change in catastrophizing was coordinated with change in projection. The change in total maladaptive coping and self-pity was very strongly related to the change in catastrophizing, so strongly that structural models could not be tested. Latent change for catastrophizing, however, were highly correlated with latent change for total maladaptive coping and self-pity.

Unique Effects

In addition to investigating each of the three motivational antecedents separately in relation to academic coping, models of unique effects were tested with all three of the predictors in the same model for each target way of coping. No previous studies provided findings about the roles of all three of these motivational predictors in relation to each other in the prediction of academic coping. Only one of the autoregressive models tested found significant effects for an individual motivational antecedent as a predictor of change in academic coping while controlling for the other two motivational antecedents.

In the current research, the investigation of unique effects was limited. The study may have been underpowered, with inadequate sample size for the effect sizes in relation to the number of variables and complexity of the models used to test unique effects.

Additionally, multivariate latent change score models, a potentially valuable approach to investigating these relationships, were not attempted in this study, but may be useful in future efforts to investigate unique effects of the three motivational variables.

Study 1 was also limited to investigating the power of the motivational variables to predict change in ways of academic coping over time. None of the models included the opposite pathway, from academic coping to the motivational variables. It is possible that, for at least some ways of academic coping, coping in fall might predict change over time in one or more of the motivational variables. For example, the use of high levels of strategizing coping may boost a student's sense of control as the school year proceeds. It may also be that there are effects in both directions, creating feedback loops, with changes in motivational variables and changes in coping reciprocally influencing each other over time. The current study did not investigate these possibilities, but future research may do so.

In addition to limitations related to the three specific predictors investigated, the current research is limited in the scope of motivational antecedents included in the studies. While variables relating to the self-system processes of competence and autonomy are tested as predictors of academic coping, constructs relevant to the self-system process of relatedness are not included. Potential predictors for relatedness might be school belonging, or dimensions of relatedness to parents or teachers. Because of their direct participation in ways of coping involving social support, the quality and content of student relationships with parents, teachers, and peers would need to be investigated in relation to the motivational antecedents to fully understand their effects on patterns of academic coping.

Contributions Regarding Peer Influence

The motivational model of academic coping (Skinner & Saxton, 2020) is a model of development in context. As such, it is related to Bronfenbrenner's contextual model of developmental influences and processes captured in Bioecological Systems Theory (Bronfenbrenner & Morris, 2006). All nested layers of context are relevant to the development of academic coping, but the everyday proximal processes of development that occur within microsystems and mesosystems are especially important. Peers are an important social partner in the school context, who have an effect on academic engagement (Kindermann, 2007). The day-to-day interactions between students and their closely affiliated classmates also provide a context for the socialization of coping (Grimes et al., n.d.). Findings in Study 2 suggest that peers may also be relevant to the development of perceived control, at least in early adolescence.

The results, however, were limited by the marginal significance of the regression coefficient in the model that tested peer group average perceived control as a predictor of change in individual perceived control. Although bivariate latent change score models were not tested to see if there was an interconnection between changing levels of peer group average perceived control and students' own perceived control, future studies may wish to examine such effects. It may be that the effect of peers on perceived control is well captured by the autoregressive model if, for example, peer levels of perceived control are different at the beginning of middle school than they were at the end of elementary school. This would be the case if the composition of the peer group changed because of social reconfiguration in the larger student body that accompanies the transition to middle school. Additionally, with the increased emphasis on performance in middle school, compared to elementary school, perceived control may become more salient for students in their peer social context as sixth grade progresses.

Study 2 capitalizes on the strengths of Social Cognitive Mapping (SCM; Cairns et al., 1985) to determine student's peer affiliations. Unlike methods which rely on student perceptions of the attributes of their peers, or on teacher reports, SCM uses reports from multiple student observers to identity peer affiliations, and then uses that information to construct measurements of peer group attributes for each student.

Methodological Contributions

This research has several methodological strengths and limitations. I will first discuss the characteristics of the dataset and then some points involving the analysis plans and designs for the two studies. The archival data for the current research provides a sample with some strong positive characteristics, as well as some limitations. The sample collection targeted an entire sixth grade cohort of the only public middle school in a small northeastern U.S. town. Participation rates were good for questionnaire data and very good for the mapping of peer affiliations. The size and coverage make for a sample with good generalizability, but only to populations with similar demographic characteristics. The town was largely blue collar and middle class and predominately white, so results may not be applicable to more urban and more diverse populations. The archival data was also collected about twenty years ago, so the results may not be consistent with what would be obtained with a more current sample. Before applying results to more diverse contexts, the proposed studies would need to be replicated with current data and more diverse groups.

In terms of analytic strategies, a series of progressively more complex models were used across the two studies to investigate key processes in the development of academic coping. Autoregressive models looked for predictive effects. Latent change models looked for linkage between dynamic processes. Social network models looked for interplay between peers as a relevant influence in the academic context and the developmental process of academic coping.

Study 1 makes a valuable contribution to the study of developmental change in academic contexts by demonstrating the benefit of bivariate latent change score models for investigating the interconnection of simultaneous change in more than one variable. This approach informs the understanding of development as relational and dynamic (Lerner, 2011; Overton, 2015). The study pioneers the use of two wave latent change scores (2W-LCS; Henk & Castro-Shilo, 2016) within the field of academic coping. The closely interlinked developmental changes between the motivational antecedents and the coping variables, as revealed by the moderate to strong relationships represented in the beta coefficients of this pathway in the 2W-LCS models, could encourage researchers to consider these and other developmental relationships from a new perspective.

Much research is built on the goal of establishing causal relationships with mechanistic effects of an event or a situation seen as having causal force, such as the level of a variable at the beginning of a study impacting another variable over time. LCS models, however, suggest that we consider our variables and their constructs more dynamically, systemically, and contextually, in terms of the processes in which they are embedded. Developmental processes are connected to each other in complex ways that might not be captured by focusing solely on the impact of an event or situation at the beginning of a time interval. The idea of “process causality” is relatively underutilized in developmental psychology but it offers a promising opportunity to investigate phenomena in a new way (Dowe, 2009; Van Geert, 2019).

In terms of design, information about relationships between variables within development most clearly captures developmental trends when data from multiple time points are used in longitudinal research designs. These two studies used only two time points across one academic year, with data collection in fall and spring. The use of longitudinal designs in this research is a strength, compared to what would be obtained using a more typical cross-sectional design. In the autoregressive models, by establishing the relationship between levels of the motivational antecedents and the ways of academic coping, evidence was obtained for temporal precedence, one of the key components of causal explanation (Pearl, 2000). More time points, however, such as three waves across the year may more accurately reveal trajectories of change in the variables. For the bivariate latent change score models in Study 1, without a third time point, it was not possible to establish temporal precedence. Those models estimate the relationship between change in motivational antecedents and change in coping over the same period. Adding data from the preceding year, when students were completing elementary school, would also be beneficial, creating a better picture of the effect of the transition to middle school.

Systematic investigation of potential causal relationships in longitudinal designs also requires researchers to rule out alternative explanations. This can be done by including appropriate control variables and other predictors which might share variance with the study variables. If there are omitted variables which could explain part of the covariance seen in the relationship between study variables, failing to identify and include them could impair interpretation of the results, leading to invalid conclusions. This is a concern generally in developmental studies, and specifically in the study of peer effects (Veronneau & Vitaro, 2007). Both studies include gender as a control variable and in Study 2 student's own level of the motivational predictors is included as a control. The results are limited to the extent that other predictors which might explain effects of the motivational antecedents or of peer groups may have been overlooked, and if so, should be investigated in future studies. No specific potential confounds were identified in the literature review. Student engagement, however, which is positively correlated with perceived control and with autonomous motivation and has also been found to be positively or negatively correlated with the various ways of academic coping, might be an interesting covariate to explore in future work. A study could check for shared variance between engagement and the three motivational variables in the prediction of changes in academic coping.

Finally, Study 2 makes an important methodological contribution by showing how a specific approach to social network analysis, Kindermann's variant of Social-Cognitive Mapping (SCM, Kindermann, 1996), can be useful in capturing the relevant peer affiliations in academic contexts that need to be identified to assess peer influence. By using students as observers to generate data about peer affiliations, this method of identifying peer relationships relies on those who are most familiar with the peer interactions. By using multiple reporters to identify who hangs out with whom, the method permits a probabilistic determination of the significance of specific observed pairings of individuals. By testing the significance of pairings, the method can identify a list of each student's significant affiliations, rather than restricting measurement of peer characteristics to groups of peers who are seen together at the same time, but not all of whom may be strongly affiliated with the target student.

Implications for Practice and Intervention

The findings in this research demonstrate an important role for motivational antecedents in academic coping and have implications for parents, teachers, school counselors, and education researchers. Adaptive ways of coping are associated with perseverance and reengagement. Maladaptive ways of coping interfere with academic engagement and impair students' prospects for success in school. A better understanding of how coping strategies are linked to motivational processes draws attention to relevant markers of these processes (e.g., confidence, persistence, and interest, versus worry, or procrastination), providing avenues for effective interventions. Additionally, understanding how peers influence motivational processes related to coping can help educators find ways to leverage peer relationships to promote positive academic outcomes.

Implications for Motivational Antecedents and Academic Coping

The results of Study 1 provide evidence that the three motivational antecedents, perceived control, autonomous motivation, and catastrophizing, are closely linked to students' repertoires of academic coping. Consistent with findings from Skinner et al. (2013), academic coping, in turn, is linked to students' academic engagement. Parents and teachers can learn to recognize and understand the specific patterns of motivational antecedents that individual students are experiencing. They can also integrate targeted interpersonal and pedagogical strategies into the classroom aimed at increasing levels of positive motivational antecedents and decreasing levels of negative motivational antecedents across all students. . Interventions that increase perceived control, increase autonomous motivation, or decrease catastrophizing, either directly or indirectly, could increase adaptive coping and decrease maladaptive coping. New and existing interventions that target self-efficacy, autonomy, fixed and growth mindsets, and social and emotional learning can be created or modified to promote positive change in motivational antecedents.

The relevance of the three motivational variables to academic coping could be especially helpful for parents and school counselors, who need to be able to identify specifically what characteristics, including beliefs and patterns of thinking, are instrumental in diagnosing students' motivational challenges and coaching them to develop in positive directions. The new insights about the connections between motivational antecedents and academic coping would also be beneficial in efforts to reduce dropout. The student characteristics associated with dropout, such as family adversity, poor grades, low engagement, (Rumberger, 2011), may be linked to levels of perceived control, autonomous motivation, and catastrophizing. Helping students find resources, curricula, or interventions that target these motivational variables may be an effective way to shift the key student characteristics that raise the risk of dropout.

Perceived control in particular may play a key role in motivational processes for students who become disengaged and ultimately drop out of school. The emphasis on performance in middle school and high school raises the stakes for students' academic self-concept and perception by others at a time when both self-esteem and social acceptance are malleable and salient. Students whose academic performance is average or below may be at high risk for disillusionment with academic goals, followed by disaffection and disengagement, if they are low on perceived control, low on autonomous motivation. This would be compounded for students prone to catastrophizing. Counselors need guidance and intervention techniques to help correct these negative tendencies.

Educators and researchers can design interventions to improve student coping with an eye on its connection to academic motivation and engagement. Perceived control and catastrophizing have cognitive components that can be targeted by interventions. Adolescents have strong emerging capacities for self-reflection and meta-cognition. They can be coached to actively engage in developing their academic self-regulation, which encompasses strategizing skills and productive help-seeking. Active participation in improving regulatory skills, for example, can focus on mindful attention to cognitive interpretations of challenges and setbacks (Larson, 2011).

Autonomous motivation can be increased by increasing the autonomy support coming from parents and teachers. Autonomy-supportive teaching is effective in promoting students' motivation and engagement (Reeve & Cheon, 2021). By increasing autonomous motivation, it can also be beneficial in promoting effecting academic coping. Autonomous motivation can also be promoted indirectly, by intervening on constructs that are connected to autonomous motivation. Interventions targeting, for example, self-efficacy, growth mindsets, and mastery goals, could have positive consequences for autonomous motivation. Teacher training that emphasizes relevant and interesting curriculum should also have an impact.

On top of or in combination with interventions targeting the three motivational antecedents, students can be coached and trained explicitly to increase their use of adaptive coping strategies and reduce their use of maladaptive coping. Parents and teachers can learn how to coach students to use adaptive coping when they run into problems. Information about coping could be included in general curriculum or in programs targeted to students in trouble, in combination with information about procrastination, self-handicapping, and fixed mindsets. Recognizing the role of motivational antecedents and helping students to improve their levels on these three characteristics, while keeping an eye on their coping preferences, can be a useful approach to improve students' academic engagement and achievement.

Implications for Peer Influence and Academic Coping

The Study 2 findings on peer group perceived control as a predictor, though modest, underscore the fact that peer relationships are important in middle school classrooms, and that teachers can leverage their awareness of peer interactions to facilitate relationships that foster enthusiastic learning and combat normative declines in motivation and engagement (Farmer et al., 2011; Kindermann, 2011). Researchers can incorporate the study findings into a more nuanced understanding of the processes of selection and influence that account for peer effects (Kindermann, 2016; Laursen, 2017, 2018). Adolescents tend to select their friends and form other close peer affiliations based on similarity, and they also become more similar over time (Laursen, 2017). Friends, however, are never entirely similar on all their characteristics. In Study 2, average levels of perceived control, autonomous motivation, and catastrophizing in the peer group were positively but only weakly correlated with students' own levels of the three variables. This means that students are more likely to be affiliated with individuals different from themselves in their motivational antecedents, for example, than in their extracurricular interests, where correlations are stronger. Higher levels of motivational assets in the peer group (or lower levels of motivational liabilities) can make peers a greater resource at school. They can have a positive impact on academic trajectories. Beyond encouraging efforts to leverage peers as resources, the findings of connections between peers' perceived control and students' own perceived control or academic coping are useful in evaluating the need for and direction of future studies.

Directions for Future Research

In addition to making useful contributions to the understanding of academic coping, and having implications for parents, educators, and interventionists, this research provides inspiration for additional research. Future studies on the motivational antecedents of academic coping will be needed to further clarify the meaning of each of the three predictors and their role in the coping process. Future studies on the relation of peers to motivation and coping can help clarify how peer relationships should be encouraged and shaped.

Future Directions for Research on Motivational Antecedents

One approach would be to continue to investigate each of the motivational antecedents separately. There are still unanswered questions regarding their different dimensions, mechanisms of operation, and developmental sequences. Research can also further investigate their relationships to one another. Another approach would be to use person-centered approaches to clarify whether the motivational antecedents and their combinations work differently for different groups of students (Laursen & Hoff, 2006; Ratelle et al., 2007). For example, the possibility of cumulative motivational effects could be examined by dividing students into subgroups based on how many of these positive antecedents and risk factors they possess, and then comparing them on their use of a range of coping strategies. Such analytic strategies may be more effective than the examination of unique effects (Skinner et al., 2022).

Each potential motivational antecedent offers further possibilities for future study. For example, perceived control is a multidimensional construct consisting of strategy beliefs, capacity beliefs, and outcome expectancies (Skinner et al., 1988; Skinner, 1995). Greene (2015), in a dissertation, investigated components of control as predictors for four specific ways of academic coping and found some interesting differences in effects for specific control constructs and various ways of coping, but her investigation was limited in scope. Additional research could be done to clarify the roles of strategy beliefs, capacity beliefs, and combinations of strategy and capacity beliefs in students' preferences for specific ways of coping, as well as for adaptive and maladaptive coping aggregates. Effort and ability, both as strategy beliefs and capacity beliefs in various combinations, are especially interesting because of the importance of these aspects of motivational cognition to students' motivation and engagement, as shown in some of the research based on mindset theory (Dweck, 2002) and attribution theory (Folmer et al., 2008). Different combinations of beliefs about effort and ability are likely to be effective for different students in reducing maladaptive academic coping and increasing adaptive coping. Some students with low perceived ability, for example, may have a positive sense of perceived control but of their beliefs about the value of effort in relation to their beliefs about what constitutes adequate performance. Research is needed to identify optimal approaches for different groups of students, based on their characteristics.

Additional research is also needed to clarify the connection between autonomous motivation and other closely related motivational constructs, such as caring, valuing, and academic identity. The scales for identified motivation used to assess autonomous motivation in this research could be accompanied in separate or combined analyses with scales for the other forms of controlled and autonomous motivation (intrinsic, introjected, and extrinsic) to clarify the role of autonomous motivation. In future studies, scales for caring, valuing, and academic identity could be used with identified motivation in studies designed to clarify the relationships between these constructs, and their differential or overlapping roles in shaping the development of adaptive and maladaptive academic coping.

There is also work to be done on catastrophizing in academic contexts. To clarify its role in academic coping the nomological network of catastrophizing need to be further explored. Clarifying the relationships between catastrophizing and other closely related constructs, such as self-doubt and worry, might be a good place to start. Investigating the interaction of cognitive and emotional aspects of catastrophizing, and related constructs, could provide a basis for further progress in investigating the relationship between catastrophizing and academic coping. Future research also needs to further investigate the relationship between perceived control and catastrophizing. Catastrophizing is more than just low perceived control. In this research catastrophizing was operationalized primarily in terms of cognitive aspects, which include low expectations for success or high expectations for failure, which are strongly associated with low perceived control. Future research is needed to further explore cognitive aspects of catastrophizing, as well as its emotional aspects.

Catastrophizing has emotional correlates in students' experiences of hope or despair. In one existing study, perceived control has been identified as a moderator of the effects of hope and optimism (Shanahan et al., 2020). In another study, Pereira and colleagues (2018) have proposed perceived control as a point of leverage for interventions on cognitive distortion and maladaptive coping in anxious children. In addition to studying the nomological network surrounding catastrophizing, future research also needs to investigate the development of catastrophizing. Mezulis and colleagues (2011), for example, followed a community (nonclinical) sample of youth from age 11 to 15 and found 22% of the participants had trajectories of increasing negative cognitions and depressive symptoms. Future research can investigate whether the normative challenges of early adolescence create a general climate of overwhelming stress for some individuals that may exhaust their coping resources and contribute to patterns of declining academic motivation, lower engagement, and maladaptive coping. It would be helpful in designing effective interventions to understand the role catastrophizing plays in these circumstances.

Building on the motivational model of academic coping, with its emphasis on the social context in the development of the three basic self-system processes of competence, autonomy, and relatedness, additional research will need to continue to investigate the role of social partners in the development of the three motivational antecedents. Knowing that these motivational variables are connected to academic coping heightens the relevance of this line of inquiry. In addition to investigating how social partners influence their development, we need to know how perceived control, autonomous motivation, and catastrophizing may develop differently in students with different kinds and levels of support from their social partners.

Future Directions for Research on Peer Effects

Future studies may be conducted to further explore whether peers influence coping by shaping its motivational antecedents. The current research finding of modest peer effects on perceived control, although at a marginal level of significance, encourages further inquiry into the role of peers in motivational change and its connection to academic coping. Additional research could investigate, for example, whether peer group average levels of perceived control are also related to changes in students' autonomous motivation, or in their academic engagement. Clarification of the process of peer influence is needed. One approach has been to look at peers as agents of socialization, with mechanisms of influence involving reinforcement, observation, and instruction or explanation (Grimes et al., n.d.). Observational studies could be conducted using, for example, content analysis of peer conversations, to develop a better understanding of the mechanisms and proximal processes through which peer influence on motivational antecedents takes place.

The measurement of peer effects could also be refined. One avenue would be to expand the understanding of the aggregate variables used to represent peer group characteristics by investigating the relative importance of different peers. Methods for weighting peer group members' contributions to the peer average that could be explored include quantifying the stability of the relationships across the year, the relative frequency with which each dyadic association was reported by student observers, and whether a peer group member has also been identified as a close friend. Alternatively, research could further investigate peer averages calculated using only stable peers, that is those who remain closely affiliated across the year, a promising avenue for identifying key interpersonal relationships involved in peer influence (Vollet & Kindermann, 2020).

Peers are an important social partner in the school environment of early adolescence. In addition to their role in competence and, potentially, autonomy, peer processes involve the self-system process of relatedness and the need for relatedness and belonging. Investigation of peer influences on coping generally, and on motivational antecedents specifically, can be expanded to include the role of relatedness and belongingness variables as moderators of peer influences on coping. One approach with good potential would be to use person-centered analysis to study peers, investigating the separate and combined effects of peer variables and related predictors for sub-groups of students. Clusters or profiles of students could be identified on the basis of relatedness variables, motivational characteristics, such as academic engagement and autonomous motivation, or even personal characteristics, such as personality, catastrophizing, or demographics. The relative prevalence of different coping strategies in each group could then be compared to gain insight into the patterns that exist in the associations between student characteristics and coping repertoires.

Conclusion

Students' repertoires of ways of academic coping can allow them to respond strategically and flexibly to difficulties in their pursuit of learning activities. Flexibility in coping can provide resilience (Cheng et al., 2014), but we also know that responses to academic coping are most effective when they include frequent use of adaptive strategies and infrequent use of maladaptive strategies. Motivational antecedents are seen to play an important role in the development of academic coping. Students' coping repertories develop in tandem with the development of student's motivation and engagement, within their age-specific experiences, but social partners can also make a positive contribution. Teachers and others can benefit from increasing their understanding of the developmental processes of the three motivational variables investigated in this dissertation and the social contextual factors that shape them, including the role of peers, to promote students' movement away from maladaptive coping and toward more adaptive and effective coping repertoires. This research makes a contribution to expanding comprehension of these processes and helps orient researchers to useful further steps.

References

Alivernini, F., Lucidi, F., & Manganelli, S. (2008). Assessment of academic motivation: A mixed methods study. *International Journal of Multiple Research Approaches, 2*(1), 71–82. https://doi.org/10.5172/mra.455.2.1.711

Allen, J. P., Loeb, E. L., Kansky, J., & Davis, A. A. (2022). Beyond susceptibility: Openness to peer influence is predicted by adaptive social relationships. *International Journal of Behavioral Development*, *46*(3), 180–189. https://doi.org/10.1177/0165025420922616

Alloy, L. B., Abramson, L. Y., Whitehouse, W. G., Hogan, M. E., Tashman, N. A., L. Steinberg, D., Rose, D. T., & Donovan, P. (1999). Depressogenic cognitive styles: Predictive validity, information processing and personality characteristics, and developmental origins. *Behaviour Research and Therapy*, *37*(6), 503–531. https://doi.org/10.1016/S0005-7967(98)00157-0

Altermatt, E. R. (2007). Coping with academic failure: gender differences in students' self-reported interactions with family members and friends. *The Journal of Early Adolescence*, *27*(4), 479–508. https://doi.org/10.1177/0272431607302938

Altermatt, E. R. (2019). Academic support from peers as a predictor of academic self-efficacy among college students. *Journal of College Student Retention: Research, Theory & Practice*, *21*(1), 21–37. https://doi.org/10.1177/1521025116686588

Altermatt, E. R., & Broady, E. F. (2009). Coping with achievement-related failure: An examination of conversations between friends. *Merrill-Palmer Quarterly*, *55*(4), 454–487. https://doi.org/10.1353/mpq.0.0037

Anniko, M. K., Boersma, K., & Tillfors, M. (2019). Sources of stress and worry in the development of stress-related mental health problems: A longitudinal investigation from early- to mid-adolescence. *Anxiety, Stress, & Coping*, *32*(2), 155–167. https://doi.org/10.1080/10615806.2018.1549657

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review*, *84*, 191–215.

Bandura, A. (1997). *Self-efficacy, the exercise of control*. W.H. Freeman.

Beck, A. T., & Clark, D. A. (1997). An information processing model of anxiety: Automatic and strategic processes. *Behaviour Research and Therapy*, *35*(1), 49–58. https://doi.org/10.1016/S0005-7967(96)00069-1

Beck, A. T., Emery, G., & Greenberg, R. L. (2005). *Anxiety disorders and phobias: A cognitive perspective*. Basic Books.

Benner, A. D., & Wang, Y. (2014). Shifting attendance trajectories from middle to high school: Influences of school transitions and changing school contexts. *Developmental Psychology*, *50*(4), 1288–1301. http://dx.doi.org/10.1037/a0035366

Berndt, T. J., & Keefe, K. (1996). Friends' influence on school adjustment: A motivational analysis. In J. Juvonen & K. R. Wentzel (Eds.), *Social motivation: Understanding children's school adjustment* (pp. 248–278). Cambridge University Press. https://doi.org/10.1017/CBO9780511571190.013

Blakemore, S.-J., & Mills, K. L. (2014). Is adolescence a sensitive period for sociocultural processing? *Annual Review of Psychology*, *65*(1), 187–207. https://doi.org/10.1146/annurev-psych-010213-115202

Blascovich, J. (2008). Challenge and threat. In *Handbook of approach and avoidance motivation* (pp. 431–445). Psychology Press.

Boiché, J., & Stephan, Y. (2014). Motivational profiles and achievement: A prospective study testing potential mediators. *Motivation and Emotion*, *38*(1), 79–92. https://doi.org/10.1007/s11031-013-9361-6

Braslow, M. D., Guerrettaz, J., Arkin, R. M., & Oleson, K. C. (2012). Self-doubt. *Social and Personality Psychology Compass*, *6*(6), 470–482. https://doi.org/10.1111/j.1751-9004.2012.00441.x

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

Brown, B. B., & Larson, J. (2009). Peer relationships in adolescence. In R. M. Lerner & L. Steinberg (Eds.), *Handbook of Adolescent Psychology* (Vol. 1, pp. 74–103). John Wiley & Sons, Inc. https://doi.org/10.1002/9780470479193

Brunstein, J. C., & Heckhausen, H. (2018). Achievement motivation. In J. Heckhausen & H. Heckhausen (Eds.), *Motivation and Action* (pp. 221–304). Springer International Publishing. https://doi.org/10.1007/978-3-319-65094-4_6

Bukowski, W. M., Sippola, L. K., & Newcomb, A. F. (2000). Variations in patterns of attraction of same- and other-sex peers during early adolescence. *Developmental Psychology*, *36*(2), 147–154. http://dx.doi.org/10.1037/0012-1649.36.2.147

Burnett, P. C., & Fanshawe, J. P. (1997). Measuring school-related stressors in adolescents. *Journal of Youth and Adolescence*, *26*(4), 415–428. https://doi.org/10.1023/A:1024529321194

Butera, F., & Darnon, C. (2017). Competence assessment, social comparison, and conflict regulation. In *Handbook of competence and motivation: Theory and application, 2nd ed* (pp. 192–213). The Guilford Press.

Buunk, A. P., Dijkstra, P. D., & Bosma, H. A. (2020). Changes in social comparison orientation over the life-span. *Journal of Clinical & Developmental Psychology*, *2*(2), Article 2. https://doi.org/10.6092/2612-4033/0110-2359

Byrne, D. G., Davenport, S. C., & Mazanov, J. (2007). Profiles of adolescent stress: The development of the adolescent stress questionnaire (ASQ). *Journal of Adolescence*, *30*(3), 393–416. https://doi.org/10.1016/j.adolescence.2006.04.004

Byrnes, J. P. (2006). Cognitive development during adolescence. In *Blackwell Handbook of Adolescence* (pp. 227–246). John Wiley & Sons, Ltd. https://doi.org/10.1002/9780470756607.ch11

Cairns, R. B., Perrin, J. E., & Cairns, B. D. (1985). Social structure and social cognition in early adolescence: Affiliative patterns. *The Journal of Early Adolescence*, *5*(3), 339–355. https://doi.org/10.1177/0272431685053007

Cantin, S., & Boivin, M. (2004). Change and stability in children's social network and self-perceptions during transition from elementary to junior high school. *International Journal of Behavioral Development*, *28*(6), 561–570. https://doi.org/10.1080/01650250444000289

Cantor, N., & Norem, J. K. (1989). Defensive pessimism and stress and coping. *Social Cognition*, *7*(2), 92–112. https://doi.org/10.1521/soco.1989.7.2.92

Carver, C. S., & Scheier, M. F. (2014). Dispositional optimism. *Trends in Cognitive Sciences*, *18*(6), 293–299. https://doi.org/10.1016/j.tics.2014.02.003

Causey, D. L., & Dubow, E. F. (1992). Development of a self-report coping measure for elementary school children. *Journal of Clinical Child Psychology*, *21*(1), 47–59. https://doi.org/10.1207/s15374424jccp2101_8

Causey, D. L., & Dubow, E. F. (1993). Negotiating the transition to junior high school. *Prevention in Human Services*, *10*(2), 59–81. https://doi.org/10.1300/J293v10n02_05

Chatterjee, M. B., Baumann, N., & Koole, S. L. (2017). Feeling better when someone is alike: Poor emotion regulators profit from pro-social values and priming for similarities with close others. *Journal of Personality*, *85*(6), 841–851. https://doi.org/10.1111/jopy.12292

Cheng, C., Lau, H. P. B., & Chan, M. P. S. (2014). Coping flexibility and psychological adjustment to stressful life changes: A meta-analytic review. *Psychological Bulletin*, *140*(6), 1582. https://doi.org/10.1037/a0037913

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

Chow, A., Kiuru, N., Parker, P. D., Eccles, J. S., & Salmela-Aro, K. (2018). Development of friendship and task values in a new school: Friend selection for the arts and physical education but socialization for academic subjects. *Journal of Youth and Adolescence*, *47*(9), 1966–1977. https://doi.org/10.1007/s10964-018-0894-6

Chow, C. M., & Buhrmester, D. (2011). Interdependent patterns of coping and support among close friends. *Journal of Social and Personal Relationships*, *28*(5), 684–705. https://doi.org/10.1177/0265407510386134

Clark, D. A., & Beck, A. T. (2010). Cognitive theory and therapy of anxiety and depression: Convergence with neurobiological findings. *Trends in Cognitive Sciences*, *14*(9), 418–424. https://doi.org/10.1016/j.tics.2010.06.007

Collins, L. M., Schafer, J. L., & Kam, C.-M. (2001). A comparison of inclusive and restrictive strategies in modern missing data procedures. *Psychological Methods, 6*(4), 330–351. https://doi.org/10.1037/1082-989X.6.4.330

Compas, B. E., Banez, G. A., Malcarne, V., & Worsham, N. (1991). Perceived control and coping with stress: A developmental perspective. *Journal of Social Issues*, *47*(4), 23–34. https://doi.org/10.1111/j.1540-4560.1991.tb01832.x

Connell, J. P., & Ryan, R. M. (1987). Self-Regulatory Style Questionnaire: A measure of external, introjected, identified, and intrinsic reasons for initiating behavior. Manual, University of Rochester.

Connell, J. P., & Wellborn, J. G. (1991). Competence, autonomy, and relatedness: A motivational analysis of self-system processes. In *Self processes and development* (pp. 43–77). Lawrence Erlbaum Associates, Inc.

Crone, E. A. (2016). *The adolescent brain: Changes in learning, decision-making and social relations*. Routledge. https://doi.org/10.4324/9781315720012

Curran, P. J., & Bauer, D. J. (2011). The disaggregation of within-person and between-person effects in longitudinal models of change. *Annual Review of Psychology*, *62*(1), 583–619. https://doi.org/10.1146/annurev.psych.093008.100356

Davis, H. A., DiStefano, C., & Schutz, P. A. (2008). Identifying patterns of appraising tests in first-year college students: Implications for anxiety and emotion regulation during test taking. *Journal of Educational Psychology*, *100*(4), 942–960. https://doi.org/10.1037/a0013096

Deci, E. L., & Ryan, R. M. (1985). Intrinsic motivation and self-determination in human behavior. Plenum.

Deci, E. L., Vallerand, R. J., Pelletier, L. G., & Ryan, R. M. (1991). Motivation and education: The self-determination perspective. *Educational Psychologist*, *26*(3–4), 325–346. https://doi.org/10.1080/00461520.1991.9653137

Dirks, M. A., Dunfield, K. A., & Recchia, H. E. (2018). Prosocial behavior with peers: Intentions, outcomes, and interpersonal adjustment. In *Handbook of peer interactions, relationships, and groups, 2nd ed* (pp. 243–264). The Guilford Press.

Doron, J., Stephan, Y., Boiché, J., & Scanff, C. L. (2009). Coping with examinations: Exploring relationships between students' coping strategies, implicit theories of ability, and perceived control. *British Journal of Educational Psychology*, *79*(3), 515–528. https://doi.org/10.1348/978185409X402580

Doron, J., Stephan, Y., Maiano, C., & Scanff, C. L. (2011). Motivational predictors of coping with academic examination. *The Journal of Social Psychology*, *151*(1), 87–104. https://doi.org/10.1080/00224540903366768

Dowe, P. (2009). Causal process theories. In H. Beebee, C. Hitchcock, & P. Menzies (Eds.), *The Oxford handbook of causation*. Oxford, UK: Oxford University Press.

Dweck, C. S. (2002). The development of ability conceptions. In A. Wigfield & J. S. Eccles (Eds.), *Development of achievement motivation* (pp. 57–88). Academic Press. https://doi.org/10.1016/B978-012750053-9/50005-X

Eccles, J. S., & Midgley, C. (1989). Stage/environment fit: Developmentally appropriate classrooms for early adolescents. In R. E. Ames & C. Ames (Eds.), *Research on motivation in education* (Vol. 3, pp. 139-186). New York: Academic Press.

Eccles, J. S., Midgley, C., Wigfield, A., Buchanan, C. M., Reuman, D., Flanagan, C., & Mac Iver, D. (1993). Development during adolescence: The impact of stage-environment fit on young adolescents' experiences in schools and in families. *American Psychologist*, *48*(2), 90–101. http://dx.doi.org/10.1037/0003-066X.48.2.90

Eccles, J. S., & Wigfield, A. (2020). From expectancy-value theory to situated expectancy-value theory: A developmental, social cognitive, and sociocultural perspective on motivation. *Contemporary Educational Psychology*, *61*, 101859. https://doi.org/10.1016/j.cedpsych.2020.101859

Enders, C. K., & Bandalos, D. L. (2001). The relative performance of full information maximum likelihood estimation for missing data in structural equation models. *Structural Equation Modeling: A Multidisciplinary Journal*, *8*(3), 430–457. https://doi.org/10.1207/S15328007SEM0803_5

Farmer, T. W., Chen, C.-C., Hamm, J. V., Moates, M. M., Mehtaji, M., Lee, D., & Huneke, M. R. (2016). Supporting teachers' management of middle school social dynamics: The scouting report process. *Intervention in School and Clinic*, *52*(2), 67–76. https://doi.org/10.1177/1053451216636073

Farmer, T. W., McAuliffe Lines, M., & Hamm, J. V. (2011). Revealing the invisible hand: The role of teachers in children's peer experiences. *Journal of Applied Developmental Psychology*, *32*, 247-256. https://doi.org/10.1016/j.appdev.2011.04.006

Finch, W. H., & Shim, S. S. (2018). A comparison of methods for estimating relationships in the change between two time points for latent variables. *Educational and Psychological Measurement*, *78*(2), 232–252. https://doi.org/10.1177/0013164416680701

Finn. J. D. (1989). Withdrawing from school. *Review of Educational Research*, *59*, 117-142. https://doi.org/10.3102/00346543059002117

Finney, S.J., & DiStefano, C. (2013). Non-normal and categorical data in structural equation modeling. In G.R. Hancock & R.O. Mueller (Eds.), Structural equation modeling: A second course, 2nd Edition (pp. 439–492). Information Age Publishing.

Fisher, S. (1986). *Stress and strategy*. Routledge. https://doi.org/10.4324/9781315627212

Folkman, S. (1984). Personal control and stress and coping processes: A theoretical analysis. *Journal of Personality and Social Psychology*, *46*(4), 839–852. https://doi.org/10.1037/0022-3514.46.4.839

Folkman, S., & Lazarus, R. S. (1985). If it changes it must be a process: Study of emotion and coping during three stages of a college examination. *Journal of Personality and Social Psychology*, *48*(1), 150–170. http://dx.doi.org.proxy.lib.pdx.edu/10.1037/0022-3514.48.1.150

Folmer, A. S., Cole, D. A., Sigal, A. B., Benbow, L. D., Satterwhite, L. F., Swygert, K. E., & Ciesla, J. A. (2008). Age-related changes in children's understanding of effort and ability: Implications for attribution theory and motivation, *Journal of Experimental Child Psychology*, *99*(2), 114-134. https://doi.org/10.1016/j.jecp.2007.09.003.

Fontaine, K. R., Manstead, A. S. R., & Wagner, H. (1993). Optimism, perceived control over stress, and coping. *European Journal of Personality*, *7*(4), 267–281. https://doi.org/10.1002/per.2410070407

Forsythe, C. J., & Compas, B. E. (1987). Interaction of cognitive appraisals of stressful events and coping: Testing the goodness of fit hypothesis. *Cognitive Therapy and Research*, *11*(4), 473–485. https://doi.org/10.1007/BF01175357

Foulkes, L., & Blakemore, S.-J. (2016). Is there heightened sensitivity to social reward in adolescence? *Current Opinion in Neurobiology*, *40*, 81–85. https://doi.org/10.1016/j.conb.2016.06.016

Freire, C., Ferradás, M. del M., Regueiro, B., Rodríguez, S., Valle, A., & Núñez, J. C. (2020). Coping strategies and self-efficacy in university students: A person-centered approach. *Frontiers in Psychology*, *11*. https://www.frontiersin.org/article/10.3389/fpsyg.2020.00841

Friedel, J. M., Cortina, K. S., Turner, J. C., & Midgley, C. (2007). Achievement goals, efficacy beliefs and coping strategies in mathematics: The roles of perceived parent and teacher goal emphases. *Contemporary Educational Psychology*, *32*(3), 434–458. https://doi.org/10.1016/j.cedpsych.2006.10.009

Furrer, C., & Skinner, E. (2003). Sense of relatedness as a factor in children’s academic engagement and performance. *Journal of Educational Psychology*, *95*(1), 148–162. http://dx.doi.org/10.1037/0022-0663.95.1.148

Garnefski, N., Kraaij, V., & Spinhoven, P. (2001). Negative life events, cognitive emotion regulation and emotional problems. *Personality and Individual Differences*, *30*(8), 1311–1327. https://doi.org/10.1016/S0191-8869(00)00113-6

Giletta, M., Choukas-Bradley, S., Maes, M., Linthicum, K. P., Card, N. A., Prinstein, M. J. (2021). A meta-analysis of longitudinal peer influence effects in childhood and adolescence. *Psychological Bulletin*, *147*(7), 719–747. http://dx.doi.org.proxy.lib.pdx.edu/10.1037/bul0000329

Giletta, M., Scholte, R. H. J., Burk, W. J., Engels, R. C. M. E., Larsen, J. K., Prinstein, M. J., & Ciairano, S. (2011). Similarity in depressive symptoms in adolescents’ friendship dyads: Selection or socialization? *Developmental Psychology*, *47*(6), 1804–1814. https://doi.org/10.1037/a0023872

Goodenow, C. (1993). The psychological sense of school membership among adolescents: Scale development and educational correlates. *Psychology in the Schools*, *30*(1), 79–90. https://doi.org/10.1002/1520-6807(199301)30:1<79::AID-PITS2310300113>3.0.CO;2-X

Goretzko, D., Siemund, K., & Sterner, P. (2023). Evaluating model fit of measurement models in confirmatory factor analysis. *Educational and Psychological Measurement*, 00131644231163813. https://doi.org/10.1177/00131644231163813

Gottfried, A. E., Fleming, J. S., & Gottfried, A.W. (2001). Continuity of academic intrinsic motivation from childhood through late adolescence: A longitudinal study. *Journal of Educational Psychology*, *93*, 3—13. https://doi.org/10.1037/0022-0663.93.1.3

Gottfried, A. E., Marcoulides, G. A., Gottfried, A. W., Oliver, P. H., & Guerin, D. W. (2007). Multivariate latent change modeling of developmental decline in academic intrinsic math motivation and achievement: Childhood through adolescence. *International Journal of Behavioral Development*, *31*(4), 317–327. https://doi.org/10.1177/0165025407077752

Graham, J. W. (2009). Missing data analysis: Making it work in the real world. *Annual Review of Psychology*, *60*(1), 549–576. https://doi.org/10.1146/annurev.psych.58.110405.085530

Graham, J. W., & Hofer, S. M. (2000). Multiple imputation in multivariate research. In *Modeling longitudinal and multilevel data: Practical issues, applied approaches, and specific examples* (pp. 201–218, 269–281). Lawrence Erlbaum Associates Publishers.

Greene, T. (2015). The development of personal resources in the academic domain: Age differences in the evolution of coping and perceived control and the process structures that facilitate academic engagement [Ph.D., Portland State University]. https://pdxscholar.library.pdx.edu/open_access_etds/2632

Grimes, D. L. (2018). Peers' academic coping as a resource for academic engagement and motivational resilience in the first year of middle school. [M.S., Portland State University].

Grimes, D. L., Kindermann, T. A., & Skinner, E. A. (no date). (Unpublished manuscript). Peer groups' influence students' own academic coping over the first year of middle school.

Grimm, K. J., An, Y., McArdle, J. J., Zonderman, A. B., & Resnick, S. M. (2012). Recent changes leading to subsequent changes: Extensions of multivariate latent difference score models. *Structural Equation Modeling: A Multidisciplinary Journal*, *19*(2), 268–292. https://doi.org/10.1080/10705511.2012.659627

Guay, F., & Bureau, J. S. (2018). Motivation at school: Differentiation between and within school subjects matters in the prediction of academic achievement. *Contemporary Educational Psychology*, *54*, 42–54. https://doi.org/10.1016/j.cedpsych.2018.05.004

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2013). *Multivariate data analysis*. Pearson Education Limited.

Hamm, J. V., & Faircloth, B. S. (2005). The role of friendship in adolescents' sense of school belonging. *New Directions for Child and Adolescent Development*, *2005*(107), 61–78. https://doi.org/10.1002/cd.121

Harlow, R. E., & Cantor, N. (1994). Social pursuit of academics: Side effects and spillover of strategic reassurance seeking. *Journal of Personality and Social Psychology*, *66*(2), 386–397. https://doi.org/10.1037/0022-3514.66.2.386

Harlow, R. E., & Cantor, N. (1995). Overcoming a lack of self-assurance in an achievement domain. In M. H. Kernis (Ed.), *Efficacy, Agency, and Self-Esteem* (pp. 171–195). Springer US. https://doi.org/10.1007/978-1-4899-1280-0_9

Harter, S. (1978). Effectance motivation reconsidered. Toward a developmental model. *Human Development*, *21*(1), 34–64. https://doi.org/10.1159/000271574

Heckhausen, H. (1977). Achievement motivation and its constructs: A cognitive model. *Motivation and Emotion*, *1*(4), 283–329. https://doi.org/10.1007/BF00992538

Henk, C. M., & Castro-Schilo, L. (2016). Preliminary detection of relations among dynamic processes with two-occasion data. *Structural Equation Modeling: A Multidisciplinary Journal*, *23*(2), 180–193. https://doi.org/10.1080/10705511.2015.1030022

Hilsman, R., & Garber, J. (1995). A test of the cognitive diathesis-stress model of depression in children: Academic stressors, attributional style, perceived competence, and control. *Journal of Personality and Social Psychology*, *69*(2), 370–380. https://doi.org/10.1037/0022-3514.69.2.370

Hirsch, B. J. (1985). Adolescent coping and support across multiple social environments. *American Journal of Community Psychology*, *13*(4), 381–392. https://doi.org/10.1007/BF00911215

Hodgins, H. S., Weibust, K. S., Weinstein, N., Shiffman, S., Miller, A., Coombs, G., & Adair, K. C. (2010). The Cost of self-protection: Threat response and performance as a function of autonomous and controlled motivations. *Personality and Socia l Psychology Bulletin*, *36*(8), 1101–1114. https://doi.org/10.1177/0146167210375618

Hodgins, H. S., Yacko, H. A., & Gottlieb, E. (2006). Autonomy and nondefensiveness. *Motivation and Emotion*, *30*(4), 283. https://doi.org/10.1007/s11031-006-9036-7

Howard, J. L., Bureau, J., Guay, F., Chong, J. X. Y., & Ryan, R. M. (2021). Student motivation and associated outcomes: A meta-analysis from Self-Determination Theory. *Perspectives on Psychological Science*, *16*(6), 1300–1323. https://doi.org/10.1177/1745691620966789

Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal*, *6*(1), 1–55. https://doi.org/10.1080/10705519909540118

IBM Corp. (2022). *IBM SPSS statistics for Windows, version 29*. Armonk, NY: IBM Corp.

Infurna, F. J., Gerstorf, D., Ram, N., Schupp, J., & Wagner, G. G. (2011). Long-term antecedents and outcomes of perceived control. *Psychology and Aging*, *26*(3), 559–575. http://dx.doi.org.proxy.lib.pdx.edu/10.1037/a0022890

Jones, G. E., Dembo, M. H., & Jones, G. P. (1989). Age and sex role differences in intimate friendships during childhood and adolescence. *Merrill-Palmer Quarterly*, *35*(4), 445–462. http://www.jstor.org/stable/23086395

Juvonen, J., Espinoza, G., & Knifsend, C. (2012). The role of peer relationships in student academic and extracurricular engagement. In S. Christenson, A. Reschly, & C. Wylie (Eds.), *Handbook of Research on Student Engagement* (pp. 387-401). New York: Springer Science.

Kandel, D. B. (1978). Homophily, selection, and socialization in adolescent friendships. *American Journal of Sociology*, *84*(2), 427–436. https://doi.org/10.1086/226792

Khan, A. (2012). Sex differences in educational encouragement and academic achievement. *Psychological Reports*, *111*(1), 149–155. https://doi.org/10.2466/10.11.21.PR0.111.4.149-155

Kindermann, T. A. (1993). Natural peer groups as contexts for individual development: The case of children's motivation in school. *Developmental Psychology*, *29*(6), 970–977. http://dx.doi.org/10.1037/0012-1649.29.6.970

Kindermann, T. A. (1996). Strategies for the study of individual development within naturally-existing peer groups. *Social Development*, *5*(2), 158–173. https://doi.org/10.1111/j.1467-9507.1996.tb00078.x

Kindermann, T.A. (2007). Effects of naturally existing peer groups on changes in academic engagement in a cohort of sixth graders. *Child Development*, *78*(4), 1186-1203. https://doi.org/10.1111/j.1467-8624.2007.01060.x

Kindermann, T. A. (2011). Commentary: The invisible hand of the teacher. *Journal of Applied Developmental Psychology*, *32*, 304-308. https://doi.org/10.1016/j.appdev.2011.04.005

Kindermann, T. A. (2016). Peer group influences on students' academic motivation. In K. Wentzel & G. Ramani (Eds.), *Handbook of social influences in school contexts* (pp. 31–47). Routledge.

Kindermann, T. A., & Skinner, E. A. (1992). Modeling environmental development: Individual and contextual trajectories. In J. B. Asendorpf & J. Valsiner (Eds.), *Stability and change in development: A study of methodological reasoning* (pp. 155–206). Sage Publications, Inc.

King, R. B., McInerney, D. M., & Watkins, D. A. (2012). Studying for the sake of others: the role of social goals on academic achievement. *Educational Psychology*, *32*(6), 749-776. https://doi.org/10.1080/01443410.2012.730479

Kiuru, N., Burk, W. J., Laursen, B., Nurmi, J. E., & Salmela-Aro, K. (2012). Is depression contagious? A test of alternative peer socialization mechanisms of depressive symptoms in adolescent peer networks. *Journal of Adolescent Health, 50*, 250–255. https://doi.org/10.1016/j.jadohealth.2011.06.013.

Kline, R. B. (2023). *Principles and Practice of Structural Equation Modeling, Fifth Edition*. Guilford Publications.

Knee, C. R., & Zuckerman, M. (1998). A nondefensive personality: Autonomy and control as moderators of defensive coping and self-handicapping. *Journal of Research in Personality*, *32*(2), 115–130. https://doi.org/10.1006/jrpe.1997.2207

Lam, C. B., McHale, S. M., & Crouter, A. C. (2014). Time with peers from middle childhood to late adolescence: Developmental course and adjustment correlates. *Child Development*, *85*(4), 1677–1693. https://doi.org/10.1111/cdev.12235

Lapp, W. M., & Collins, R. L. (1993). Relative/proportional scoring of the ways of coping checklist: Is it advantageous or artificial. *Multivariate Behavioral Research*, *28*(4), 483–512. https://doi.org/10.1207/s15327906mbr2804_5

Larson, R. W. (2011). Adolescents' conscious processes of developing regulation: Learning to appraise challenges. *New Directions for Child and Adolescent Development*, *2011*(133), 87–97. https://doi.org/10.1002/cd.306

Larson, R., & Richards, M. H. (1991). Daily companionship in late childhood and early adolescence: Changing developmental contexts. *Child Development*, *62*(2), 284-300. https://doi.org/10.1111/j.1467-8624.1991.tb01531.x

Larson, R., Richards, M. H., Moneta, G., Holmbeck, G., & Duckett, E. (1996). Changes in adolescents' daily interactions with their families from ages 10 to 18: Disengagement and transformation. *Developmental Psychology, 32*, 744-754. https://doi.org/ 10.1037/0012-1649.32.4.744

Laursen, B. (2017). Making and keeping friends: The importance of being similar. *Child Development Perspectives*, *11*(4), 282–289. https://doi.org/10.1111/cdep.12246

Laursen, B. (2018). Peer influence. In *Handbook of peer interactions, relationships, and groups, 2nd ed* (pp. 447–469). The Guilford Press.

Laursen, B., Altman, R. L., Bukowski, W. M., & Wei, L. (2020). Being fun: An overlooked indicator of childhood social status. *Journal of Personality*, *88*(5), 993–1006. https://doi.org/10.1111/jopy.12546

Laursen, B., & Faur, S. (2022). What does it mean to be susceptible to influence? A brief primer on peer conformity and developmental changes that affect it. *International Journal of Behavioral Development*, *46*(3), 222–237. https://doi.org/10.1177/01650254221084103

Laursen, B., & Hoff, E. (2006). Person-Centered and Variable-Centered Approaches to Longitudinal Data. *Merrill*-Palmer *Quarterly*, *52*(3), 377–389. https://doi.org/10.1353/mpq.2006.0029

Laursen, B., & Veenstra, R. (2021). Toward understanding the functions of peer influence: A summary and synthesis of recent empirical research. *Journal of Research on Adolescence*, *31*(4), 889–907. https://doi.org/10.1111/jora.12606

Lazarus, R. S. (2000). Evolution of a model of stress, coping, and discrete emotions. In *Handbook of stress, coping, and health: Implications for nursing research, theory, and practice* (pp. 195–222). Sage Publications, Inc.

Lazarus, R. S., & Folkman, S. (1984). *Stress, Appraisal, and Coping*. Springer Publishing Company.

Lei, P.-W., & Wu, Q. (2012). Estimation in structural equation modeling. In *Handbook of structural equation modeling* (pp. 164–180). The Guilford Press.

Leitenberg, H., Yost, L. W., & Carroll-Wilson, M. (1986). Negative cognitive errors in children: Questionnaire development, normative data, and comparisons between children with and without self-reported symptoms of depression, low self-esteem, and evaluation anxiety. *Journal of Consulting and Clinical Psychology*, *54*(4), 528–536. https://doi.org/ 10.1037/0022-006X.54.4.528

Lerner, R. M. (2011). Structure and process in relational, developmental systems theories: A commentary on “Contemporary changes in the understanding of developmental change across the life span”. *Human Development*, *54*(1), 34–43. https://doi.org/10.1159/000324866

Little, T. D., Oettingen, G., Stetsenko, A., & Baltes, P. B. (1995). Children’s action-control beliefs about school performance: How do American children compare with

German and Russian children? *Journal of Personality and Social Psychology*, *69*(4), 686–700. https://doi.org/10.1037/0022-3514.69.4.686

Lopez, D. F. (1999). Social cognitive influences on self-regulated learning: The impact of action-control beliefs and academic goals on achievement-related outcomes. *Learning and Individual Differences*, *11*(3), 301–319. https://doi.org/10.1016/S1041-6080(99)80005-3

Mantzicopoulos, P. (1990). Coping with school failure: Characteristics of students employing successful and unsuccessful coping strategies. *Psychology in the Schools*, *27*(2), 138–143. https://doi.org/10.1002/1520-6807(199004)27:2%3C138::AID-PITS2310270208%3E3.0.CO;2-8

Mantzicopoulos, P. (1997). How do children cope with school failure? A study of social/emotional factors related to children's coping strategies. *Psychology in the Schools*, *34*(3), 229–237. https://doi.org/10.1002/(SICI)1520-6807(199707)34:3%3C229::AID-PITS5%3E3.0.CO;2-J

Marques, T., Pereira, A. I. F., Barros, L., & Muris, P. (2013). Cognitive vulnerability profiles of highly anxious and non-anxious children. *Child Psychiatry & Human Development*, *44*(6), 777–785. https://doi.org/10.1007/s10578-013-0370-1

McArdle, J. J., & Nesselroade, J. R. (1994). Using Multivariate Data to Structure Developmental Change. In *Life-Span Developmental Psychology*. Psychology Press.

Mezulis, A., Funasaki, K., & Hyde, J. S. (2011). Negative Cognitive Style Trajectories in the Transition to Adolescence. *Journal of Clinical Child & Adolescent Psychology*, *40*(2), 318–331. https://doi.org/10.1080/15374416.2011.546048

Miele, D. B., & Scholer, A. A. (2018). The role of metamotivational monitoring in motivation regulation. *Educational Psychologist*, *53*(1), 1–21. https://doi.org/10.1080/00461520.2017.1371601

Miserandino, M. (1996). Children who do well in school: Individual differences in perceived competence and autonomy in above-average children. *Journal of Educational Psychology*, *88*(2), 203–214. http://dx.doi.org/10.1037/0022-0663.88.2.203

Moller, A. C., Deci, E. L., & Ryan, R. M. (2006). Choice and Ego-Depletion: The Moderating Role of Autonomy. *Personality and Social Psychology Bulletin*, *32*(8), 1024–1036. https://doi.org/10.1177/0146167206288008

Muris, P., Jacques, P., & Mayer, B. (2004). The stability of threat perception abnormalities and anxiety disorder symptoms in non-clinical children. *Child*

Psychiatry and Human Development, *34*, 251-265. https://doi.org/10.1023/B:CHUD.0000015000.13845.9d

Musher-Eizenman, D. R., Nesselroade, J. R., & Schmitz, B. (2002). Perceived control and academic performance: A comparison of high- and low-performing children on within-person change patterns. *International Journal of Behavioral Development*, *26*(6), 540–547. https://doi.org/10.1080/01650250143000517

Muthén, L. K., & Muthén, B. O. (2023). *Mplus User's Guide (8th ed.)*. Muthén & Muthén.

Nelson, R. M., & DeBacker, T. K. (2008). Achievement motivation in adolescents: the role of peer climate and best friends. *The Journal of Experimental Education*, *76*(2), 170–189. https://doi.org/10.3200/JEXE.76.2.170-190

Nelson, E. E., Jarcho, J. M., & Guyer, A. E. (2016). Social re-orientation and brain development: An expanded and updated view. *Developmental Cognitive Neuroscience*, *17*, 118–127. https://doi.org/10.1016/j.dcn.2015.12.008

Nes, L. S., & Segerstrom, S. C. (2006). Dispositional optimism and coping: A meta-analytic review. *Personality and Social Psychology Review*, *10*(3), 235–251. https://doi.org/10.1207/s15327957pspr1003_3

Newman, R. S. (2002). How self-regulated learners cope with academic difficulty: The role of adaptive help seeking. *Theory Into Practice*, *41*(2), 132–138. https://doi.org/10.1207/s15430421tip4102_10

Newman, B. M., & Newman, P. R. (2001). Group identity and alienation: Giving the we its due. *Journal of Youth and Adolescence*, *30*(5), 515–538. https://doi.org/10.1023/A:1010480003929

Newsom, J. T. (2024). *Longitudinal structural equation modeling: A comprehensive introduction*. Routledge.

Norem, J., & Cantor, N. (1986). Defensive pessimism: Harnessing anxiety as motivation. *Journal of Personality and Social Psychology*, *51*, 1208–1217. https://doi.org/10.1037/0022-3514.51.6.1208

Ntoumanis, N., Healy, L. C., Sedikides, C., Duda, J., Stewart, B., Smith, A., & Bond, J. (2014). When the going gets tough: The "why" of goal striving matters. *Journal of Personality*, *82*(3), 225–236. https://doi.org/10.1111/jopy.12047

Oleson, K. C., Poehlmann, K. M., Yost, J. H., Lynch, M. E., & Arkin, R. M. (2000). Subjective overachievement: Individual differences in self-doubt and concern with performance. *Journal of Personality*, *68*(3), 491–524. https://doi.org/10.1111/1467-6494.00104

Overton, W. F. (2015). Processes, relations, and relational-developmental-systems. In W. F. Overton & P. C. M. Molenaar (Eds.). *Theory and Method.* Volume 1 of *Handbook of child psychology and developmental science* (7th ed.), (pp. 9-62). John Wiley & Sons, Inc. http://onlinelibrary.wiley.com.proxy.lib.pdx.edu/doi/10.1002/9781118963418.childpsy102/abstract

Palmonari, A., Kirchler, E., & Pombeni, M. L. (1991). Differential effects of identification with family and peers on coping with developmental tasks in adolescence. *European Journal of Social Psychology*, *21*(5), 381–402. https://doi.org/10.1002/ejsp.2420210503

Papini, D. R., Farmer, F. F., Clark, S. M., Micka, J. C., & Barnett, J. K. (1990). Early adolescent age and gender differences in patterns of emotional self-disclo sure to parents and friends. *Adolescence*, *25*(100), 959–976.

Patrick, B. C., Skinner, E. A., & Connell, J. P. (1993). What motivates children's behavior and emotion? Joint effects of perceived control and autonomy in the academic domain. *Journal of Personality and Social Psychology*, *65*(4), 781–791. https://doi.org/10.1037/0022-3514.65.4.781

Pearl, J. (2000). *Causality: Models, reasoning and inference*. Cambridge University Press.

Pereira, A. I., Muris, P., Roberto, M. S., Marques, T., Goes, R., & Barros, L. (2018). Examining the mechanisms of therapeutic change in a cognitive-behavioral intervention for anxious children: The role of interpretation bias, perceived control, and coping strategies. *Child Psychiatry and Human Development*, *49*(1), 73–85. https://doi.org/10.1007/s10578-017-0731-2

Pitzer, J., & Skinner, E. (2017). Predictors of changes in students' motivational resilience over the school year: The roles of teacher support, self-appraisals, and emotional reactivity. *International Journal of Behavioral Development*, *41*, 15-29. https://doi.org/10.1177/0165025416642051

Raftery-Helmer, J., & Grolnick, W. (2016). Children's coping with academic failure: Relations with contextual and motivational resources supporting competence. *The Journal of Early Adolescence*, *36*. https://doi.org/10.1177/0272431615594459

Ratelle, C. F., Guay, F., Vallerand, R. J., Larose, S., & Senécal, C. (2007). Autonomous, controlled, and amotivated types of academic motivation: A person-oriented analysis. *Journal of Educational Psychology*, *99*(4), 734–746. http://dx.doi.org.proxy.lib.pdx.edu/10.1037/0022-0663.99.4.734

Reeve, J., & Cheon, S.H. (2021). Autonomy-supportive teaching: Its malleability, benefits, and potential to improve educational practice. *Educational Psychologist, 56*(1), 54-77. https://doi.org/10.1080/00461520.2020.1862657

Reschly, A. L., Huebner, E. S., Appleton, J. J., & Antaramian, S. (2008). Engagement as flourishing: The contribution of positive emotions and coping to adolescents' engagement at school and with learning. *Psychology in the Schools*, *45*(5), 419–431. https://doi.org/10.1002/pits.20306

Rhemtulla, M., Brosseau-Liard, P. É., & Savalei, V. (2012). When can categorical variables be treated as continuous? A comparison of robust continuous and categorical SEM estimation methods under suboptimal conditions. *Psychological methods*, *17*, 354-373. https://doi.org/ 10.1037/a0029315

Rodgers, W.M., Conner, M. and Murray, T.C. (2008), Distinguishing among perceived control, perceived difficulty, and self-efficacy as determinants of intentions and behaviours. *British Journal of Social Psychology*, *47*: 607-630. https://doi.org/10.1348/014466607X248903

Roseth, C. J., Johnson, D. W., & Johnson, R. T. (2008). Promoting early adolescents' achievement and peer relationships: The effects of cooperative, competitive, and individualistic goal structures. *Psychological Bulletin*, *134*(2), 223–246. http://dx.doi.org/10.1037/0033-2909.134.2.223

Rotenberg, K. J., & Chase, N. (1992). Development of the reciprocity of self-disclosure. *The Journal of Genetic Psychology*, *153*(1), 75–86. https://doi.org/10.1080/00221325.1992.10753703

Rotenberg, K. J., & Mann, L. (1986). The development of the norm of the reciprocity of self-disclosure and its function in children's attraction to peers. *Child Development*, *57*(6), 1349–1357. https://doi.org/10.2307/1130414

Rotter, J. B. (1966). Generalized expectances for internal versus external locus of control. *Psychological Monographs: General and Applied*, *80*, 1–28.

Roussel, P., Elliot, A. J., & Feltman, R. (2011). The influence of achievement goals and social goals on help-seeking from peers in an academic context. *Learning and Instruction*, *21*(3), 394–402. https://doi.org/10.1016/j.learninstruc.2010.05.003

Rubin, D. B. (1976). Inference and missing data. *Biometrika*, *63*(3), 581-592. https://doi.org/10.1093/biomet/63.3.581

Rubin, K. H., Bukowski, W. M., & Bowker, J. C. (2015). Children in peer groups. In K. H. Rubin (Ed.), *Handbook of child psychology and developmental science: Ecological settings and Processes*. Wiley.

Rumberger, R. W. (2011). *Dropping out: Why students drop out of high school and what can be done about it*. Harvard University Press. https://doi.org/10.4159/harvard.9780674063167

Ryan, A. M. (2001). The peer group as a context for the development of young adolescent motivation and achievement. *Child Development*, *72*(4), 1135–1150. https://doi.org/10.1111/1467-8624.00338

Ryan, A. M., & Patrick, H. (2001). The classroom social environment and changes in adolescents' motivation and engagement during middle school. *American Educational Research Journal*, *38*(2), 437–460. https://doi.org/10.3102/00028312038002437

Ryan, A. M., Patrick, H., & Shim, S.-O. (2005). Differential profiles of students identified by their teacher as having avoidant, appropriate, or dependent help-seeking tendencies in the classroom. *Journal of Educational Psychology, 97*, 275–285. https://doi.org/10.1037/0022-0663.97.2.275

Ryan, A. M., & Shim, S. S. (2012). Changes in help seeking from peers during early adolescence: Associations with changes in achievement and perceptions of teachers. *Journal of Educational Psychology*, *104*(4), 1122–1134. https://doi.org/ 10.1037/a0027696Ryan, A. M., & Shin, H. (2018). Peers, academics, and teachers. In W. Bukowski, B. Laursen & K. Rubin (Eds.), *Handbook of peer interactions, relationships and groups* (2nd ed., pp. 637-656). New York: Guilford.

Ryan, R. M., & Connell, J. P. (1989). Perceived locus of causality and internalization: Examining reasons for acting in two domains. *Journal of Personality and Social Psychology, 57*, 749-761. https://doi.org/ 10.1037/0022-3514.57.5.749Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist, 55*, 68–78. https://doi.org/ 10.1037/0003-066X.55.1.68

Ryan, R. M., & Deci, E. L. (2020). Intrinsic and extrinsic motivation from a self-determination theory perspective: Definitions, theory, practices, and future directions. *Contemporary Educational Psychology*, *61*, 101860. https://doi.org/10.1016/j.cedpsych.2020.101860

Schafer, J. L., & Graham, J. W. (2002). Missing data: Our view of the state of the art. *Psychological Methods*, *7*(2), 147–177. http://dx.doi.org.proxy.lib.pdx.edu/10.1037/1082-989X.7.2.147

Schunk, D. H., & DiBenedetto, M. K. (2016). Self-efficacy theory in education. In *Handbook of motivation at school: Second edition* (pp. 34-52).

Sebastian, C., Viding, E., Williams, K. D., & Blakemore, S.-J. (2010). Social brain development and the affective consequences of ostracism in adolescence. *Brain and Cognition*, *72*(1), 134–145. https://doi.org/10.1016/j.bandc.2009.06.008

Seery, M. D., Weisbuch, M., & Blascovich, J. (2009). Something to gain, something to lose: The cardiovascular consequences of outcome framing. *International Journal of Psychophysiology*, *73*(3), 308–312. https://doi.org/10.1016/j.ijpsycho.2009.05.006

Shanahan, M. L., Fischer, I. C., & Rand, K. L. (2020). Hope, optimism, and affect as predictors and consequences of expectancies: The potential moderating roles of perceived control and success. *Journal of Research in Personality*, *84,* 103903. https://doi.org/10.1016/j.jrp.2019.103903

Shi, D., Lee, T., & Maydeu-Olivares, A. (2019). Understanding the model size effect on SEM fit indices. *Educational and Psychological Measurement*, *79*(2), 310–334. https://doi.org/10.1177/0013164418783530

Shim, S. S., Kiefer, S. M., & Wang, C. (2013). Help seeking among peers: The role of goal structure and peer climate. *The Journal of Educational Research*, *106*(4), 290–300. https://doi.org/10.1080/00220671.2012.692733

Shin, H., & Ryan, A. M. (2014). Early adolescent friendships and academic adjustment: Examining selection and influence processes with longitudinal social network analysis. *Developmental Psychology*, *50*(11), 2462–2472. http://dx.doi.org/10.1037/a0037922

Skinner, E. A. (1995). *Perceived control, motivation, & coping* (pp. xviii, 213). Sage Publications, Inc. https://doi.org/10.4135/9781483327198

Skinner, E. A., Chapman, M., & Baltes, P. B. (1988). Control, means-ends, and agency beliefs: A new conceptualization and its measurement during childhood. *Journal of Personality and Social Psychology*, *54*(1), 117–133.

Skinner, E. A., & Edge, K. (2002). Self-determination, coping, and development. In E. L. Deci & R. M. Ryan (Eds.), *Handbook of self-determination research* (pp. 297–337). University of Rochester Press.

Skinner, E. A., Edge, K., Altman, J., & Sherwood, H. (2003). Searching for the structure of coping: A review and critique of category systems for classifying ways of coping. *Psychological Bulletin*, *129*(2), 216–269. https://doi.org/10.1037/0033-2909.129.2.216

Skinner, E. A., Kindermann, T. A., Connell, J. P., & Wellborn, J. G. (2009). Engagement and disaffection as organizational constructs in the dynamics of motivational development. In K. Wentzel & A. Wigfield (Eds.), *Handbook of motivation at school* (pp. 223–245). Erlbaum. http://citeseerx.ist.psu.edu/viewdoc/summary?doi=10.1.1.470.5314

Skinner, E. A., Pitzer, J., & Steele, J. (2013). Coping as part of motivational resilience in school: A multidimensional measure of families, allocations, and profiles of academic coping. *Educational and Psychological Measurement*, *73*(5), 803–835. https://doi.org/10.1177/0013164413485241

Skinner, E. A., Rickert, N. P., Vollet, J. W., & Kindermann, T. A. (2022). The complex social ecology of academic development: A bioecological framework and illustration examining the collective effects of parents, teachers, and peers on student engagement. *Educational Psychologist*, *57*(2), 87–113. https://doi.org/10.1080/00461520.2022.2038603

Skinner, E. A., & Saxton, E. A. (2019). The development of academic coping in children and youth: A comprehensive review and critique. *Developmental Review*, *53*, 100870. https://doi.org/10.1016/j.dr.2019.100870

Skinner, E. A., & Saxton, E. A. (2020). The development of academic coping across late elementary and early middle school: Do patterns differ for students with differing motivational resources? *International Journal of Behavioral Development*, *44*(4), 339–353. https://doi.org/10.1177/0165025419896423

Skinner, E. A., & Wellborn, J. G. (1994). Coping during childhood and adolescence: A motivational perspective. In *Life-span development and behavior, Vol. 12* (pp. 91–133). Lawrence Erlbaum Associates, Inc.

Skinner, E. A., & Wellborn, J. G. (1997). Children's coping in the academic domain. In S. A. Wolchik & I. N. Sandler (Eds.), *Handbook of children's coping* (pp. 387–422). Springer US.

Skinner, E. A., Wellborn, J. G., & Connell, J. P. (1990). What it takes to do well in school and whether I've got it: A process model of perceived control and children's engagement and achievement in school. *Journal of Educational Psychology*, *82*(1), 22–32. https://doi.org/10.1037/0022-0663.82.1.22

Skinner, E. A., & Zimmer-Gembeck, M. J. (2011). Perceived Control and the Development of Coping. In S. Folkman (Ed.), *The Oxford Handbook of Stress, Health, and Coping* (pp. 35–59). Oxford University Press.

Skinner, E. A., Zimmer-Gembeck, M. J. (2018). *Development of coping: Stress, neurophysiology, social relationships, and resilience during childhood and adolescence*. Springer.

Skinner, E. A., Zimmer-Gembeck, M. J., Connell, J. P., Eccles, J. S., & Wellborn, J. G. (1998). Individual differences and the development of perceived control. *Monographs of the Society for Research in Child Development*, *63*(2/3). https://doi.org/10.2307/1166220

Smith, K. E., & Pollak, S. D. (2021). Rethinking concepts and categories for understanding the neurodevelopmental effects of childhood adversity. *Perspectives on Psychological Science*, *16*(1), 67–93. https://doi.org/10.1177/1745691620920725

Somerville, L. H. (2013). The teenage brain: Sensitivity to social evaluation. *Current Directions in Psychological Science*, *22*(2), 121–127. https://doi.org/10.1177/0963721413476512

Sorjonen, K., Melin, B., & Nilsonne, G. (2022). Lord's paradox in latent change score modeling: An example involving facilitating longitudinal effects between intelligence and academic achievement. *Personality and Individual Differences*, *189*, 111520. https://doi.org/10.1016/j.paid.2022.111520

Stake, J. E. (2006). The critical mediating role of social encouragement for science motivation and confidence among high school girls and boys. *Journal of Applied Social Psychology*, *36*(4), 1017–1045. https://doi.org/10.1111/j.0021-9029.2006.00053.x

Steglich, C., Snijder, T. A. B., & Pearson, M. (2010). Dynamic networks and behavior: Separating selection from influence. *Sociological Methodology*, *40*, 329–393. https://doi.org/10.1111/j.1467-9531.2010.01225.x

Stevens, E. A., & Prinstein, M. J. (2005). Peer contagion of depressogenic attributional styles among adolescents: A longitudinal study. *Journal of Abnormal Child Psychology*, *33*, 25–37. https://doi.org/10.1007/s10802-005-0931-2.

Stöber, J. (2003). Self-Pity: Exploring the Links to Personality, Control Beliefs, and Anger. *Journal of Personality*, *71*(2), 183–220. https://doi.org/10.1111/1467-6494.7102004

Thoits, P. A. (2006). Personal Agency in the Stress Process. *Journal of Health and Social Behavior*, *47*(4), 309–323. https://doi.org/10.1177/002214650604700401

Thompson, A., & Gaudreau, P. (2008). From optimism and pessimism to coping: The mediating role of academic motivation. *International Journal of Stress Management*, *15*(3), 269–288. https://doi.org/ 10.1037/a0012941

Thompson, M., Kaslow, N., & Weiss, B. (1998). Children's Attributional Style Questionnaire-Revised. *Psychological Assessment*, *10*, 166–170. https://doi.org/10.1037/1040-3590.10.2.166

Urberg, K. A., Degirmencioglu, S. M., & Tolson, J. M. (1998). Adolescent friendship selection and termination: The role of similarity. *Journal of Social and Personal Relationships*, *15*(5), 703–710. https://doi.org/10.1177/0265407598155008

Van Geert, P. L. C. (2019). Dynamic systems, process and development. *Human Development*, *63*(3–4), 153–179. https://doi.org/10.1159/000503825

Valkenburg, P. M., Sumter, S. R., & Peter, J. (2011). Gender differences in online and offline self-disclosure in pre-adolescence and adolescence. British *Journal of Developmental Psychology*, *29*(2), 253–269. https://doi.org/10.1348/2044-835X.002001

Vanlede, M., Little, T. D., & Card, N. A. (2006). Action-control beliefs and behaviors as predictors of change in adjustment across the transition to middle school. *Anxiety, Stress, & Coping*, *19*(2), 111–127. https://doi.org/10.1080/10615800600632896

Vansteenkiste, M., Lens, W., & Deci, E. L. (2006). Intrinsic versus extrinsic goal contents in self-determination theory: Another look at the quality of academic motivation. *Educational Psychologist*, *41*(1), 19–31. https://doi.org/10.1207/s15326985ep4101_4

Vartanian, L. R. (2000). Revisiting the imaginary audience and personal fable constructs of adolescent egocentrism: A conceptual review. *Adolescence*, *35*(140), 639. https://link.gale.com/apps/doc/A70777828/AONE?u=anon~d488695b&sid=googleScholar&xid=e37f8ba4

Vasey, M. W., & Borkovec, T. D. (1992). A catastrophizing assessment of worrisome thoughts. *Cognitive Therapy and Research*, *16*(5), 505–520. https://doi.org/10.1007/BF01175138

Véronneau, M.-H., & Vitaro, F. (2007). Social experiences with peers and high school graduation: A review of theoretical and empirical research. *Educational Psychology*, *27*(3), 419–445. https://doi.org/10.1080/01443410601104320

Voelkl, K. E. (1997). Identification with school. *American Journal of Education*, *105*(3), 294–318. https://doi.org/10.1086/444158

Vollet, J. W., & Kindermann, T. A. (2020). Promoting persistence: Peer group influences on students' re-engagement following academic problems and setbacks. *International Journal of Behavioral Development*, *44*(4), 354–364. https://doi.org/10.1177/0165025419880614

Wang, M.-T., Kiuru, N., Degol, J. L., & Salmela-Aro, K. (2018). Friends, academic achievement, and school engagement during adolescence: A social network approach to peer influence and selection effects. *Learning and Instruction*, *58*, 148–160. https://doi.org/10.1016/j.learninstruc.2018.06.003

Weems, C. F., Costa, N. M., Watts, S. E., Taylor, L. K., & Cannon, M. F. (2007). Cognitive errors, anxiety sensitivity, and anxiety control beliefs: Their unique and specific associations with childhood anxiety symptoms. *Behavior Modification*, *31*(2), 174–201. https://doi.org/10.1177/0145445506297016

Weiner, B. (1985). An attributional theory of achievement motivation and emotion. *Psychological Review*, *92*(4), 548–573. https://doi.org/10.1037/0033-295X.92.4.548

Weiner, B. (2018). The legacy of an attribution approach to motivation and emotion: A no-crisis zone. *Motivation Science*, *4*(1), 4–14. http://dx.doi.org.proxy.lib.pdx.edu/10.1037/mot0000082

Weisz, J. R. (1986). Understanding the developing understanding of control. In M. Perlmutter (Ed.), *Cognitive perspectives on children's social and behavioral development: The Minnesota symposia on child psychology* (Vol. 18, pp. 219-275). Erlbaum.

Wellborn, J. G., Connell, J. P., & Skinner, E. A. (1989). *The Student Perceptions of Control Questionnaire.* Rochester, NY: University of Rochester.

Wentzel, K. R. (1998). Social relationships and motivation in middle school: The role of parents, teachers, and peers. *Journal of Educational Psychology*, *90*(2), 202–209. http://dx.doi.org.proxy.lib.pdx.edu/10.1037/0022-0663.90.2.202

Wentzel, K. R. (2004). Understanding classroom competence: The role of social-motivational and self-processes. In R. V. Kail (Ed.), *Advances in Child Development and Behavior* (Vol. 32, pp. 213–241). JAI. https://doi.org/10.1016/S0065-2407(04)80008-9

Wentzel, K. R. (2017). Peer relationships, motivation, and academic performance at school. In *Handbook of competence and motivation: Theory and application, 2nd ed* (pp. 586–603). The Guilford Press.

Wentzel, K. R. (2021). Motivational decision-making in achievement settings: A competence-in-context approach. In A. J. Elliot (Ed.), *Advances in Motivation Science* (Vol. 8, pp. 245–284). Elsevier. https://doi.org/10.1016/bs.adms.2020.06.002

White, R.W. (1959). Motivation reconsidered: The concept of competence. *Psychological Review*, *66*, 297-333.

Wichman, A. L., & Hermann, A. D. (2009). Deconstructing the link between self-doubt and self-worth: Ideas to reduce maladaptive coping. In R. M. Arkin, K. C. Oleson, & P. J. Carroll (Eds.), *Handbook of the uncertain self* (pp. 321–337). Psychology Press.

You, S., Hong, S., & Ho, H. (2011). Longitudinal Effects of Perceived Control on Academic Achievement. *The Journal of Educational Research*, *104*(4), 253–266. https://doi.org/10.1080/00220671003733807

Yuan, K.-H., & Bentler, P. M. (1998). Robust mean and covariance structure analysis. *British Journal of Mathematical and Statistical Psychology*, *51*(1), 63–88. https://doi.org/10.1111/j.2044-8317.1998.tb00667.x

Zuckerman, M., Kieffer, S. C., & Knee, C. R. (1998). Consequences of self-handicapping: Effects on coping, academic performance, and adjustment. *Journal of Personality and Social Psychology*, *74*(6), 1619–1628. https://doi.org/10.1037/0022-3514.74.6.1619

Appendix. Confirmatory Factor Analysis Results

Table X.1

Confirmatory Factor Analysis Results for Perceived Control

		Fall		Spring	
	Item	Loading*	Significance	Loading*	Significance
1	If I decide to learn something hard, I can.	.526	$p < .001$	.712	$p < .001$
2	I can do well in school if I want to.	.461	$p < .001$	.563	$p < .001$
3	When I'm in class, I can work hard.	.578	$p < .001$	.546	$p < .001$
4	I can work really hard in school.	.480	$p < .001$	.382	$p < .001$
5	When I'm doing classwork, I can really work hard on it.	.589	$p < .001$	.589	$p < .001$
	CFI	1.000		1.000	
	RMSEA [.90]	.000 [.000 .073]		.000 [.000 .000]	
	SRMR	.019		.004	

*Loadings are standardized.

Table X.2

Confirmatory Factor Analysis Results for Autonomous Motivation

		Fall		Spring	
	Item	Loading*	Significance	Loading*	Significance
1	Why do I do my homework? Because I want to understand the subject.	.564	$p < .001$	.541	$p < .001$
2	Why do I do my classwork? Because I want to learn new things.	.708	$p < .001$	.621	$p < .001$
3	Why do I work on my classwork? Because I think classwork is important for my learning.	.789	$p < .001$	.852	$p < .001$
4	Why do I try to do well in school? Because I enjoy doing schoolwork well.	.483	$p < .001$	.411	$p < .001$
5	Why do I try to do well in school? Because doing well in school is important to me.	.512	$p < .001$	.539	$p < .001$
	CFI	.987		.970	
	RMSEA [.90]	.057 [.000 .119]		.079 [.025 .139]	
	SRMR	.022		.025	

*Loadings are standardized.

Table X.3

Confirmatory Factor Analysis Results for Catastrophizing

		Fall		Spring	
	Stem	Loading*	Significance	Loading*	Significance
	When something bad happens to me in school (like not doing well on a test or not being able to answer an important question in class),				
	Item				
1	I worry that I will miss other problems too.	.518	*p* < .001	.551	*p* < .001
2	I worry about what will happen next time.	.506	*p* < .001	.509	*p* < .001
3	I worry that I won't do well on anything.	.582	*p* < .001	.622	*p* < .001
4	I worry that I'll never learn how to do it.	.633	*p* < .001	.637	*p* < .001
5	I feel totally stupid.	.701	*p* < .001	.670	*p* < .001
6	I feel like the dumbest person in the world.	.685	*p* < .001	.698	*p* < .001
7	I feel like an idiot.	.678	*p* < .001	.696	*p* < .001
8	I feel totally incompetent.	.613	*p* < .001	.597	*p* < .001
9	I feel really dumb.	.624	*p* < .001	.698	*p* < .001
	CFI	.979		.995	
	RMSEA [.90]	.044 [.017 .068]		.021 [.000 .051]	
	SRMR	.031		.029	

*Loadings are standardized.

Table X.4

Confirmatory Factor Analysis Results for Strategizing

		Fall		Spring	
	Stem	Loading*	Significance	Loading*	Significance
	When something bad happens to me in school (like not doing well on a test or not being able to answer an important question in class),				
	Item				
1	I try to figure out what I did wrong so that it won't happen again.	.655	*p* < .001	.707	*p* < .001
2	I try to see what I did wrong.	.714	*p* < .001	.533	*p* < .001
3	I think about some way to keep this from happening again.	.471	*p* < .001	.593	*p* < .001
4	I try to figure out how to do better next time.	.580	*p* < .001	.666	*p* < .001
5	I think of some things that will help me next time.	.463	*p* < .001	.488	*p* < .001
	CFI	1.000		.989	
	RMSEA [.90]	.000 [.000 .065]		.044 [.000 .110]	
	SRMR	.015		.025	

*Loadings are standardized.

Table X.5

Confirmatory Factor Analysis Results for Help-Seeking

		Fall		Spring	
	Stem	Loading*	Significance	Loading*	Significance
	When I have trouble with a subject in school,				
	Item				
1	I ask for some help with understanding the material.	.590	$p < .001$	.600	$p < .001$
2	I get some help to understand the material better.	.658	$p < .001$	.595	$p < .001$
3	I ask the teacher to go over it with me.	.631	$p < .001$	.604	$p < .001$
4	I ask the teacher to explain what I didn't understand.	.632	$p < .001$	.546	$p < .001$
5	I get some help on the parts I didn't understand.	.629	$p < .001$	.732	$p < .001$
	CFI	.995		.998	
	RMSEA [.90]	.029 [.000 .091]		.016 [.000 .085]	
	SRMR	.021		.021	

*Loadings are standardized.

Table X.6

Confirmatory Factor Analysis Results for Comfort-Seeking

	Stem	Fall		Spring	
		Loading*	Significance	Loading*	Significance
	When something bad happens to me in school (like not doing well on a test or not being able to answer an important question),				
	Item				
1	I talk about it with someone who will make me feel better.	.387	*p* < .001	.638	*p* < .001
2	I spend time with someone who will cheer me up.	.486	*p* < .001	.755	*p* < .001
3	I talk about it with someone I'm close to.	.471	*p* < .001	.479	*p* < .001
4	I discuss it with someone who will help me feel better about it.	.737	*p* < .001	.635	*p* < .001
5	I talk with someone who will keep me from feeling bad about it.	.526	*p* < .001	.657	*p* < .001
	CFI	1.000		1.000	
	RMSEA [.90]	.000 [.000 .079]		.000 [.000 .041]	
	SRMR	.019		.011	

*Loadings are standardized.

Table X.7

Confirmatory Factor Analysis Results for Self-Encouragement

		Fall		Spring	
	Stem	Loading*	Significance	Loading*	Significance
	When I run into a problem on an important test,				
	Item				
1	I think about the time I did it right.	.293	*p* < .001	.382	*p* < .001
2	I tell myself it's not so bad to make a mistake.	.484	*p* < .001	.587	*p* < .001
3	I tell myself I'll do better next time.	.651	*p* < .001	.555	*p* < .001
4	I tell myself I'll have another chance.	.399	*p* < .001	.442	*p* < .001
5	I tell myself it'll be okay.	.289	*p* < .001	.318	*p* < .001
	CFI	1.000		1.000	
	RMSEA [.90]	.000 [.000 .040]		.000 [.000 .078]	
	SRMR	.010		.016	

*Loadings are standardized.

Table X.8

Confirmatory Factor Analysis Results for Commitment

	Stem	Fall		Spring	
		Loading*	Significance	Loading*	Significance
	When I have difficulty learning something,				
	Item				
1	I think about all the reasons it's important to me.	.535	*p* < .001	.754	*p* < .001
2	I remind myself that it's worth it to me in the long run.	.516	*p* < .001	.608	*p* < .001
3	I remind myself that this is important in reaching my own goals.	.574	*p* < .001	.587	*p* < .001
4	I remind myself that it's something that I really want to do.	.453	*p* < .001	.495	*p* < .001
5	I think about how this is important for my own personal goals.	.607	*p* < .001	.714	*p* < .001
	CFI	1.000		.992	
	RMSEA [.90]	.000 [.000 .011]		.033 [.000 .088]	
	SRMR	.013		.030	

*Loadings are standardized.

Table X.9

Confirmatory Factor Analysis Results for Adaptive Coping Composite

		Fall		Spring	
	First-Order Factor	Loading*	Significance	Loading*	Significance
1	Strategizing	.950	$p < .001$	.981	$p < .001$
2	Help-Seeking	.823	$p < .001$	.895	$p < .001$
3	Comfort-Seeking	.761	$p < .001$	.774	$p < .001$
4	Self-Encouragement	.947	$p < .001$	.910	$p < .001$
5	Commitment	.881	$p < .001$	.848	$p < .001$
	CFI	.973		.968	
	RMSEA [.90]	.020 [.000 .030]		.023 [.009 .033]	
	SRMR	.048		.052	

*Loadings are standardized.

Table X.10

Confirmatory Factor Analysis Results for Confusion

		Fall		Spring	
	Stem	Loading*	Significance	Loading*	Significance
	When I run into a problem on an important test,				
	Item				
1	I'm not sure what to do next.	.699	*p* < .001	.548	*p* < .001
2	I can't remember what to do.	.659	*p* < .001	.631	*p* < .001
3	My mind goes blank.	.659	*p* < .001	.614	*p* < .001
4	I get all confused.	.680	*p* < .001	.541	*p* < .001
5	It's difficult for me to think.	.433	*p* < .001	.570	*p* < .001
	CFI	1.000		1.000	
	RMSEA [.90]	.010 [.000 .083]		.000 [.000 .080]	
	SRMR	.019		.022	

*Loadings are standardized.

Table X.11

Confirmatory Factor Analysis Results for Escape

	Stem	Fall		Spring	
		Loading*	Significance	Loading*	Significance
	When something bad happens to me in school (like not doing well on a test or not being able to answer on important question),				
	Item				
1	I tell myself not to let it bother me.	.458	$p < .001$	.553	$p < .001$
2	I tell myself it's not such a big deal.	.535	$p < .001$	.405	$p < .001$
3	I tell myself it didn't matter.	.730	$p < .001$	.705	$p < .001$
4	I say it wasn't important.	.600	$p < .001$	.582	$p < .001$
5	I say I didn't care about it.	.705	$p < .001$	.706	$p < .001$
	CFI	1.000		1.000	
	RMSEA [.90]	.000 [.000 .059]		.000 [.000 .008]	
	SRMR	.013		.008	

*Loadings are standardized.

Table X.12

Confirmatory Factor Analysis Results for Concealment

		Fall		Spring	
	Stem	Loading*	Significance	Loading*	Significance
	When I have difficulty learning something,				
	Item				
1	I try to keep people from finding out.	.505	$p < .001$	.467	$p < .001$
2	I make sure nobody finds out.	.516	$p < .001$	.488	$p < .001$
3	I try to hide it.	.617	$p < .001$	.594	$p < .001$
4	I don’t tell anyone about it.	.676	$p < .001$	.766	$p < .001$
5	I don’t let anybody know about it.	.629	$p < .001$	.707	$p < .001$
	CFI	1.000		.990	
	RMSEA [.90]	.000 [.000 .079]		.039 [.000 .098]	
	SRMR	.018		.023	

*Loadings are standardized.

Table X.13

Confirmatory Factor Analysis Results for Self-Pity

	Stem	Fall		Spring	
		Loading*	Significance	Loading*	Significance
	When something bad happens to me in school (like not doing well on a test or not being able to answer an important question),				
	Item				
1	I think about all the times this happens to me.	.590	$p < .001$	.663	$p < .001$
2	I say "This always happens to me."	.754	$p < .001$	.758	$p < .001$
3	I ask myself "Why is this always happening to me?"	.784	$p < .001$	.833	$p < .001$
4	I say "Here we go again."	.560	$p < .001$	.607	$p < .001$
5	I can't believe this is always happening to me.	.729	$p < .001$	.834	$p < .001$
	CFI	1.000		.997	
	RMSEA [.90]	.000 [.000 .053]		.031 [.000 .093]	
	SRMR	.010		.016	

*Loadings are standardized.

Table X.14

Confirmatory Factor Analysis Results for Projection

		Fall		Spring	
	Stem	Loading*	Significance	Loading*	Significance
	When I run into a problem on an important test,				
	Item				
1	I say it was the teacher's fault.	.729	$p < .001$	.496	$p < .001$
2	I say the teacher didn't tell us the right thing to study.	.673	$p < .001$	.701	$p < .001$
3	I say the teacher isn't fair.	.708	$p < .001$	.730	$p < .001$
4	I say the test was too hard.	.469	$p < .001$	.531	$p < .001$
5	I say the test was not fair.	.664	$p < .001$	.567	$p < .001$
	CFI	1.000		1.000	
	RMSEA [.90]	.000 [.000 .067]		.000 [.000 .046]	
	SRMR	.014		.012	

*Loadings are standardized.

Table X.15

Confirmatory Factor Analysis Results for Maladaptive Coping Composite

		Fall		Spring	
	First-Order Factor	Loading*	Significance	Loading*	Significance
1	Confusion	.842	$p < .001$	.804	$p < .001$
2	Escape	.943	$p < .001$	.912	$p < .001$
3	Concealment	.651	$p < .001$	.630	$p < .001$
4	Self-Pity	.788	$p < .001$	.799	$p < .001$
5	Projection	.920	$p < .001$	.888	$p < .001$
	CFI	.962		.952	
	RMSEA [.90]	.031 [.021 .040]		.033 [.023 .041]	
	SRMR	.052		.051	

*Loadings are standardized.