The Validation Study of the Persistent Academic Possible Selves Scale for Adolescents

by

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ABSTRACT

Possible selves researchers have uncovered many issues associated with the current possible selves measures. For instance, one of the most famous possible selves measures, Oyserman (2004)'s open-ended possible selves, has proven to be difficult to score reliably and also involves laborious scoring procedures. Therefore, this study was initiated to develop a close-ended measure, called the Persistent Academic Possible Selves Scale for Adolescents (PAPSS), that meets these challenges. The PAPSS integrates possible selves theories (personal and social identities) and educational psychology (self-regulation in social cognitive theory). Four hundred and ninety five junior high and high school students participated in the validation study of the PAPSS. I conducted confirmatory factor analyses (CFA) to compare fit for a baseline model to the hypothesized models using Mplus version 7 (Muthén & Muthén, 2012). A weighted least square means and a variance adjusted (WLSMV) estimation method was used for handling multivariate nonnormality of ordered categorical data. The final PAPSS has validity evidence based on the internal structure. The factor structure is composed of three goal-driven factors, one self-regulated factor that focuses on peers, and four self-regulated factors that emphasize the self. Oyserman (2004)'s open-ended questionnaire was used for exploring the evidence of convergent validity. Many issues regarding Oyserman (2003)'s instructions were found during the coding process of academic plausibility. It was complicated to detect hidden academic possible selves and strategies from non-academic possible selves and strategies. Also, interpersonal related strategies were over weighted in the scoring process compared to interpersonal related academic possible selves. The study results uncovered that all of the academic goal-related factors

in the PAPSS are significantly related to academic plausibility in a positive direction. However, self-regulated factors in the PAPSS are not. The correlation results between the self-regulated factors and academic plausibility do not provide the evidence of convergent validity. Theoretical and methodological explanations for the test results are discussed.

DEDICATION

I dedicate this dissertation to my God and Lord.
Father, take all the accomplishments because I know it's not from what I've done
but from your graciousness.

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Chapter 1

INTRODUCTION

Possible selves refer to one's temporal goals in a future state or one's clear picture of their future possibilities (Oyserman & Fryberg, 2006; Oyserman & James, 2008). Researchers demonstrated that adolescents can differentiate between positive possible selves, what they expect to become next year, and negative possible selves, what they want to avoid having next year (e.g., Oyserman, Terry, & Bybee, 2002; Oyserman, Bybee, & Terry, 2006). Researchers argue that adolescents can achieve positive possible selves and prevent negative possible selves by self-regulation associated with these possible selves (Oyserman & James, 2008).

While I was working for the CompuGirls: A Culturally Relevant Technology Program for Girls (NSF: 0833773) as a research assistant, I administered Oyserman (2004)'s open-ended possible selves questionnaire and coded the data for both the program participants and control group. My colleagues and I discovered that coding the girls' open-ended responses had many challenges, such as difficulties in reliable scoring and laborious scoring procedures (Lee, Husman, Maez, & Scott, 2011). We also uncovered that analyzing the longitudinal data of academic possible selves and strategies has problems due to limited in-depth information. The students generated very general academic possible selves (e.g., 7th grader) and strategies (e.g., going to school) over time. (Lee et al., 2011).

Therefore, I reviewed the possible selves literature, focusing on measures of possible selves and strategies to achieve these possible selves. First, I uncovered that researchers measured possible selves using diverse operationalization (e.g., hope-for

selves vs. expected selves). Second, researchers coded possible selves and strategies using different coding procedures (e.g., simple counting vs. complex coding schemes). Third, there is no standard time framework for measuring possible selves (e.g., next year vs. in the future). Fourth, current close-ended measures of possible selves and strategies have not extensively incorporated empirical findings such as the role of social identities (e.g., Kemmelmeier & Oyserman, 2001). Based on the reviews, I argue that open-ended possible selves measures have shortcomings such as complex instructions used to produce reliable scoring and laborious scoring procedures. Moreover, a majority of close-ended possible selves measures have not incorporated sufficient empirical findings (Lee & Husman, 2012).

More recently, Oyserman (2007) proposed the identity-based motivation model. The identity-based motivation model has been invented under social psychology and has adopted social identity, personal identity, and social cognition theories (Oyserman, 2007; Oyserman & Destin, 2010). The identity-based motivation model aims to describe the process of actualization of possible selves or possible identities by means of self-regulation. However, there is no questionnaire that was specifically developed to measure the identity-based motivation (Oyserman & James, 2011). As a result, I decided to develop a close-ended measure of the *Persistent Academic Possible Selves Scale for Adolescents (PAPSS)* which incorporates important components such as social and personal identities as well as self-regulation.

I adopted social cognitive theory to develop the items associated with self-regulation. Social cognitive theory was originated from Albert Bandura and applied to educational settings in the 1980s by Dale Schunk (Bandura & Schunk, 1981).

Educational psychologists have long investigated the process of goals, self-regulation, and self-reflection in academic settings (Zimmerman & Martinez-Pons, 2007). Zimmerman (2000)'s forethought phase and performance phase in self-regulated learning strategies had been utilized in the item generation process. To explore the validity evidence of the internal structure, I will use confirmatory factor analysis (CFA) to compare fit of a baseline model and the hypothesized models. I will correlate Oyserman (2003)'s academic plausibility and the final factors in the PAPSS to examine validity evidence of the relations to other measures. In the next chapter, I will explain the theoretical framework and empirical findings of academic possible selves and self-regulation in both possible selves and social cognitive research.

Chapter 2

LITERATURE REVIEW

Impoverished adolescents experience greater difficulties developing academic possible selves and conducting actions to achieve those possible selves compared to other adolescents. For example, if a student, we will call her Cecelia, has no family members with a postsecondary degree, she may not think that a college education is important for her future, whereas her friend whose parents have postsecondary degrees, may see a postsecondary degree as an unquestionably vital part of her future plans. Even if Cecelia were to attend college, she is likely to encounter special challenges unique to her socioeconomic situation, such as limited resources. She may even harbor guilt as a result of not being able to take care of her younger siblings at home because she had to study for the SATs.

Many adolescents from minority groups in the United States live in poverty, and both their socioeconomic status and membership in a marginalized group creates significant challenges for these students when pursuing their future academic goals (Oyserman & Fryberg, 2006). In fact, research has shown that students who come from economically stressed families often do not envision themselves as academically successful adults and have difficulty developing and exerting academic self-regulation (Oyserman & Fryberg, 2006; Oyserman 2013). On the other hand, other researchers have found that minority students from low-income families frequently report high academic aspirations. However, when these students do not also possess an education-related adult identity, they are less likely to spend time on studying (Destin & Oyserman, 2010). Possible selves researchers have investigated how adolescents can project, pursue, and

attain academic possible selves in spite of limited success, personally or vicariously, through family and friends.

Possible Selves

Operationalization. *Possible selves* are temporal goals in a future state or clear pictures of one's possible future (Oyserman & Fryberg, 2006; Oyserman & James, 2008). Salient possible selves can guide individuals' current self-regulation toward achieving their future goals (Oyserman, Bybee, Terry, & Hart-Johnson, 2004). Possible selves have been widely studied in many areas under psychology since the mid-1980s (Packard & Conway, 2006). Empirical study results reveal that adolescents can express their positive possible selves, such as what they want to achieve and what they would like to become in the future. Also, adolescents can state negative possible selves, such as what they want to avoid having or becoming in the future (Oyserman et al. 2002; Oyserman et al. 2006). Given that possible selves can be positive or negative, researchers argue that possible selves are distinct from fantasies or dreams, which are more likely to be used to induce a positive mood, to distract from negative thoughts, or to directly oppose them (Oyserman & Fryberg, 2006).

Measurement issues. Recently, many issues regarding the measurement of future possible selves have been identified. The first issue is the use of arbitrary time frameworks for measuring possible selves (Oyserman & Fryberg, 2006). Researchers have measured possible selves using diverse time frameworks: abstract time (e.g., "the future"), exact time (e.g., "next year"), or developmental stages (e.g., "as adults"). Consequently, definitions of possible selves have been operationalized using different time frameworks, creating challenges in generalizing the research findings. In general,

“next year” is widely used for measuring academic possible selves (e.g., Oyserman et al., 2002; 2006) and “in the future” is often used for measuring various possible selves (e.g., Leondari, Syngollitou, & Kiosseoglou, 1998). However, there is no standardized time framework for measuring possible selves at the present, and few researchers have tested impacts of different time frameworks associated with possible selves measures (Oyserman & Fryberg, 2006).

The second issue arises in coding open-ended possible selves measures. Researchers conducting possible selves studies use either open-ended or close-ended measures (Oyserman & Fryberg, 2006). One of the most widely-used measures in possible selves research is Oyserman (2004)’s open-ended questionnaire (Oyserman et al., 2002; 2006). However, open-ended measures have well-known challenges such as difficulty in achieving reliable scoring and laborious scoring procedures (Reynolds, Livingston, & Willson, 2009). Longitudinally, problems relating to reliability of Oyserman (2004)’s open-ended questionnaire have been documented (Lee et al., 2011).

The third issue is limited in-depth information gathered by possible selves measures (Lee et al., 2011). When my colleagues and I analyzed academic possible selves in girls of color during a two-year intervention program, we found that the girls’ responses were very general (e.g., I want to be a 7th grader next year). We cannot know from this whether the students' future possible selves are not well-developed, or whether the students have more detailed and specific models that the open-ended measure fails to elicit. Therefore, we recommended further investigation to explore the effects of gender and ethnicity on the outcome space of the questionnaire (Lee et al., 2011).

Finally, there is no close-ended measure which is adequately grounded in both theoretical positions and empirical findings (Lee & Husman, 2012). Although possible selves researchers have discovered and posited many factors that significantly impact actualization of possible selves, existing close-ended measures do not reflect these hypotheses and findings sufficiently. Thus, possible selves researchers need a close-ended measure that more fully identifies and explains students' academic possible selves and self-regulation to achieve their possible selves. Students' response to the measure should also reflect the reciprocal relationship between possible selves and self-regulation.

Self-regulation in Possible Selves Research

Operationalization. Possible selves researchers have investigated the influence of self-regulation on students' achievement of possible selves (Oyserman & James, 2008). Many researchers did not distinguish self-regulation from possible selves (e.g., Anderman, Anderman, & Griesinger, 1999; Leondari et al., 1998). However, Oyserman and her colleagues demonstrated the need to separate self-regulation from expected and avoided possible selves. Oyserman and her colleagues operationalized self-regulation as "the extent to which achievement possible selves and the strategies connected to them were plausibly self-regulating" (Oyserman et al., 2004; p. 136). In this notion, more academic possible selves and relevant strategies mean higher plausibility of conducting self-regulation.

Researchers have used Oyserman (2004)'s open-ended questionnaire to measure self-regulation (e.g., Oyserman et al., 2004). Students first describe a positive possible self (i.e., a future goal in the next year). Then, the students are asked to describe their current actions to achieve the possible self. They repeat the same procedure four times to

answer a maximum number of four positive possible selves and strategies. Next, the students are asked to write a negative possible self (i.e., a future concern in the next year). Then, they are asked to describe their current actions to avoid actualizing the negative possible self. The students repeat the same procedure four times to write a maximum number of four negative possible selves and strategies. Students can leave blanks if they cannot provide four of each type of possible self. Students are also allowed to leave blanks for a strategy if they are not taking any particular steps to achieve or avoid a possible self.

Measurement issues. Measuring possible selves and self-regulation in this manner raises several issues. First, it is uncertain how a student links possible selves to actions. A student may state a goal, and only then consider how they might reach it, choosing any current activity that can be somehow related to the goal, even if the link is tenuous or unclear. For example, a student might state the goal of becoming tech savvy next year, and then start searching his current activities for something relevant to this goal. He might choose a current action that has some relationship with the possible self (e.g., playing a computer game every day), but the link between playing computer games and becoming tech savvy is left unexplained and unexamined as to whether it is likely to help the student achieve his goal.

Second, how to evaluate self-regulation is also questionable. Oyserman and her colleagues have examined self-regulation either using a simple procedure (e.g., counting the numbers of self-regulative strategies) or applying for a complex coding scheme (e.g., how plausible the strategy is to achieve a possible self). Study results demonstrated that self-regulation scores from the complex coding scheme have more power to predict

students' academic behaviors (e.g., spending more time on homework) than those resulting from the simpler procedure (Oyserman et al, 2004). It is reasonable that the quantity of strategies functions differently from the quality of strategies, but how to best take each of these into consideration has not yet been determined. Although possible selves researchers have considered linkages between possible selves and self-regulation, many unanswered questions still exist in theoretical and methodological perspectives.

Identity, Self-concept, and the Self

Research in self-concept and identity have focused on elemental inquiries such as "Who am I?," "Where do I belong?," and "How do I fit (or fit in)?" (Oyserman, 2001, p. 499). Oyserman and her colleagues have published extensively on identity, self-concept, and the self, as well as clarifying these terminologies (e.g., Oyserman, 2001; Oyserman, Elmore, & Smith, 2012). Oyserman and her colleagues view identities as determinants (e.g., traits, characteristics, relationships, and social roles) that we can use when we judge who we are (Oyserman et al., 2012). Self-concepts are composed of many different identities and the perceptions of who we are. For example, adolescents can differentiate their academic self-concepts in diverse subject areas (Marsh, 2007, Marsh, Byrne, & Shavelson, 1988). All kinds of self-relevant information (e.g., self-images and self-feelings) can be subsumed under a global notion of the self (James, 1890/1963; Oyserman et al., 2012).

Whereas social identities emphasize social contexts (e.g., socioeconomic status) and social group memberships (e.g., gender and age), cultural identities focus on genetic and historical aspects of the self, such as Asian versus Western cultures (Oyserman,

2007). In possible selves theory, social and cultural identities can manifest as preferred or persistent social group memberships. Oyserman (2007) articulated that:

> It seems reasonable that social identity and cultural perspectives be integrated to provide an identity-based sociocultural model of motivation, in which content of self-concept differs both chronically (based on differences in cultural milieu) and momentarily (based on momentary salience of social roles or group memberships; p. 436).

I adopted Oyserman's notions and regard social identity and/or social identities as salient social group memberships that one possesses at the present.

Social Identity

Social identity is one's perception of his or her social group memberships, which play a role in one's plans and also guides a person's choices regarding goals and actions (Oyserman, 2007). Social identity influences the strength of the relationship between future possible selves and the current self (Oyserman, 2007). When one's social identity does not support specific future selves, a person often devalues efforts that are needed for pursuing the possible selves. In addition, the gap between social identity and possible selves affect the implementation of self-regulation. For example, when a student aims for studying better at home, which is at odds with the actions of her sociable parents, who are frequently having parties at home, she may undervalue studying at home or abandon the goal altogether. Thus, Oyserman (2007; 2008) has argued that social identity is essential to not only create possible selves but also to develop self-regulation to achieve these possible selves.

The reciprocal, sometimes incompatible, relationships between social identity, possible selves, and self-regulation can be applied to many settings and groups, including women in engineering programs, especially women of color. Women of color have been under-represented in most undergraduate engineering programs (Riegle-Crumb & King, 2010; Seymour & Hewitt, 1997). For example, even when a girl of color has maintained a desire to become an engineer throughout her youth, participating in numerous engineering camps and entering a college of engineering, she may here encounter challenges not previously experienced. A lack of social support may make her feel "unwelcome" in the college and this conflict between her environment and identity may negatively affect her ability to use self-regulation strategies to survive the challenging curriculums in the college. Girls of color often struggle with the perceived mismatch between their social identity and engineering identity. Additional support to encourage these women to persist in postsecondary engineering education is needed (American Association of University Women, 2010).

Personal Identity

People develop distinctive personal identities but are still greatly influenced by their social identities (Oyserman, 2007). For example, if a white male student wants to become a mechanical engineer (a possible self), as an extension of perceiving himself to be a smart student (personal identity), the origin of his possible self may be traced to his engineer father or friends who want to become mechanical engineers (social identity). Thus, Oyserman (2007) claimed that both social and personal identities are important to actualize possible selves. Destin and Oyserman (2009) found that when adolescents are focused on routes of open access to college (e.g., financial aid), they are willing to study

more time than adolescents focusing on reasons why access may be limited (e.g., tuition).

Oyserman and her colleagues developed and implemented a 9-week possible selves intervention program (School-to-Jobs intervention; Oyserman et al., 2002). The intervention study results demonstrated that changes in students' possible selves can promote academic behaviors regardless of changes in their social group memberships. Before the program, academic perceptions held by the program participants and control group students were not significantly different. However, at the end of the program, the participants exceeded the control group students on many academic performance variables (Oyserman et al., 2002). The study results indicated possible selves can change one's personal identity without changing their social group memberships.

Identity-based Motivation Model

Oyserman and her colleagues postulated that if adolescents can develop, employ, and monitor self-regulation, they are more likely to achieve positive possible selves and prevent negative possible selves becoming a reality (Oyserman & James, 2008; Oyserman, 2008). Oyserman (2007) emphasized that people are motivated by goals that are congruent to their social group memberships. Oyserman's identity-based motivation model explains the process of actualizing possible selves by means of self-regulation. Important factors that affect the strength of the relationship between possible selves and self-regulation are social identity, personal identity, social cognition, and self-schema theories (Oyserman, 2007).

Initially, the model did not specifically describe how adolescents conduct self-regulation to achieve academic possible selves in educational settings. Since then, Oyserman and her colleagues have published theoretical and empirical articles referring

to “identity-based motivation” rather than “possible selves” (Oyserman & Destin, 2010; Oyserman 2013). The main reasons for the terminology change were to enhance social and contextual aspects as well as to refocus current trends in possible selves research, which has emphasized more specific identities than the general self (Oyserman & Destin, 2010). Oyserman maintained that “People interpret situations and difficulties in ways that are congruent with currently active identities and prefer identity-congruent to identity-incongruent actions” (Oyserman & Destin, 2010, p. 1001).

However, I will continue using the original terminology. The new terminology may bring new insights and foci, but it also represents a significant break with past research, without indicating how researchers might link this new framework with the past 20 years of possible selves research (e.g. Markus & Nurius, 1986).

Of particular concern, identity-based motivation model sheds light on social identity as a trigger for particular actions, but at the cost of reducing the importance of the self as an actor who uses self-regulation to bring about their academic possible selves. Oyserman and Destin (2010) articulated that “social identity theory does not specify whether contexts are likely to make social (e.g., being a boy) or personal (e.g., being a good speller) identities salient; rather it predicts that when an identity is salient in context it will matter” (p.1008).

I believe that this possibly tautological model fails to adequately explain what influences a student when, nor does it explain how the influence leads to variation in students’ actions when they develop academic possible selves and maintain self-regulation to achieve academic possible goals. I believe that social cognitive theory can be used here to provide greater insight.

Social Cognitive Theory

Social cognitive theory was originated from Albert Bandura and adapted to educational settings in the 1980s by Dale Schunk (Bandura & Schunk, 1981). The research under social cognitive theory has long investigated the process of goals, self-regulation, and self-reflection in academic settings. Social cognitive theorists argue that people behave according to their thoughts, goals, beliefs, and values that are developed in social contexts (Schunk, Pintrich, & Meece, 2008). Social cognitive theory addresses social and personal factors to describe the process of self-regulation. Zimmerman (2000) mentioned that "A social cognitive perspective entails not only behavioral skill in self-managing environmental contingencies, but also the knowledge and the sense of personal agency to enact this skill in relevant contests" (pp.13-14). The interaction of social and personal factors can be explained by the process model of triadic reciprocality (Bandura, 1997).

In the triadic model, there are person, environment, and behavior factors and these three factors interact with each other (Schunk et al., 2008). An example of the behavior and environment link is that a teacher (environment) directs a student's action (behavior). The behavior and person link is illustrated by self-efficacy theory (Bandura, 1997). Self-efficacy is one's perceived ability to engage action to complete a specific task. For example, if a student completed a task according to his teacher's directions (behavior), the student will assess his expected performance (person). High self-appraisal will result in high self-efficacy for the task. The person and environment relation is illustrated in the teacher's evaluation of the students' performance. If the teacher gives a relatively high

score to the student (environment), the student's self-efficacy for completing that task in the future will be increased (person).

Bandura and Schunk (1981) articulated that "Self-efficacy is concerned with judgments about how well one can organize and execute courses of action required to deal with prospective situations containing many ambiguous, unpredictable, and often stressful elements" (p. 587). Self-efficacy and outcome expectations are related but are not identical (Schunk et al., 2008). For instance, a high efficacious student playing a piano may have low outcome expectations of her national competition results because of notorious competition. Conversely, low self-efficacy for a certain task can interact with either low outcome expectations or high outcome expectations. For example, a low efficacious student in algebra may expect a low outcome from an algebra test and this may make him feel like he would like to give up studying for the test. If the student feels pressure for his parents' high expectation for the test, he may blame himself for not being able to get a good grade on the test.

People with high self-efficacy beliefs tend to employ efforts and persist in actions to achieve higher goals (Schunk, 1999). Positive peer modeling and external rewards can also play with goal settings (Schunk et al., 2008). Researchers found that adolescent friendship affect academic motivation and performances. Adolescents are relatively malleable in amending their self-beliefs and behaviors that can bring better reputation in their peer groups (Jones, Audley-Piotrowski, & Kiefer, 2012). Models can be a motivational force for students. While observing the models' actions and performance results, students can estimate their own outcome expectations based on a comparison of themselves with the models (Schunk, 1999). For example, if a student has a peer group

who focuses on high academic achievement, the student will set up similar goals (e.g., studying harder) to other friends in the group. In terms of external rewards, Schunk and his colleagues (Schunk et al., 2008) stated that external rewards are effective when goals are easy to moderate difficulty levels. For example, a student can reward himself with a movie as a result of his improvement toward achieving his goal. Such self-rewards can motivate and persist in self-regulatory behaviors for pursuing goals (Schunk & Zimmerman, 1997).

Self-regulation. In this context self-regulation is adoption of self-regulative strategies to achieve specific goals (Schunk et al., 2008). Zimmerman (2000) stated that "Self-regulation refers to self-generated thoughts, feelings, and actions that are planned and cyclically adapted to the attainment of personal goals" (p. 14). Zimmerman and his colleagues developed three phases of self-regulation: *Forethought, Performance or Volitional control*, and *Self-reflection* (Zimmerman, 2000; Zimmerman & Martinez-Pons, 2007). Zimmerman (2000) stated that "Forethought refers to influential processes that precede efforts to act and set the stage for it" (p. 16). In the forethought phase, a student analyzes a task (e.g., goal setting) and considers self-motivational beliefs (e.g., self-efficacy). Zimmerman (2000) explained that "Performance or volitional control involves processes that occur during motoric efforts and affect attention and action" (p. 16). In the performance phase, the student controls her performance (e.g., attention focusing) and observes her strategies (e.g., metacognitive monitoring). Zimmerman (2000) stated that "Self-reaction involves processes that occur after performance efforts and influence a person's response to that experience" (p. 16). In the self-reflection phase, the student

judges her performance (e.g., self-evaluation) and relates her past strategies (e.g., adaptive or defensive). The three phases are cyclical.

Zimmerman and his colleagues created developmental levels of self-regulation (Schunk & Zimmerman, 1997). In the model, there are four levels, each describing how people develop regulatory skills by applying what they learn in social contexts to themselves (Schunk & Zimmerman, 1997). At the *observation level*, students observe a model's skills or strategies but are not required to perform them (Schunk, 1999). Zimmerman (2000) stated that "Despite the value of this vicarious information, most learners also need to perform the strategies personally to incorporate them into their behavioral repertories" (p. 29). At the *emulation level,* the students' performances imitate the model's skills and strategies. The students approximate the model's behaviors and will then improve their behaviors if the model takes a teaching role and offers feedback and suggestions (Zimmerman, 2000). The first two levels are mainly influenced by social resources similar to social identities in identity based motivation theory. At the *self-controlled level,* the students can use the model's skills and strategies regardless of the presence of the model. Zimmerman (2000) stated that "The learner's success in matching that covert standard during practice efforts will determine the amount of self-reinforcement he or she will experience" (p. 30). The last level is *self-regulation* and the students can modify their skills and strategies based on their own unique social and personal contexts, distinct from those of any model. They also can adjust their self-regulation while consideration of outcome expectation (Zimmerman, 2000).

I argue that the self-controlled and self-regulation levels are related to personal identity, and that this element is under-represented in the identity-based motivation model

that Oyserman espouses. These levels can affect and explain the variation in students' efforts for persisting in self-regulation to achieve their academic possible selves.

Self-regulated learning strategies. Zimmerman and his colleagues articulated that students' academic self-regulation is an active approach to utilizing self-regulated learning strategies in order to achieve academic goals above and beyond adults' direct guidance (Zimmerman & Martinez-Pons, 2007). Zimmerman & Martinez-Pons (1986; 1988) defined self-regulated learning strategies using *the Self-regulated Learning Interview Schedule (SRLIS).* The interview includes six learning contexts based on pilot interviews: in classroom situations, at home, when completing writing assignments outside class, when completing mathematics assignments outside class, when preparing for and taking tests, and when poorly motivated. An exemplary interview item is that "Most teachers give tests at the end of marking periods, and these tests greatly determine report card grades. Do you have any particular method for preparing for this type of test in English or history?" (Zimmerman & Martinez-Pons, 1986, p.617)

The researchers recruited high achieving and lower achieving high school students and coded these students' data using 14 self-regulated learning strategies as defined from the literature review: self-evaluation, organizing and transforming, goal-setting and planning, seeking information, keeping records and monitoring, environmental structuring, self-consequences, rehearsing and memorizing, seeking peer, teacher, or adult assistance, and reviewing tests, notes, and textbooks. A non-self-regulatory learning category was added for a coding purpose (Zimmerman & Martinez-Pons, 1986). The researchers found that high achieving students used significantly more self-regulatory learning strategies than lower achieving students except for the self-

evaluation category (Zimmerman & Martinez-Pons, 1986). In addition, the researchers uncovered that these students' self-reported scores of self-regulated learning strategies were highly correlated with teachers' reports of the students' self-regulated learning (Zimmerman & Martinez-Pons, 1988).

Social cognitive theory vs. Possible selves. Although self-efficacy concerns an outcome expectation for a specific task, possible selves consider students' expectation about their future (Garcia & Pintrich, 1995). Garcia and Pintrich (1995) stated that "Possible selves can be seen as student characteristics, representing the personalized, cognitive-affective organizations of previous experiences and the acknowledgment of one's aptitudes" (p.9). Study results uncovered that although self-efficacy explains the highest portion of the variance in self-regulation, possible selves accounts for a significant portion of the variance in self-regulation beyond self-efficacy. Therefore, Garcia and Pintrich (1995) argued that possible selves encourage self-regulation above and beyond self-efficacy. The researchers mentioned that "By projecting oneself into the future, one need not be limited to what one is at the present" (p. 9). Thus, the virtue of possible selves is that self-efficacy is greatly influenced by an outcome expectation for a specific task at the present, but possible selves are relatively free from outcome expectations and have power to generate self-regulation for the future goals.

The Purpose of the Study

This study was initiated to solve measurement issues associated with current possible selves measures as well as to enhance possible selves research by encompassing social cognitive theory. The results of this study will be the development of a new measure, the *Persistent Academic Possible Selves Scale for Adolescents (PAPSS)*. The

PAPSS integrates important factors that have revealed their significant influence on academic achievements such as social identity, personal identity, and self-regulation. The PAPSS will measure how students can achieve academic possible selves by means of self-regulation, adopted from social cognitive theory.

Research Questions

First: Does integration of social cognitive theory into possible selves theory improve the measurement of academic possible selves and self-regulation for attaining academic possible selves? I expect that self-regulation items, which were derived from self-regulated learning strategies in social cognitive theory, will provide more knowledge about how students use self-regulated strategies to achieve academic possible goals next year.

Second: Does the PAPSS provide reliable and valid score interpretation of academic possible selves and self-regulation? I will test a baseline model and the hypothesized models in the study. I believe that fit comparisons of the models using confirmatory factor analysis (CFA) will result in a best fitting model which provides the validity evidence of the internal structure. The model should be theoretically sound in terms of possible selves and social cognitive theories.

Third: Does the PAPSS provide more practical administration and efficient scoring interpretation compared to Oyserman (2004)'s possible selves questionnaire? I anticipate that complex coding procedures of Oyserman's open-ended questionnaire including inter-rater reliability will demonstrate issues associated with score interpretation of the scale. Therefore, the convergent evidence between the PAPSS and Oyserman's open-ended questionnaire is of interest in this study.

Chapter 3

ITEM DESIGN AND PILOT STUDY

Academic Possible Selves Categories

I used existing data of a general comparison group in the CompuGirls (PI: Dr. Kimberly Scott; EHR-0833773). 63 participants took the first survey, 52 participants took the second survey, and 37 participants took the third survey. In total, 72 participants participated in the survey at least one time. Oyserman (2004)'s open-ended possible selves questionnaire was used. Students' open-ended responses of positive and negative possible selves were summarized in the five domains (see Table 1). The students' individual responses were then coded using the five domains. All data was double-coded by a research assistant and I. The interrater agreement was 89% (Lee et al., 2011).

Table 1

Domains and Examples for Positive and Negative Possible Selves

Domain	Example
1. Academic	Going to next grade
	Joining extra classes
	Failing a class
2. Social	Family
	Social Club
	Peers
3. Personality	Being more nice
	Acting more responsible

	Being more mature
4. Health	Beauty
	Drugs
	Pregnancy
5. Career	Part time jobs
	Working for family
	Future profession
Etc.	Cooking
	Saving money
	Religion

Note. Adopted from Lee et al. (2011)

Then, we separated academic possible selves responses from other possible selves responses and reviewed categories of the academic possible selves. The analysis resulted in seven categories for positive and eight categories for negative academic possible selves (see Table 2). We coded individual responses of academic possible selves using the 15 categories and the interrater agreement was 89%.

Table 2

Categories of Academic Possible Selves

Academic Possible Selves	Category
Positive Direction	
1	Being a good student
2	Getting good grades

3	Being smart
4	Passing onto the next grade
5	Staying in school
6	Taking advanced/extra classes
7	Etc
Negative Direction	
1	Being a bad student
2	Getting bad grades
3	Not being smart
4	Not passing onto the next grade
5	Dropping out of school
6	Poor attendance
7	Failing classes
8	Etc

Note. Adopted from Lee et al. (2011).

As part of our work with this data, our research team determined that the domains of possible selves responses and the categories of academic possible selves responses are limited (Lee et al., 2011). Previously, other researchers found that students in under-resourced areas have less positive academic possible selves than students from high-resource districts (Kao, 2000). Thus, we recommended replicating this study with other groups of students (e.g., girls from middle class) to investigate the effect of social contexts on the outcome space of the questionnaire (Lee et al., 2011).

The Initial Item Revisions

I initially developed 42 items according to the categories of academic possible selves. The initial PAPSS items were revised based on the analysis results of content validity evidence. The initial 42 items were reduced to 32 items using the four topics: "Advancing a grade", "Getting good grades", "Being a better student" and "Having good school attendance". The PAPSS scoring was changed from a seven-point Likert scale (1 = Not at all true of me; 7 = Very true of me) into a five-point Likert scale (1 = strongly disagree; 5 = strongly agree). The main reason was that an expert recommended using the five Likert scale and I wondered if it would make scales seems smaller and more manageable to students.

The Pilot Study

Twenty-five high school students participated in the pre survey and 28 students participated in the post survey with a three-week interval. 43 students took either pre or post surveys and 10 students took both of the surveys. In the pre survey, students were firstly asked to match items to theoretical statements. Then, the students were asked to answer the PAPSS. In the post survey, students were asked to answer the PAPSS items, only. The test-retest reliability is high (r = .97). Fifteen experts who are affiliated with either the school of education or the school of social and family dynamics at a large southwestern university took the expert survey. Experts were asked to match items to theoretical statements. Overall, the experts provided more accurate answers in the matching questions. As I learned that less choice options tended to generate more discrete data, I changed the response option from a five-point to a seven-point Likert scale.

Chapter 4

DISSERTATION STUDY METHOD

Procedure

Engineering summer camps. I contacted two engineering summer camps held at a large southwestern university via email and introduced the Persistent Academic Possible Selves Scale for Adolescents (PAPSS) in the spring of 2012. The two directors of the camps allowed me to conduct data collections during their camps in the coming summer. I scheduled the data collections at the beginning of the camps to avoid the program's effect on students' responses. I followed three steps to collect student assent and parental consent forms before the camps started. First, the camps sent out flyers containing information about the PAPSS study, parental consent forms, and student assent forms. Second, I collected the students' consent and assent forms at the beginning of the camps. Third, I administered the PAPSS survey along with other measures at the camp for about 30 minutes. I distributed pens to the participant as survey incentives.

Public schools. I received approval from the district and school levels in Mesa in the fall of 2012. Then, I conducted data collections from one high school and one junior high school from the fall of 2012 and the spring of 2013. I collected data from two social studies teachers' classrooms in the junior high school and three science teachers' classrooms in the high school. I followed the three steps to collect parental consent and student assent forms from the participants. First, I explained my study at the beginning of the class and distributed survey flyers, parental consent forms, and student assent forms. Second, I came back to the class a week later, collected those forms, and administered my survey for approximately 20-30 minutes during the class. Third, I revisited the class a

week later and distributed survey incentives to the participants. I used movie tickets in the fall of 2012 and five dollars in the spring of 2013.

Participants

One hundred and forty two students in two engineering camps participated in the study in the summer of 2012. In Mesa district, fifty one junior high school students and 65 high school students participated in the study in the fall of 2012. Eighty five junior high school students and 152 high school students participated in the study in the spring of 2013. In total, 495 students participated in the study. The average age of the students was 14 years with a range of 10 to 18 years. Most of the students were 7th (28%), 8th (15%), and 9th (18%) graders. A majority of them were White, non-Hispanic (56%) and Hispanic (23%). There were approximately even male and female students (47% male and 53% female).

For the convergent analysis, I used 320 students' data who participated in both the Persistent Academic Possible Selves Scale for Adolescents (PAPSS) and Oyserman (2004)'s open-ended questionnaire. I did not administer Oyserman (2004)'s open-ended questionnaire to 124 summer camp participants and 51 junior high school students because of administrative issues (i.e., time-constraints). The average age of the 320 students was 15 years with a range of 12 to 18 years. Most of the students were 7th (26%), 9th (25%), and 11th (19%) graders. A majority of them were White, non-Hispanic (64%) and Hispanic (20%). There were more female students (61%) than male students (39%).

Measures

The persistent academic possible selves scale for adolescents (PAPSS). The PAPSS (Lee & Husman, 2012) was administered in the study. The PAPSS was developed to measure adolescents' academic possible selves and self-regulation to achieve those academic possible selves. The students answered each item using a seven-point Likert scale (1= Strongly Disagree; 2=Disagree; 3=Disagree Somewhat; 4=Neutral; 5=Agree Somewhat; 6=Agree; 7=Strongly Agree). I would describe the validity evidence of the PAPSS score interpretation in the analysis and results sections.

Oyserman's open-ended possible selves questionnaire. Oyserman (2004)'s open-ended possible selves questionnaire was used for investigating students' academic possible selves and self-regulation. The students were asked to write their positive possible self ("Next year, I expect to be…."). If they were doing something to become the possible self, they were asked to write a strategy for attaining the positive possible self ("What I am doing now to be that way next year…."). The students repeated the procedure four times to provide up to four positive possible selves and strategies associated with those possible selves. Then, the students were asked to write their negative possible self ("Next year, I want to avoid…."). If they were doing something to avoid this, they were asked to write a strategy for avoiding the negative possible self ("What I am doing now to avoid being that way next year…."). The students replicated the process four times to provide up to four negative possible selves and strategies associated with those possible selves.

Quantitative Data Analysis

Confirmatory factor analysis. I conducted confirmatory factor analysis (CFA) to compare fit for a baseline model and hypothesized models using Mplus version 7 (Muthén & Muthén, 2012). CFA is a more advanced analysis than explanatory factor analysis (EFA) in terms of directly testing a hypothesized factor model with constraining parameters (Curran, West, & Finch, 1996; Flora & Curran, 2004). The rules of thumb for testing CFA using real data is a ratio of 1 (a number of item) to 10 (a sample size) based on commonly used criteria (Myers, Ahn, & Jin, 2011). The criteria supported that the current sample size (N= 495) is approximately adequate to testing CFA with 51 items in the PAPSS.

To detect multivariate nonnormality, I checked univariate nonnormality of item scores according to Curran et al (1996)'s recommendation (univariate skewness > 2.00 and kurtosis > 7.00). Based on the investigation in descriptive statistics results (see Appendix A), I decided to treat the item scores as categorical and tested the fit of the proposed models against the data using a weighted least square means and variance adjusted (WLSMV) estimation. WLSMV (i.e., Robust WLS) is a highly recommended estimation method for handling with multivariate nonnormality of ordered categorical data (e.g., a Likert-scale) for CFA (Flora & Curran, 2004).

Internal construct validity evidence. I investigated how well the PAPSS items are loaded to hypothesized factors that were specified in advance based on academic possible selves and social cognitive theories. To compare fit of the baseline model and the hypothetical factor models, I checked global fit and local fit indices. The global fit evaluates the overall closeness of a fitted (or a model implied) covariance matrix to an

actual (or observed) covariance matrix. The global fit was assessed using the Comparative Fit Index (CFI), the Tucker Lewis Index (TLI), the Root Mean Square Error of Approximation (RMSEA), and the Weighted Root Mean Square Residual (WRMR). I reviewed Hu and Benltler (1999)'s cut-off criterion which are the most popular for assessing global fit indices for normal data using Maximum likelihood (ML) based estimation. Since I used WLSMV estimation for nonnormal, ordered categorical data, I followed Yu (2002)'s suggestions (values of .95 or .96 for CFI and TLI; values of .05 or .06 for RMSEA; values close to .95 or 1.00 for WRMR).

After evaluating global fit, I examined individual item loadings to the factors in the model. I also investigated local fit indices for checking fitness of the item level. First, I checked a modification index. The modification index shows that by freeing the specific parameter constraint in request, a chi-square will be reduced by that value (Muthén & Muthén, 2012). A high value of the index means that the parameter constraint causes a significant lack of fit. Next, I checked the Expected Parameter Change (E.P.C.). An E.P.C. shows that if a parameter constraint in request is freed, the estimated parameter (i.e., loading) will be of the value (Muthén & Muthén, 2012). A high value of the E.P.I. means that the parameter constraint causes a significant lack of fit.

During the process of model fit evaluation, I also conducted specification searches (i.e., exploratory analyses). I slightly altered factor loadings in the hypothesized models and tested the models to find a final factor model which has adequate fit as well as is supported by possible selves and social cognitive theories.

Convergent validity evidence. I added academic plausibility which was coded based on Oyserman (2003)'s instructions to the final factor model. The coding process

was described in the qualitative data analysis section. I explored the convergent validity evidence between the factors in the PAPSS and academic plausibility. Individual factor correlations with academic plausibility were examined. I checked the global fit indices of the model.

Qualitative Data Analysis

Content analysis of academic plausibility. Fraenkel and Wallen (2000) described that "Content analysis is a technique that enables researchers to study human behavior in an indirect way, through an analysis of their communications" (p. 469). Content analysis is beneficial in terms of analyzing open-ended responses as a form of quantitative data after coding the responses using appropriate categories or ratings (Fraenkel & Wallen, 2000). Oyserman and her colleagues conducted content analysis of students' open-ended responses of possible selves and strategies to achieve these possible selves using the *Instructions for Coding Academic Plausibility* (Oyserman, 2003). Oyserman (2003) stated that "We coined the term 'plausibility' to convey the idea that possible selves differ in the extent that a youth could plausibly use these visions and strategies as a way to guide behavior toward achievement goal" (p. 1).

A research assistant and I reviewed the instructions and conducted four trial sessions with randomly selected samples of 10 from the entire pool of participants. Overall, our agreement rates progressively improved and reached 90% twice in a row (80%, 60%, 90%, and 90%). After completing the trial sessions, we coded 1/3 of the data for checking inter-rater reliability. We reviewed positive and negative (i.e., expected and feared in the instructions) possible selves and counted possible selves that are related to school/academics (e.g., gaining a 3.5 or higher GPA). In the instructions, possible selves

that are linked to job achievement and school activities should not be counted. More specifically, music, band, and choir are counted but physical education, art, and dance are not counted. No rationale for the distinctions is described. Two categories of academic possible selves are listed on the instructions: school and teachers. However, there are no instructions for other important categories in school settings such as peers and academic related clubs. Therefore, it is uncertain whether or not possible selves that are related to peers and academic related clubs should be counted. In this study, possible selves that are related to peers in school (e.g., avoiding bad students in my classroom) are counted. In addition, academic related clubs (e.g., National Honor Society) are counted.

For counting strategies, Oyserman (2003) displayed two types of strategies, "achievement focused strategies" and "interpersonal relationships" and provided examples. For example, "doing all my homework" and "asking teachers for help" are listed as achievement focused strategies and "avoiding the bad students" and "asking for help" are listed as strategies that indicate an interpersonal relationship aspect. However, making a distinction for some strategies are uncertain given the condition that no clarifications for the two types of strategies are provided. For instance, making a distinction for "asking teachers for help" and "asking for help" is uncertain based on the given condition. Therefore, we decided to consider strategies as interpersonal relationships when the strategies involve others (e.g., teachers and friends) in doing something positive for academic achievement in school settings. For example, if a student wrote "tutoring" as a strategy, we counted it as a strategy containing an interpersonal relationship aspect. After counting the numbers of academic possible selves and

strategies to achieve these possible selves, we calculated an academic plausibility score for each student using Oyserman (2003)'s instructions.

When calculating academic plausibility scores, we found two issues described on the instructions. The first issue is to decide whether "at least one of the possible selves and/or strategies that are provided are detailed/concrete, that is if specific action is implied and possible selves are not redundant" (p. 1). Given that no clarifications or solid examples are provided in the instructions, it is very subjective to judge how detailed/concrete the possible selves and/or strategies are. Therefore, "detailed/concrete" was less weighted during the coding process in the study. For example, if a student has four academic possible selves and two strategies, the student has a plausibility score of three regardless of how "detailed/concrete" his academic possible selves and/or strategies are. The second issue is related to academic plausibility score of five (the highest plausibility score). To receive the score, a student should have four or more academic possible selves and four or more strategies with "at least one strategy for an academic self is focused on interpersonal aspects of school context" (p. 3). However, there are no explanations why interpersonal aspect strategies over weighted for academic plausibility score. In many cases, students wrote academic possible selves that are related to an interpersonal aspect (e.g., peer pressure). However, since they are not academic strategies, those students did not receive the highest plausibility score of five, even though their possible selves clearly represented an interpersonal aspect to their academic life.

On the instructions, there is a troubleshooting section. Oyserman (2003) explains three cases in the section. The first case is the *ambiguous possible selves*. If a possible

self is uncertain, a strategy or strategies should clarify whether or not the possible self is academically related. For example, when a student wrote “hard working” as a possible self and “preparing for classes” as a strategy, then the possible self can be counted as an academic possible self. However, if the student wrote “helping my father” as a strategy, the possible self (“hard working”) should not be counted as an academic possible self. The second case is the *non-academic possible selves with academic strategies*. For example, if a student wrote they want to avoid “living at home” as a possible self and “Preparing for college” as a strategy, neither the possible self nor the strategy were counted. The third case is the *multiple strategies for an academic possible self*. If a student wrote “a better student” as a possible self and “ I’m studying more and taking classes more seriously” as a strategy, the “studying more” and “ taking classes more seriously” should be counted as two strategies.

Although the trouble shooting section was helpful for solving many issues associated with coding academic possible selves and strategies, we discovered other coding issues that appeared often. The first case is related to the *multiple academic possible selves*. Sometimes students wrote two or more academic possible selves in a blank. For example, if a student wrote “Decided on a college and working for scholarships”, “decided on a college” and “working for scholarships” were counted as two academic possible selves in this study. The second case is the *hidden academic possible selves and strategies*. Some students wrote two or more academic and other possible selves in a blank. For example, if a student wrote “physically fit and mentally strong” as a possible self and “ Working out (i.e. weights) and taking challenging classes”

as a strategy, “mentally strong” was counted as an academic possible self and “taking challenging classes” was counted as a strategy in the study.

On the last page of the instructions, Oyserman (2003) provided three coding examples and explanations for the coding results. Example A covers a redundant academic possible self. If a student wrote “in the ninth grade” and “in high school” as two positive academic possible selves, the possible selves are redundant and should be counted one. Example B explains strategies that are restatements of academic possible selves. If a student wrote “getting C’s” as a negative possible self and “Keeping A’s and B’s” as a strategy, the strategy is a restatement of the possible self and should not be counted. Example C describes redundant strategies with different academic possible selves. For example, if a student wrote “in 9th grader” as a positive academic possible self and “work hard as an 8th grader” as a first strategy; “the 8th grade” as a negative academic possible self and “work hard” as a second strategy, the student had a plausibility score of two based on the two academic possible selves and two strategies. Oyserman (2003) stated that:

> The only time strategies are not double counted is when the possible selves themselves are redundant or exact opposites (e.g., a 9th grader, in the 8th grade). The only other strategies that are not counted are when the words do not form a strategy but explain or add detail as to why a possible self is import. (p. 4)

However, it is not clear why “dropping out” can be an academic possible self and “staying in school” can be a strategy of the academic possible self, as Oyserman also indicated in the instructions. In this study, we followed the instructions and did not count strategies that are restatements or exact opposites of academic possible selves. For

example, if a student wrote “A straight “A” student” as an academic possible self and “getting mostly A’s” as a strategy, the strategy was not counted because it is a restatement of the possible self.

For the 320 participants, we independently coded 1/3 of the data and compared the results for checking inter-rater reliability. Eighty nine out of 109 students’ plausibility scores were matched (82%). We checked and resolved the disagreements. Then, we divided the remaining data and individually coded.

Chapter 5

DISSERTATION STUDY RESULTS

The Final Scale

Construct. The PAPSS construct explains the conditions under which students are motivated for developing academic possible selves and conducting self-regulation for attainting these academic possible selves.

Scoring. The PAPSS adopted a seven-point Likert scale (1= Strongly Disagree; 2=Disagree; 3=Disagree Somewhat; 4=Neutral; 5=Agree Somewhat; 6=Agree; 7=Strongly Agree). The estimated minimum score was 51, when a student selected "Strongly Disagree" for all items (score 1 x 51 items) and the estimated maximum score was 357, when a student selected "Strongly Agree" for all items (score 7 x 51 items).

Items. The final items were developed using three academic goals based on the content analysis of students' academic possible selves: improving classroom grades, being a better student, and paying more attention in class (see Appendix B). The final items also encompass three theoretical components (social identity, personal identity, and self-regulation). Social identity and personal identities were derived from possible selves theory under social psychology. Self-regulation was adopted from social cognitive theory in educational psychology (Schunk & Zimmerman, 1997; Zimmerman, 2000). Among three cyclical phases of self-regulation, the forethought phase and performance phase were utilized for developing self-regulation items in the PAPSS. However, the self-reflection phase was excluded because the PAPSS was intended to measure students' planning and utilization of self-regulation to achieve academic possible selves rather than evaluating and altering self-regulation based on the past results. I argue that students can

undergo the self-reflection phase after they have attained or failed to achieve their academic possible selves in the following year. Social identity theory was utilized to measure social identity based academic possible selves and self-regulation. Personal identity and forethought phase were combined to measure students' personal identity based academic possible selves and self-regulation. The performance phase was used to develop self-regulated learning strategies.

Internal Construct Validity Evidence

Baseline model. I tested a general one factor model as a baseline model (see Figure 1). The factor variance is fixed to one. The model fits poorly based on global fit indices (CFI = .79, TLI = .78, RMESA = .13, 90% CI [.12, .13], WRMR = 3.32).

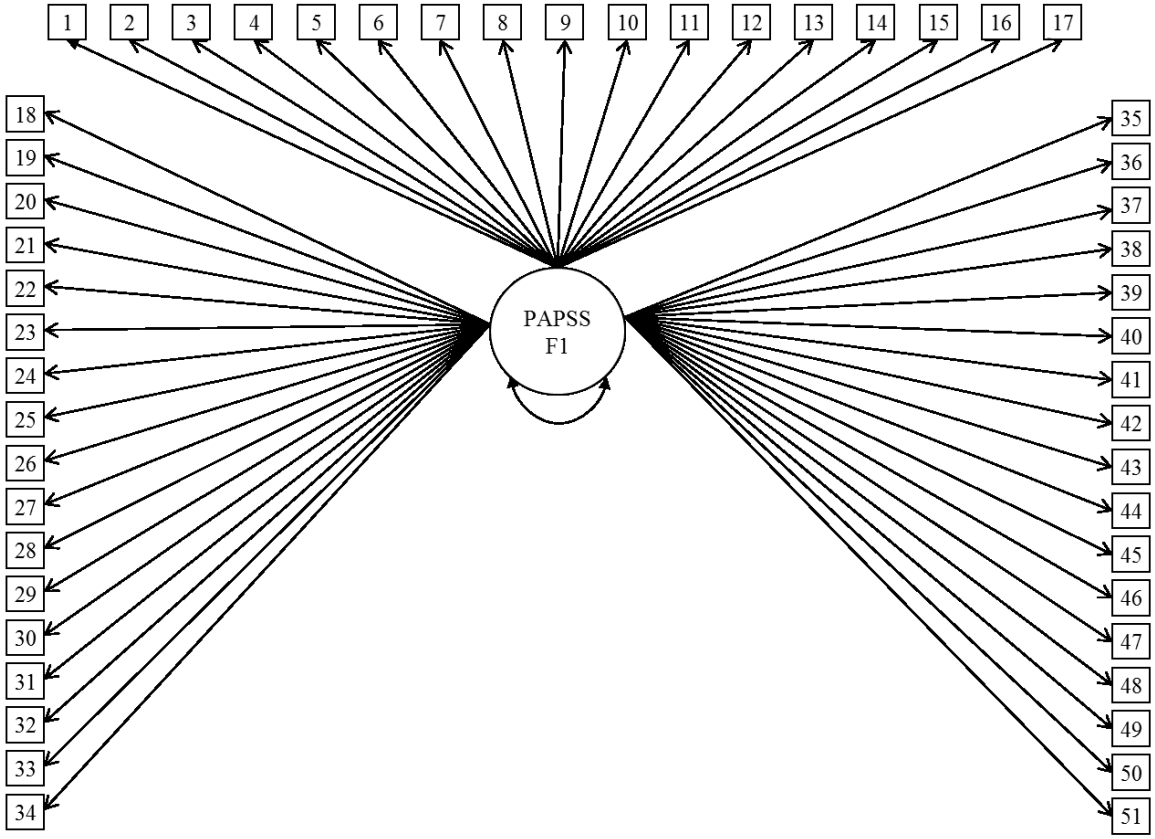

Figure 1. Baseline model.

Academic possible goal model (3 factors). I tested an academic possible goal model (see Figure 2). Three factors are academic possible goals in the PAPSS. The first factor is improving classroom grades. The second factor is being a better student. The third factor is paying more attention. The factor variances are fixed to one. Factors 1, 2, and 3 are correlated. The model fits poorly based on the global fit indices (CFI = .81, TLI = .80, RMESA = .12, 90% CI [.12, .12], WRMR = 3.11).

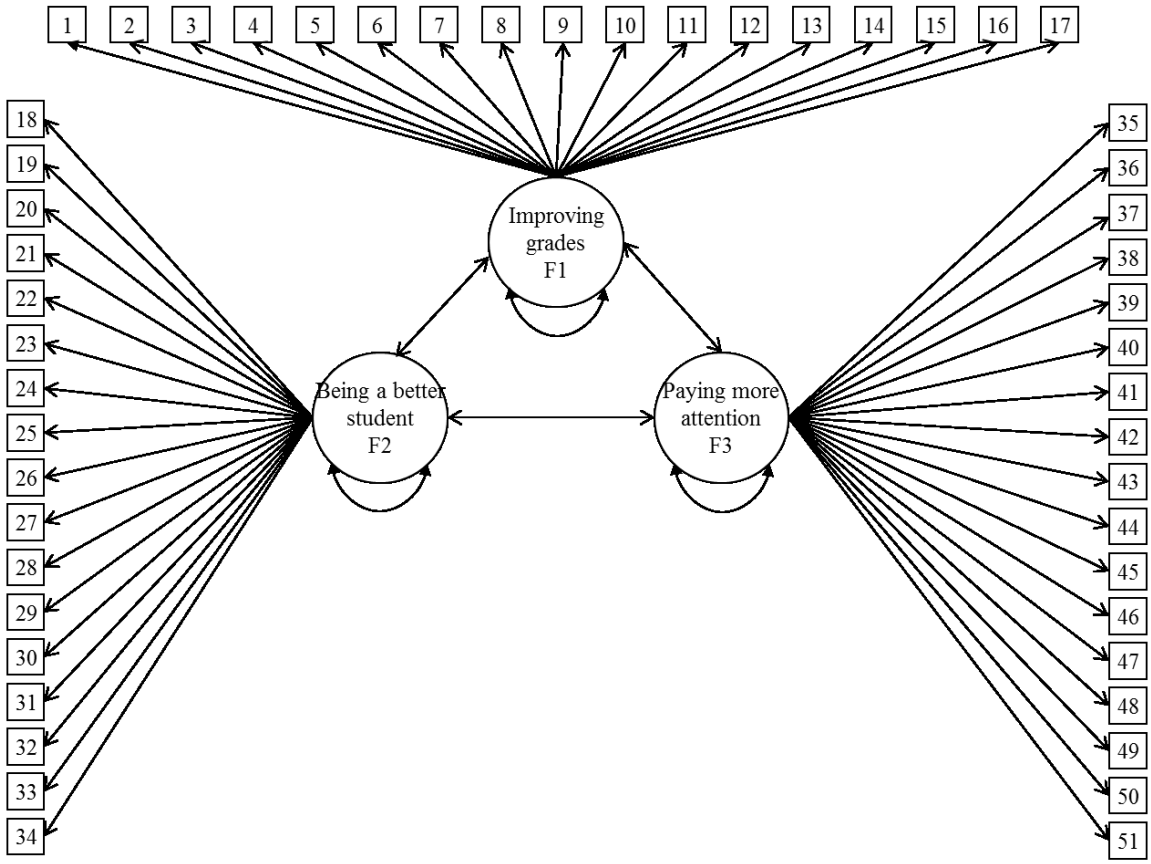

Figure 2. Academic possible goal model.

Three factor model I. I tested a three factor model I (see Figure 3). Three factors are theoretical components in the PAPSS. The first factor is social identity. The second factor is personal identity and the forethought phase in self-regulation. The third factor is the performance phase in self-regulation. The factor variances are fixed to one. Factors 1,

2, and 3 are correlated. The model fits slightly better based on the global fit indices (CFI = .85, TLI = .84, RMESA = .11, 90% CI [.10, .11], WRMR = 2.83).

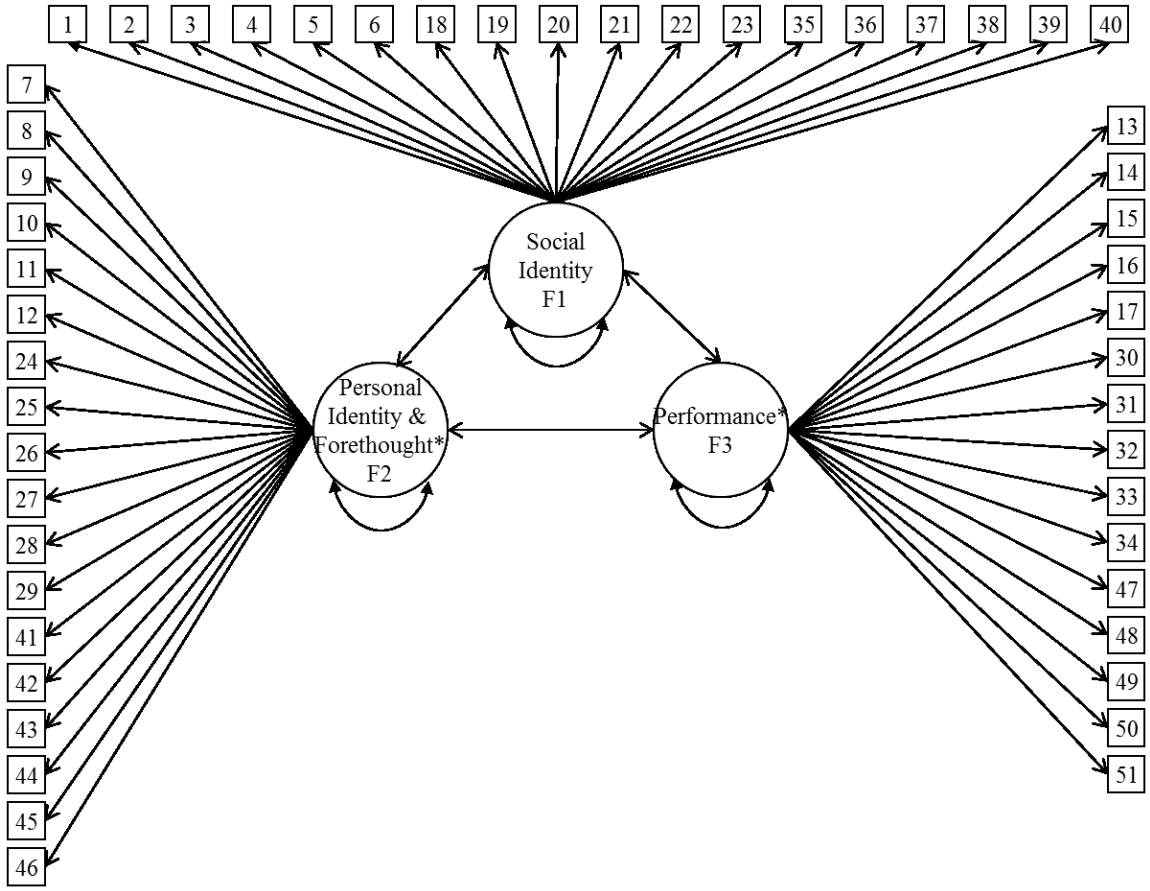

Figure 3. Three factor model I. * = Forethought phase and performance phase in self-regulation.

Three factor model II. I tested a three factor model II (see Figure 4). The first factor is identity-based academic possible selves. The second factor is identity-based self-regulation. The third factor is the performance phase in self-regulation. The factor variances are fixed to one. Factors 1, 2, and 3 are correlated. The model fits poorly based on the global fit indices (CFI = .82, TLI = .81, RMESA = .12, 90% CI [.11, .12], WRMR = 3.05).

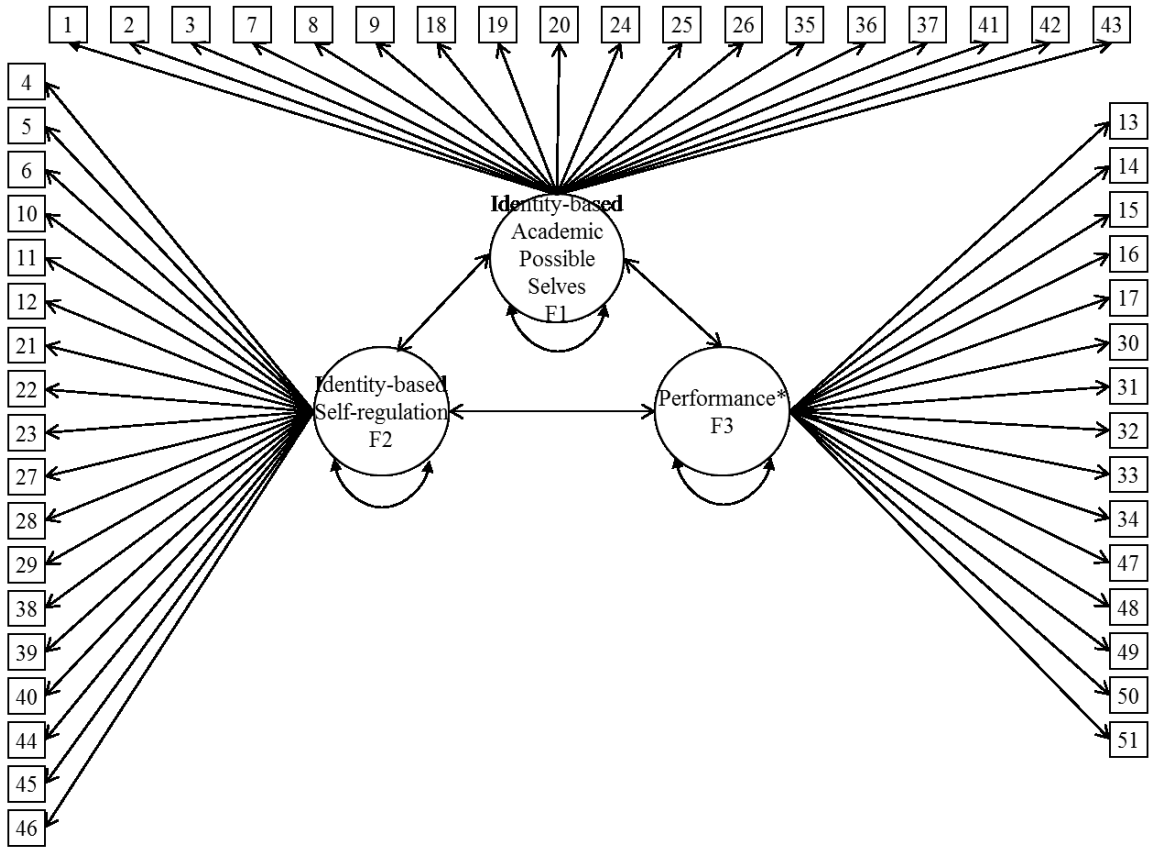

Figure 4. Three factor model II. * = Performance phase in self-regulation.

Five factor model. I tested a five factor model (see Figure 5). The first factor is social identity-based academic possible selves. The second factor is social identity-based self-regulation. The third factor is personal identity-based APS. The fourth factor is personal identity-based self-regulation. The fifth factor is the performance phase in self-regulation. The factor variances are fixed to one. Factors 1, 2, 3, 4, and 5 are correlated. The model fits slightly better based on the global fit indices (CFI = .86, TLI = .85, RMESA = .10, 90% CI [.10, .11], WRMR = 2.74).

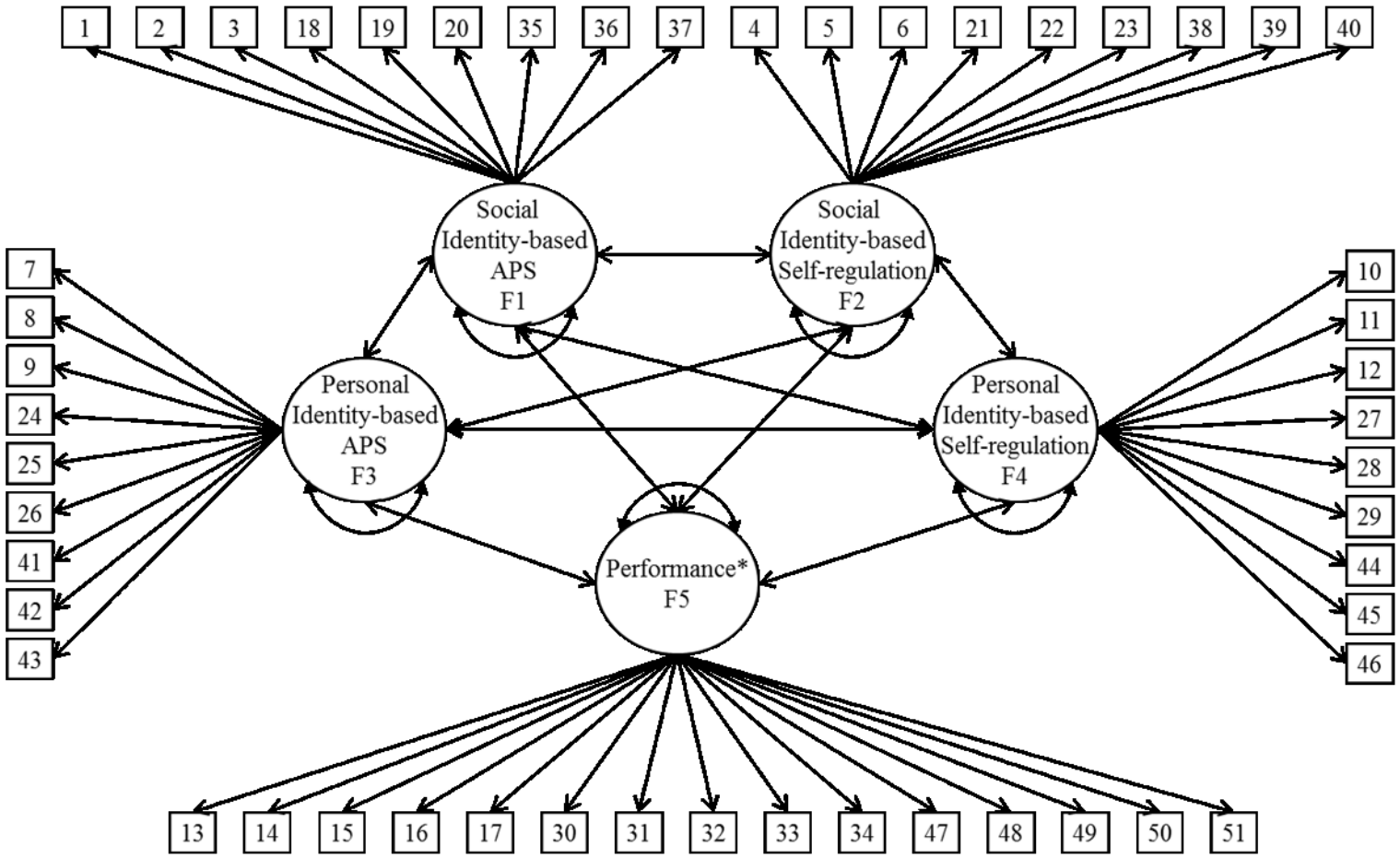

Figure 5. Five factor model. APS = Academic possible selves. * = Performance phase in self-regulation.

Six factor model. I tested a six factor model (see Figure 6). There are four domain specific factors and a general factor, the academic possible selves factor. The first domain specific factor is social identity-based academic possible selves. The second domain specific factor is social identity-based self-regulation. The third domain specific factor is personal identity-based academic possible selves. The fourth domain specific factor is personal identity-based self-regulation. The fifth factor is a general factor, the academic possible selves factor. The sixth factor is the performance phase in self-regulation. The factor variances are fixed to one. Factors 5 and 6 are correlated. The model fits better but were not satisfied based on the global fit indices (CFI = .89, TLI = .89, RMESA = .09, 90% CI [.09, .09], WRMR = 2.27).

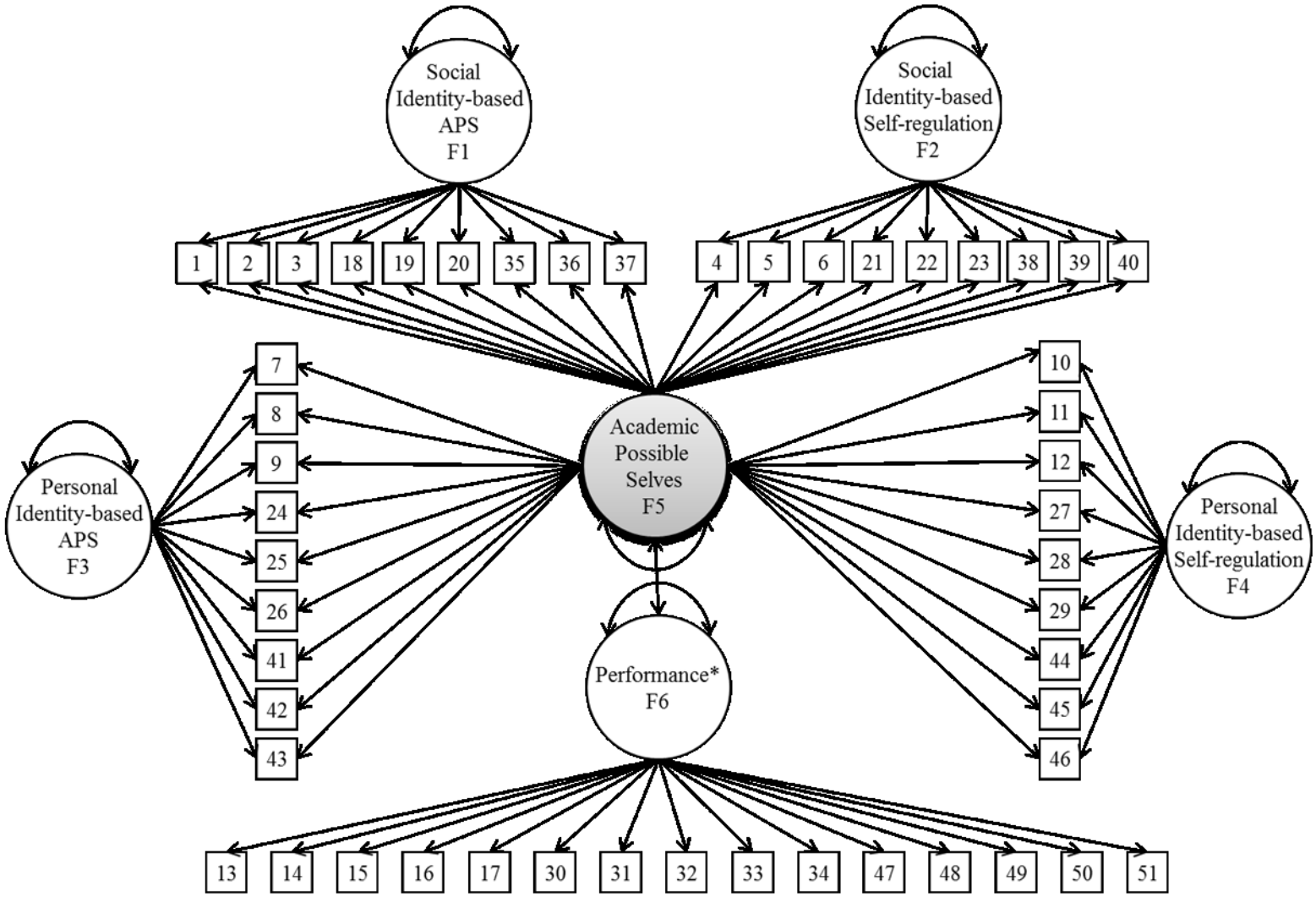

Figure 6. Six factor model. APS = Academic possible selves. * = Performance phase in self-regulation.

Complex factor model. I tested a complex factor model (see Figure 7). The first factor is improving grades. The second factor is better student. The third factor is paying attention. The fourth factor is social identity. The fifth factor is personal identity. The sixth factor is identity-based academic possible selves. The seventh factor is identity-based self-regulation. The eighth factor is the performance phase in self-regulation. The factor variances are fixed to one. Factors 1, 2, and 3 are correlated. Factors 4 and 5 are correlated. Factors 6, 7, and 8 are correlated. The model has a much better fit based on the global fit indices (CFI = .95, TLI = .95, RMESA = .06, 90% CI [.06, .06], WRMR = 1.39).

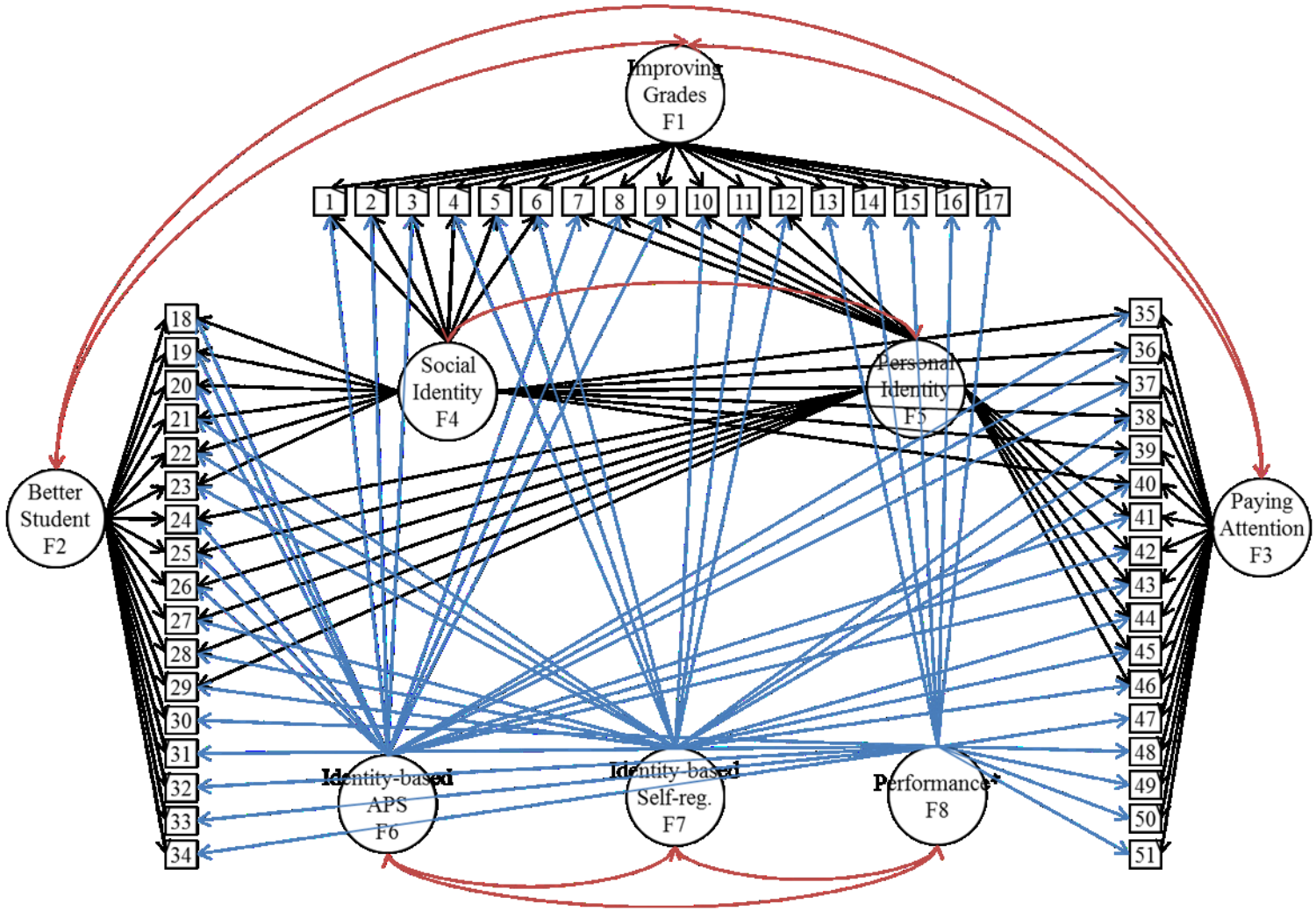

Figure 7. Complex factor model. APS = Academic possible selves. * = Performance phase in self-regulation.

More complex factor model. I tested a more complex factor model (see Figure 8). The first factor is improving grades. The second factor is better student. The third factor is paying attention. The fourth factor is social identity. The fifth factor is personal identity. The sixth factor is identity-based academic possible selves. The seventh factor is identity-based self-regulation. The eighth factor is the performance phase in self-regulation. The factor variances are fixed to one. Factors 1, 2 and 3 are correlated. Factors 4, 5, and 8 are correlated. Factors 6, 7, and 8 are correlated. The model has a slightly better fit according to the results of global fit indices (CFI = .96; TLI = .95; RMESA = .06, 90% CI [.06, .06], WRMR = 1.36).

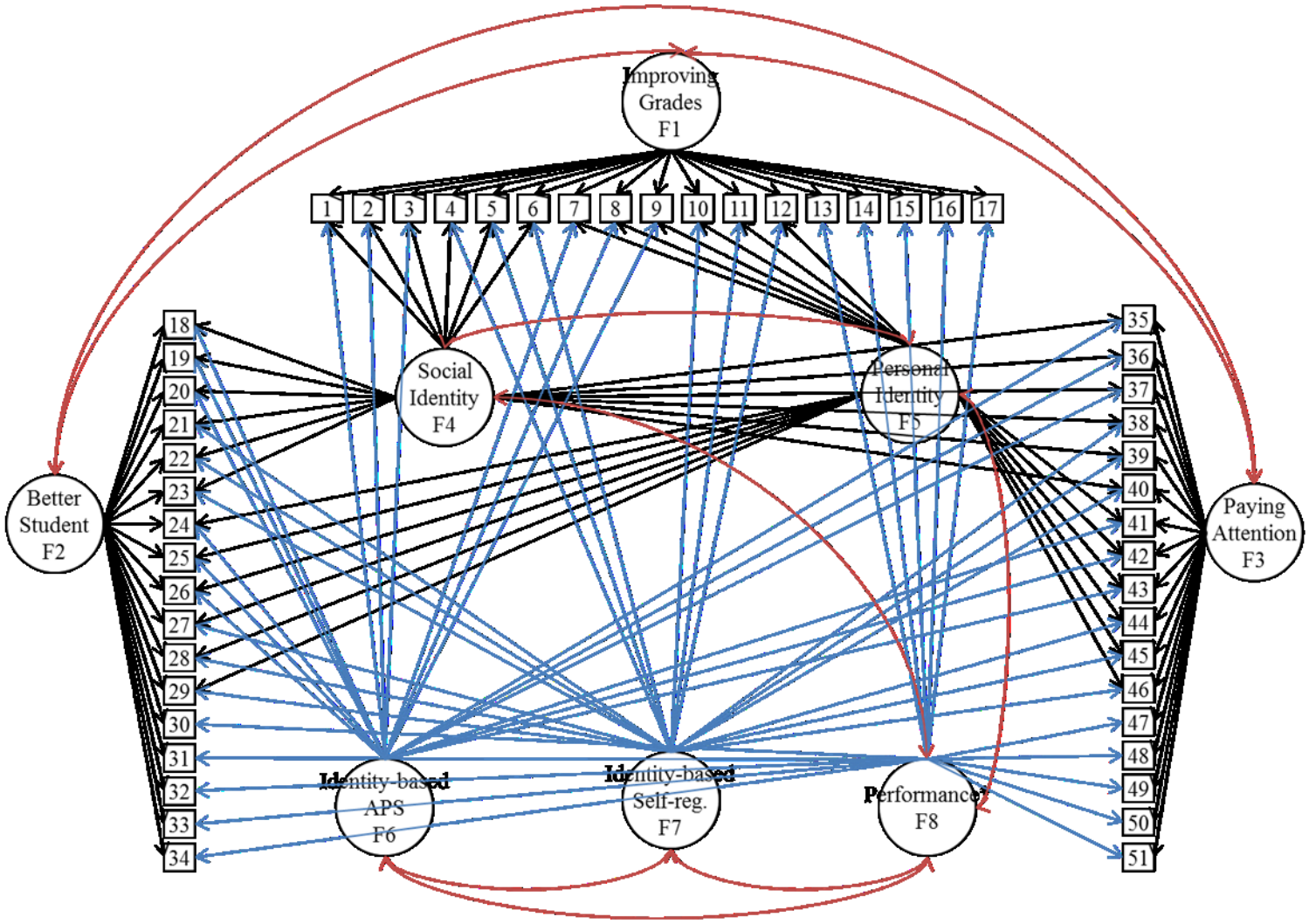

Figure 8. More complex factor model. APS = Academic possible selves. * = Performance phase in self-regulation.

Reduced complex factor model. Although the more complex factor model has good fit, several items under some factors have negative or very low factor loadings (< .20). So, I created a reduced complex factor model after removing problematic factor loadings taking into consideration the theories I used to develop the original scale, possible selves theory and social cognitive theory (see Figure 9). Note that names for factors 4, 5, 6, 7, and 8 have been changed. Once I considered the common themes in each subscale, within context of the existing self-concept research (Marsh, 2007); social cognitive theory (Zimmerman, 2000; Schunk, 1999) it was clear that these new factor scores were reflecting peer modeling (factor four); self-rewards (factor five); self-concept (factor six); self-control (factor seven); and self-regulation strategies (factor eight). The set of factors (factor one, factor two, and factor three) which represent the shared variance of each of the content areas of the possible selves, held the factor structure I proposed when writing the items. The factor variances are fixed to one. Factors 1, 2 and 3 are correlated. Factors 4 and 5 are correlated. Factors 6, 7, and 8 are correlated. The model has a slightly poor fit but still satisfying results based on the global fit indices (CFI = .95, TLI = .94, RMESA = .06, 90% CI [.06, .07], WRMR = 1.56).

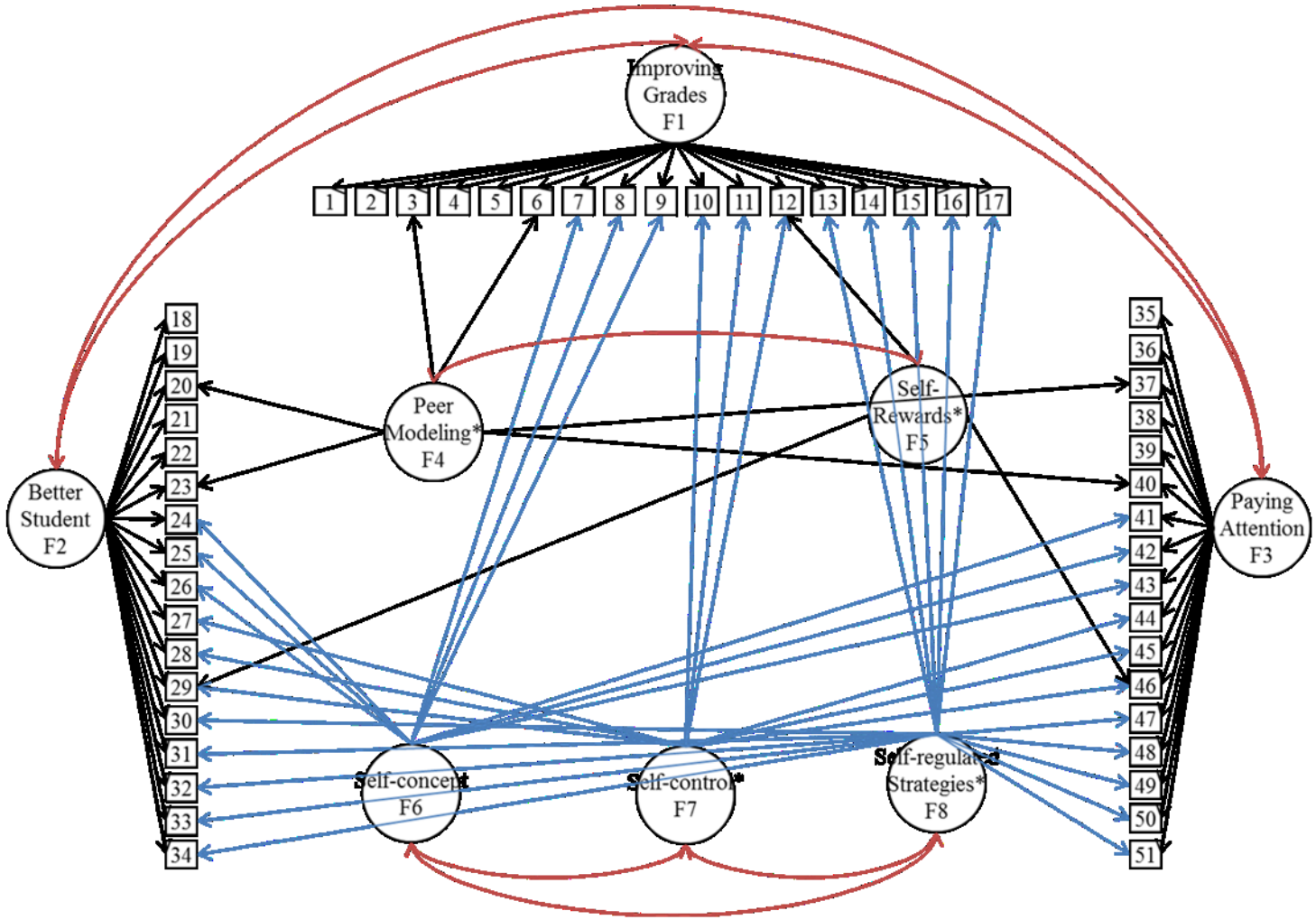

Figure 9. Reduced complex factor model. * = Self-regulation in social cognitive theory.

More reduced complex factor model. Although the reduced complex factor model has a good fit, the correlation between factor 4 and factor 5 is not significant (r = -.01; p = .785). In addition, items 12, 29, 46 have low factor loadings to the self-control factor (.17, .21, and .24). After a consideration of self-regulation in social cognitive theory, I removed the correlation as well as the problematic factor loadings (see Figure 10). The first factor is improving grades. The second factor is better student. The third factor is paying attention. The fourth factor is peer modeling. The fifth factor is self-rewards. The sixth factor is self-concept. The seventh factor is self-control. The eighth factor is self-regulated strategies. The factor variances are fixed to one. Factors 1, 2 and 3 are correlated. Factors 6, 7, and 8 are correlated. The model has a slightly better fit based on the global fit indices (CFI = .95, TLI = .94, RMESA = .06, 90% CI [.06, .07], WRMR = 1.58).

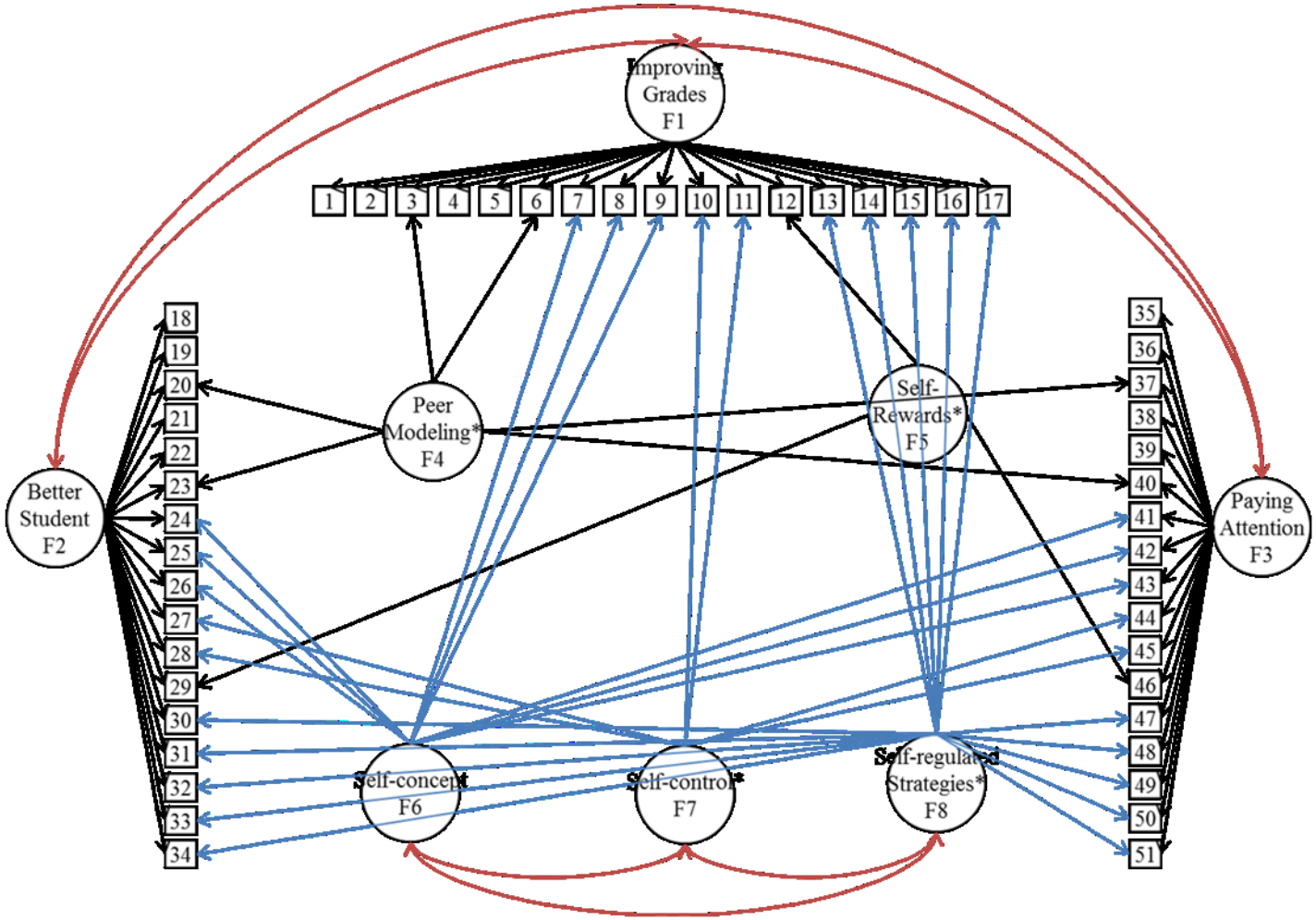

Figure 10. More reduced complex factor model. * = Self-regulation in social cognitive theory.

Final reduced complex factor model. I checked the modification index (M.I.) and Expected Parameter Change (E.P.C.) of the more reduced complex factor model. I found that a correlation of the factors 5 and 8 has M.I. of 93.30 and E.P.C. of .23. Since the factors 5 and 8 are related to self-regulation in social cognitive theory, I decided to correlate the factors 5 and 8 (see Figure 11). The first factor is improving grades. The second factor is better student. The third factor is paying attention. The fourth factor is peer modeling. The fifth factor is self-rewards. The sixth factor is self-concept. The seventh factor is self-control. The eighth factor is self-regulated strategies. The factor variances are fixed to one. Factors 1, 2 and 3 are correlated. Factors 5 and 8 are correlated. Factors 6, 7, and 8 are correlated. The model has the best fit based on the global fit indices (CFI = .95, TLI = .95, RMESA = .06, 90% CI [.06, .07], WRMR = 1.55). The model is selected as a final model of the PAPSS because of the theoretical clarity and the fit results. The factor correlations are listed in Table 3. The standardized factor loadings and polychoric correlation matrix are listed in Appendix C and Appendix D.

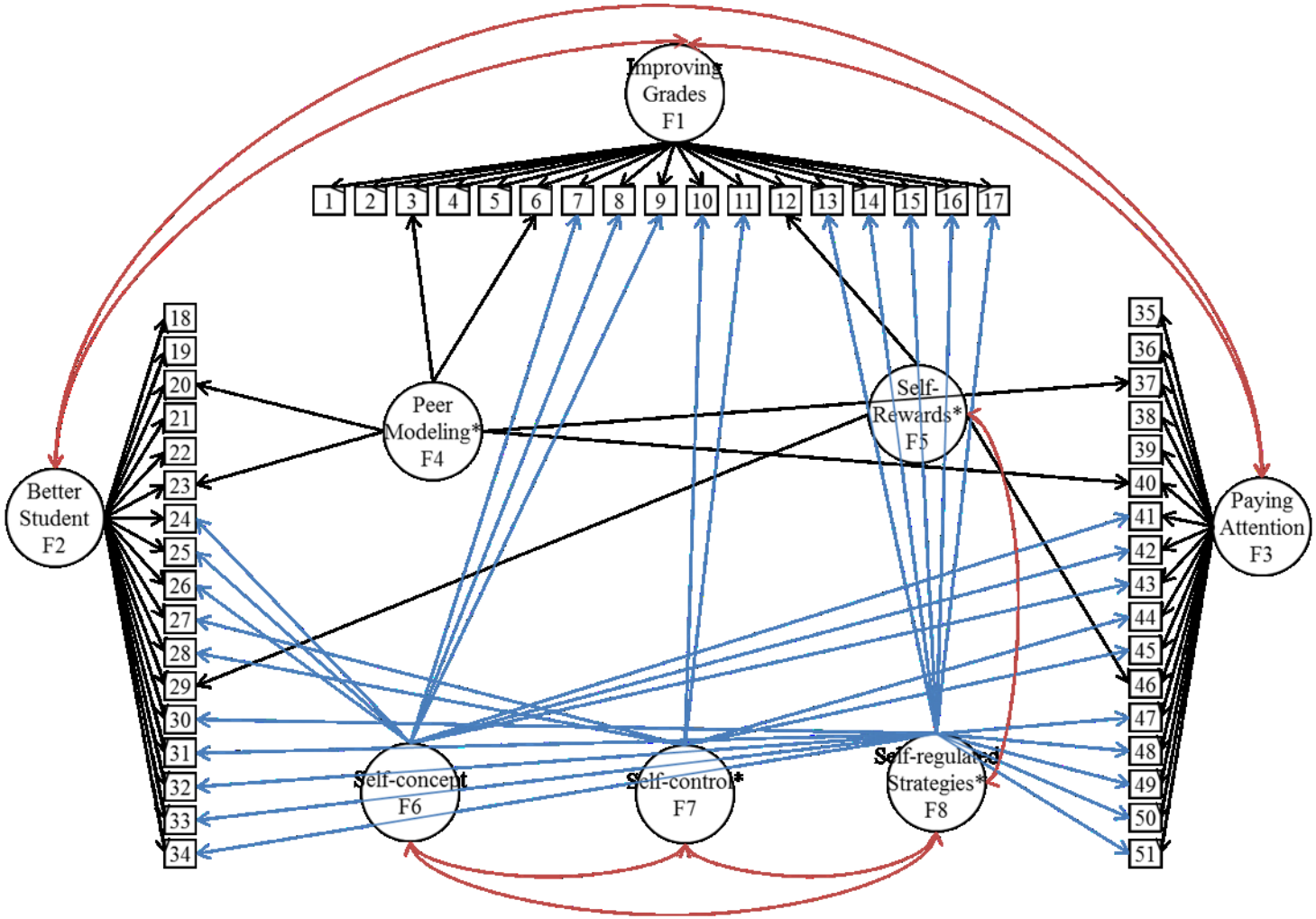

Figure 11. Final reduced complex factor model. * = Self-regulation in social cognitive theory.

Table 3

Factor Correlations

	F1	F2	F3	F4	F5	F6	F7	F8
F1	-							
F2	.94*	-						
F3	.75*	.84*	-					
F4	-	-	-	-				
F5	-	-	-	-	-			
F6	-	-	-	-	-	-		
F7	-	-	-	-	-	.73*	-	
F8	-	-	-	-	.22*	.31*	.70*	-

Note. *$p < .001$

Convergent Validity Evidence

Academic plausibility score (PLS) was added to the final model of the PAPSS to explore the convergent validity evidence (see Figure 12). The first factor is improving grades. The second factor is better student. The third factor is paying attention. The fourth factor is peer modeling. The fifth factor is self-rewards. The sixth factor is self-concept. The seventh factor is self-control. The eighth factor is self-regulated strategies. The factor variances are fixed to one. Factors 1, 2 and 3 are correlated. Factors 5 and 8 are correlated. Factors 6, 7, and 8 are correlated. The model has the adequate fit based on the global fit indices (CFI = .94; TLI = .94; RMESA = .07, 90% CI [.06, .07], WRMR = 1.42).

The PLS and F1 ($r = .20$, $p < .001$); PLS and F2 ($r = .20$, $p < .001$); PLS and F3 ($r = .13$, $p = .026$); PLS and F6 ($r = .15$, $p = .024$) are significantly correlated. However, PLS and F4 ($r = -.10$, $p = .065$); PLS and F5 ($r = .05$, $p = .365$); PLS and F7 ($r = .04$, $p = .605$); PLS and F8 ($r = .01$, $p = .923$) are not significantly correlated.

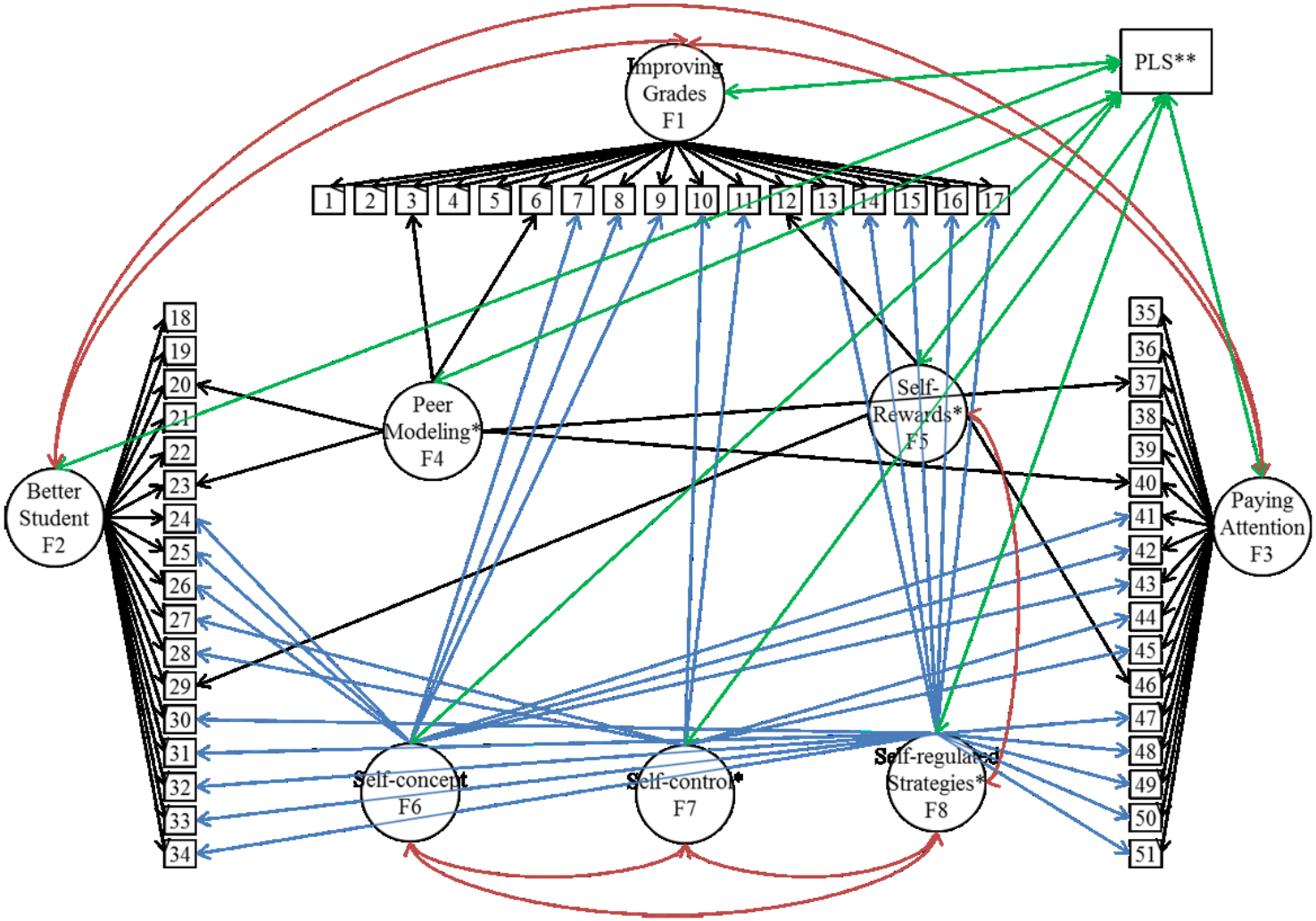

Figure 12. Convergent model. * = Self-regulation in social cognitive theory. ** = Plausibility score in academic possible selves theory

Chapter 6

DISCUSSION

Implications of the Study

Possible selves researchers have uncovered many issues associated with the current possible selves measures. For instance, one of the most famous possible selves measures, Oyserman (2004)'s open-ended possible selves questionnaire, has proven to be difficult to score reliably and also involves laborious scoring procedures (Lee et al., 2011). In addition, there is no standardized measure that incorporates sufficient empirical evidence and theoretical components in possible selves research (Packard & Conway, 2006; Oyserman & James, 2011). Therefore, this study was initiated to develop a close-ended measure, called the Persistent Academic Possible Selves Scale for Adolescents (PAPSS), that meets these challenges. The PAPSS integrates possible selves theories (personal and social identities) and educational psychology (self-regulation in social cognitive theory). Particularly, I was interested in expending self-regulation items using self-regulated learning strategies in social cognitive theory, investigating the validity evidence based on internal structure, and exploring the validity evidence based on relation to Oyserman (2004)'s open-ended questionnaire.

The development of the PAPSS was followed by the multiple iterative processes for scale development (Spector, 1992; DeVellis, 2003). I examined the validity evidence based on test content and the evidence of test-retest reliability and refined the scale during the iterative processes. First, the initial construct of the PAPSS was generated based on the reviews of social and personal identity theories in the possible selves literature. Spector (1992) argued that when developing a measure, construct clarity is key

before writing items. Then, the initial items were written based on the construct of the PAPSS as well as the content analysis results from female junior high and high school students. The initial items were refined based on subsequent research. This included extended participants such as female and male junior high and high school students as well as field experts. I gathered the evidence of test-retest reliability after administering the revised items to the same participants in a three week interval. Self-regulated learning strategies in social cognitive theory were integrated into the item revision process.

The PAPSS reframed the construct of self-regulation for achieving academic possible selves by adopting forethought and performance phases in self-regulation. The two phases describe how students can plan, develop, and manage academic self-regulation. This adaptation is meaningful in both methodological perspectives and theory development. Possible selves researchers have dealt with self-regulation with insufficient construct clarity. For example, Oyserman (2004)'s open-ended questionnaire asks students' possible selves ("Next year, I want to be….) and strategies ("What I am doing now to be that way next year…."). Oyserman and her colleagues argued that the coded results of students' academic possible selves and strategies (i.e., academic plausibility) are keenly related to self-regulation. The researchers, in fact, referred to academic plausibility as self-regulation (Oyserman et al., 2004). Other close-ended possible selves consist of general strategy questions such that "I will use my time wisely" and "I will cope well with distractions" (Kemmelmeir & Oyserman, 2001; p. 138). Therefore, self-regulation items in the PAPSS are important in terms of improving the construct clarity of self-regulation for achieving academic possible selves and examining the construct in future possible selves research.

The PAPSS has the validity evidence based on the internal structure. The factor analysis results uncovered the underlying factor structure in the PAPSS. The eight factors are three goal-driven factors (improving grades, better students, and paying attention), one self-regulated factor that focuses on peers (peer modeling), and four self-regulated factors that emphasize the self (self-rewards, self-concept, self-control, and self-regulated strategies). The goal-related factors are highly correlated with one another, which demonstrates that they are equally important academic goals for junior high and high school students. The self-rewards, self-concept, and self-control factors are significantly related to the self-related strategies factor, which supports the students' consistency in utilizing self-regulation. However, the peer modeling factor is not significantly related to other self-regulated factors. My colleagues and I (Lee & Husman, 2013) argued that students likely have much more experience and detailed understanding of their academic possible selves and self-regulation, whereas their understanding of other's beliefs may be less detailed.

It is noteworthy that this study did not provide evidence of convergent validity for the whole scale. Convergent validity evidence is necessary when test developers compare a new test and an existing test that measures a similar construct (Reynolds et al., 2009). The constructs of the PAPSS and Oyserman's academic plausibility are similar, however, the two scales differ in both empirically and theoretically in regard to measuring characteristics of strategies. The strategies measured by the PAPSS are self-regulated learning strategies (Zimmerman, 2000) for achieving academic possible selves, whereas the strategies assessed by Oyserman (2004)'s scale are unrestricted, in other words, more diverse and general strategies for attaining academic possible selves (e.g., tutoring). The

study results confirmed that academic goal-related factors in the PAPSS as well as the self-concept factor are significantly related to academic plausibility. However, the self-regulated factors: peer modeling, self-rewards, self-control, and self-regulated strategies in the PAPSS are not significantly related to academic plausibility.

I argue that the significant correlation between academic goal-related factors and academic plausibility can be used as the evidence of concurrent validity. The concurrent validity evidence is needed when test developers compare participants' current status on a test and a criterion (Reynolds et al., 2009). There are reasons for why the academic plausibility score measured by Oyserman (2004)'s questionnaire can be a criterion of academic goal factors in the PAPSS. The three goals in the PAPSS were selected based on the content analysis of students' responses using Oyserman (2004)'s questionnaire. Although the PAPSS limited the number of students' academic future goals, it did measure three academic future goals, which should accurately reflect students' self-defined goals for next year. Since, Oyserman (2004)'s questionnaire provides more free space to write down academic possible selves for next year, academic plausibility can be a criterion of the academic goal-related factors in the PAPSS.

However, many issues associated with Oyserman (2003)'s instructions were found during the coding process. It was very tricky to differentiate hidden academic possible selves and strategies from non-academic possible selves and strategies. I also detected that interpersonal related strategies were over weighted in the scoring process compared to interpersonal related academic possible selves. Wasting students' data during the coding process is also critical. Oyserman (2004)'s questionnaire was developed to measure possible selves and strategies not for academic possible selves and

strategies. Thus, my colleague and I discarded a great deal of students' possible selves and strategies that are related to other domains (e.g., social and career). Oyserman and James (2011) pointed out the significant loss of students' open-ended response in the process of coding. I recommend changing the current instructions on Oyserman (2004)'s open-ended questionnaire to more emphasize school and education contexts for academic plausibility coding. For example, "Next year, I expect to be…..in school" would be better for measuring academic possible selves and strategies than "Next year, I expect to be…."

Like most measures, the PAPSS has limitations. One would be incorporating a restricted numbers of academic possible goals and self-regulated learning strategies into one scale. Oyserman and James (2011) articulated that "….a pre-selected list reduces changes of learning what is salient to the respondent and increases the chance of social desirability influences" (p. 123). If researchers predict significant variations in participants' academic goals and self-regulated learning strategies based on pilot studies, the PAPSS may be inappropriate. The PAPSS was developed based on the content analysis of general junior high and high school students, so it may not fully capture diverse academic possible goals and self-regulated learning strategies of students in other boundaries (i.e., dropt out students). In this case, conducting content analysis of those students' open-ended responses of academic possible selves and self-regulation would be a more powerful tool to predict those students' future academic achievements. In sum, selecting appropriate measures of possible selves based on characteristics of participants and study purposes should be of a primary concern for possible selves researchers. In addition, I take into account the importance of the PAPSS direction for preventing students' pressure from choosing socially desirable answers. The direction emphasizes

the diversity in students' academic possible goals and strategies as well as focuses on personal thoughts and feelings.

Future Directions

The next step of the PAPSS study will be gathering more validity evidence. First, the validity evidence with an existing self-regulation scale which is reliable and valid is needed. It is interesting to compare the strength of relationship between self-regulation factors in the PAPSS and the existing self-regulation scale to the strength of relationship between academic plausibility and the existing self-regulation scale. I expect that the first correlation will be stronger because self-regulation items in the PAPSS were generated based on self-regulated learning strategies. One theoretical question before conducting the study is whether a construct of self-regulation for achieving academic goals with no time boundary is similar to a construct of self-regulation for achieving academic future goals for next year. Depending on the level of similarity of the two constructs, the study results can be the evidence of convergent validity or the evidence of divergent validity evidence of self-regulation factors in the PAPSS.

In addition, the evidence of convergent validity of the overall PAPSS is required. If an intervention program is designed to improve students' academic future goals and self-regulation for achieving these goals, the PAPSS should capture the program effect (i.e., growth over time). However, developing an intervention program and examining the program effect on both academic possible selves and self-regulation should proceed before testing the evidence of convergent validity of the PAPSS. In addition, the program effect should be measured by multiple methods such as interviews with participants, ratings from teachers and parents, and participants' academic achievement in

the following year (e.g., GPA) to check any bias associated with self-reported scores of the PAPSS.

The current factor structure of the PAPSS is a complex, multi-dimensional factor structure which can be interpretable within the Structural Equation Modeling (SEM) framework. Therefore, it would be the next step for researchers to investigate how to use the PAPSS scores in convenient way in secondary education (e.g., a mean score of an individual factor). The research question would be how we can meaningfully interpret subscale means and an average score of the PAPSS and how we can use these scores for better understanding students' academic possible selves and self-regulation. It can be valuable to test whether summated scores by factors in the PAPSS can predict students' academic performance for the coming year. The study results can be used as the evidence of predictive validity of the PAPSS.

After consecutive validation study, the PAPSS will be a beneficial tool for researchers to use for examining students' academic possible selves and self-regulation, for evaluating a program effect on promoting academic possible selves and self-regulation, and for investigating the processes of actualizing academic possible selves by means of self-regulated learning strategies. For teachers, the PAPSS will be a useful tool for developing curriculums and instructions to motivate students' academic possible selves and self-regulation, encouraging students' congruency with academic possible selves, and educating the significance of self-regulation toward achieving academic possible selves. For parents, the PAPSS will be a helpful device for understanding important aspects of academic possible selves of their children and providing valuable directions for guiding their children's academic possible selves and self-regulation.

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APPENDIX A

DESCRIPTIVE STATISTICS

	N	Min	Max	M	SD	Skewness	Kurtosis
P1	495	1.00	7.00	5.91	1.13	-1.07	0.89
P2	495	1.00	7.00	6.35	0.94	-2.07	6.23
P3	493	2.00	7.00	5.55	1.11	-0.58	-0.12
P4	494	1.00	7.00	5.67	1.27	-1.24	1.68
P5	493	1.00	7.00	6.15	0.95	-1.59	4.03
P6	495	1.00	7.00	5.15	1.26	-0.65	0.28
P7	495	1.00	7.00	6.57	0.82	-2.70	9.55
P8	493	1.00	7.00	6.17	0.96	-1.73	4.78
P9	493	1.00	7.00	6.14	1.01	-1.47	3.19
P10	494	1.00	7.00	5.64	1.27	-1.03	0.94
P11	495	1.00	7.00	6.43	0.88	-2.34	7.97
P12	495	1.00	7.00	5.57	1.41	-0.96	0.46
P13	495	1.00	7.00	5.50	1.21	-1.10	1.16
P14	495	1.00	7.00	5.88	1.17	-1.30	1.89
P15	495	1.00	7.00	6.21	1.00	-1.84	4.91
P16	492	2.00	7.00	5.98	0.95	-0.87	0.34
P17	494	1.00	7.00	5.75	1.15	-1.15	1.54
P18	493	1.00	7.00	5.92	1.10	-1.16	1.70
P19	492	1.00	7.00	6.08	1.09	-1.58	3.32
P20	493	1.00	7.00	5.54	1.15	-0.65	0.27
P21	494	1.00	7.00	5.70	1.21	-1.25	1.85

P22	494	1.00	7.00	6.06	1.07	-1.68	3.85
P23	493	1.00	7.00	5.25	1.24	-0.61	0.14
P24	493	1.00	7.00	6.51	0.76	-2.24	8.16
P25	494	1.00	7.00	6.22	0.95	-1.52	3.22
P26	493	1.00	7.00	6.24	0.92	-1.41	2.74
P27	494	1.00	7.00	5.69	1.27	-1.12	1.10
P28	495	1.00	7.00	6.43	0.84	-2.20	7.77
P29	494	1.00	7.00	5.59	1.43	-1.05	0.68
P30	495	1.00	7.00	5.57	1.22	-0.99	0.94
P31	495	1.00	7.00	5.84	1.15	-1.31	2.02
P32	494	1.00	7.00	5.87	1.14	-1.15	1.38
P33	495	1.00	7.00	5.82	1.13	-1.17	1.64
P34	494	1.00	7.00	5.68	1.19	-1.05	1.08
P35	495	1.00	7.00	5.69	1.21	-1.08	1.30
P36	495	1.00	7.00	5.86	1.25	-1.39	1.90
P37	493	1.00	7.00	5.17	1.34	-0.69	0.33
P38	494	1.00	7.00	5.53	1.34	-1.17	1.40
P39	495	1.00	7.00	5.88	1.21	-1.70	3.75
P40	493	1.00	7.00	5.13	1.43	-0.75	0.17
P41	495	1.00	7.00	6.16	1.01	-1.48	2.71
P42	494	1.00	7.00	5.88	1.16	-1.28	2.00
P43	492	1.00	7.00	5.97	1.11	-1.28	1.76

P44	495	1.00	7.00	5.52	1.41	-1.10	0.89
P45	494	1.00	7.00	6.18	1.06	-1.65	3.14
P46	494	1.00	7.00	5.37	1.52	-0.89	0.19
P47	495	1.00	7.00	5.40	1.36	-0.97	0.78
P48	495	1.00	7.00	5.60	1.40	-1.13	0.91
P49	495	1.00	7.00	5.23	1.53	-0.84	0.17
P50	495	1.00	7.00	5.29	1.47	-0.94	0.39
P51	495	1.00	7.00	5.38	1.51	-1.02	0.54
PLS	320	0.00	5.00	2.97	1.24	-0.50	-0.24

Note. P = The persistent academic possible selves scale for adolescents (PAPSS); PLS = Academic plausibility score.

APPENDIX B

THE PERSISTENT ACADEMIC POSSIBLE SELVES SCALE FOR ADOELSCENTS (PAPSS)

Theoretical Components	Goal 1: Improving classroom grades	Goal 2: Being a better student	Goal 3: Paying more attention in class
Social Identity	1. People who care about me think I will improve my classroom grades next year.	18. People who care about me think I will be a better student next year.	35. People who care about me think I will pay more attention in class next year.
	2. People who care about me will encourage me to improve my classroom grades next year.	19. People who care about me will encourage me to be a better student next year.	36. People who care about me will encourage me to pay more attention in class next year.
	3. In general my friends want to improve their classroom grades next year.	20. In general my friends want to be better students next year.	37. In general my friends want to pay more attention in class next year.
	4. People who care about me think I can create a plan to improve my classroom grades next year.	21. People who care about me think I can create a plan to be a better student next year.	38. People who care about me think I can create a plan to pay more attention in class next year.
	5. People who care about me will encourage my efforts to improve my classroom grades next year.	22. People who care about me will encourage my efforts to be a better student next year.	39. People who care about me will encourage my efforts to pay more attention in class next year.
	6. In general my friends are likely to use study skills to improve their classroom grades next	23. In general my friends are likely to use study skills to be better students next year.	40. In general my friends are likely to use study skills to pay more attention in class next

	year.		year.
Personal Identity & Forethought phase in self-regulation	7. I would like to improve my classroom grades next year. 8. I can see myself improving my classroom grades next year. 9. I am confident that I can improve my classroom grades next year. 10. I am confident that I will have a plan to improve my classroom grades next year. 11. With hard work, I can improve my classroom grades next year. 12. If I improve my classroom grades next year, I will treat myself to something I like.	24. I would like to be a better student next year. 25. I can see myself being a better student next year. 26. I am confident that I can be a better student next year. 27. I am confident that I will have a plan to be a better student next year. 28. With hard work, I can be a better student next year. 29. If I am a better student next year, I will treat myself to something I like.	41. I would like to pay more attention in class next year. 42. I can see myself paying more attention in class next year. 43. I am confident that I can pay more attention in class next year. 44. I am confident that I will have a plan to pay more attention in class next year. 45. With hard work, I can pay more attention in class next year. 46. If I pay more attention in class next year, I will treat myself to something I like.
Performance phase in self-regulation	13. Throughout next year I will evaluate my plan to improve my classroom grades.	30. Throughout next year I will evaluate my plan to be a better student.	47. Throughout next year I will evaluate my plan to pay more attention in class.

	14. Throughout next year I will look for help when I face problems in improving my classroom grades.	31. Throughout next year I will look for help when I face problems in being a better student.	48. Throughout next year I will look for help when I face problems in paying more attention in class.
	15. Throughout next year I will keep track of my classroom grades.	32. Throughout next year I will keep track of my progress in becoming a better student.	49. Throughout next year I will keep track of how much I pay attention in class.
	16. Throughout next year I will assess my classroom grades.	33. Throughout next year I will assess my progress in becoming a better student.	50. Throughout next year I will assess how much I pay attention in class.
	17. Throughout next year I will seek ways to create a better plan for improving my classroom grades.	34. Throughout next year I will seek ways to create a better plan for being a better student.	51. Throughout next year I will seek ways to create a better plan for paying more attention in class.

APPENDIX C

STANDARDIZED FACTOR LOADINGS

	Estimate	S.E.	Est./S.E.	*p*
F1 Improving Grades				
P1	.74	.03	28.05	$p < .001$
P2	.73	.03	25.17	$p < .001$
P3	.37	.04	8.89	$p < .001$
P4	.77	.02	35.40	$p < .001$
P5	.73	.03	29.45	$p < .001$
P6	.48	.04	13.18	$p < .001$
P7	.61	.04	15.03	$p < .001$
P8	.62	.03	20.65	$p < .001$
P9	.66	.03	23.31	$p < .001$
P10	.71	.02	29.18	$p < .001$
P11	.58	.04	15.12	$p < .001$
P12	.38	.04	9.37	$p < .001$
P13	.69	.02	28.12	$p < .001$
P14	.55	.03	18.40	$p < .001$
P15	.53	.04	14.42	$p < .001$
P16	.56	.03	16.59	$p < .001$
P17	.73	.02	31.59	$p < .001$
F2 Better Student				
P18	.75	.02	31.73	$p < .001$
P19	.81	.02	39.88	$p < .001$
P20	.47	.04	13.22	$p < .001$
P21	.82	.02	46.21	$p < .001$
P22	.81	.02	41.37	$p < .001$
P23	.60	.03	18.89	$p < .001$
P24	.68	.03	21.65	$p < .001$
P25	.63	.03	20.76	$p < .001$
P26	.68	.03	22.22	$p < .001$
P27	.72	.03	29.20	$p < .001$
P28	.64	.03	20.34	$p < .001$
P29	.40	.04	10.51	$p < .001$
P30	.74	.02	34.93	$p < .001$
P31	.57	.03	18.81	$p < .001$
P32	.65	.03	22.75	$p < .001$
P33	.68	.03	25.52	$p < .001$
P34	.72	.02	30.96	$p < .001$
F3 Paying Attention				
P35	.84	.02	45.65	$p < .001$
P36	.84	.02	49.71	$p < .001$
P37	.62	.03	19.55	$p < .001$
P38	.90	.02	52.42	$p < .001$
P39	.87	.02	52.69	$p < .001$
P40	.67	.03	22.97	$p < .001$
P41	.69	.03	23.91	$p < .001$

P42	.67	.03	23.67	$p < .001$
P43	.67	.03	22.40	$p < .001$
P44	.71	.02	29.51	$p < .001$
P45	.66	.03	23.15	$p < .001$
P46	.52	.04	15.00	$p < .001$
P47	.73	.02	31.12	$p < .001$
P48	.66	.03	23.66	$p < .001$
P49	.63	.03	22.30	$p < .001$
P50	.66	.03	25.18	$p < .001$
P51	.71	.02	29.17	$p < .001$
F4 Peer Modeling				
P3	.55	.04	15.45	$p < .001$
P6	.61	.03	20.17	$p < .001$
P20	.67	.03	24.78	$p < .001$
P23	.65	.03	22.32	$p < .001$
P37	.54	.03	19.21	$p < .001$
P40	.52	.03	18.32	$p < .001$
F5 Self-rewards				
P12	.83	.02	44.52	$p < .001$
P29	.86	.02	43.40	$p < .001$
P46	.76	.02	40.32	$p < .001$
F6 Self-concept				
P7	.26	.04	6.07	$p < .001$
P8	.53	.03	17.80	$p < .001$
P9	.49	.03	17.35	$p < .001$
P24	.26	.04	6.99	$p < .001$
P25	.59	.03	22.08	$p < .001$
P26	.60	.03	18.42	$p < .001$
P41	.33	.04	8.74	$p < .001$
P42	.57	.03	20.56	$p < .001$
P43	.58	.03	21.00	$p < .001$
F7 Self-control				
P10	.43	.03	14.84	$p < .001$
P11	.31	.04	7.45	$p < .001$
P27	.48	.03	14.94	$p < .001$
P28	.35	.04	8.87	$p < .001$
P44	.56	.03	20.12	$p < .001$
P45	.36	.03	10.68	$p < .001$
F8 Self-regulated Strategies				
P13	.45	.03	15.70	$p < .001$
P14	.45	.03	14.56	$p < .001$
P15	.30	.04	7.56	$p < .001$
P16	.31	.03	9.09	$p < .001$
P17	.42	.03	14.46	$p < .001$
P30	.48	.02	20.21	$p < .001$

P31	.48	.03	16.66	$p < .001$
P32	.54	.03	20.09	$p < .001$
P33	.56	.03	21.93	$p < .001$
P34	.47	.03	18.20	$p < .001$
P47	.55	.02	23.25	$p < .001$
P48	.49	.03	19.40	$p < .001$
P49	.55	.03	21.96	$p < .001$
P50	.55	.02	23.37	$p < .001$
P51	.54	.03	20.97	$p < .001$

Note. P = The persistent academic possible selves scale for adolescents (PAPSS).

APPENDIX D

POLYCHORIC CORRELATION MATRIX

	P1	P2	P3	P4	P5
P1	-				
P2	.67	-			
P3	.16	.26	-		
P4	.58	.58	.25	-	
P5	.54	.69	.29	.63	-
P6	.22	.25	.49	.36	.27
P7	.50	.47	.21	.42	.46
P8	.47	.40	.27	.45	.46
P9	.50	.39	.25	.46	.44
P10	.40	.39	.30	.55	.40
P11	.40	.40	.22	.39	.43
P12	.27	.25	.14	.27	.24
P13	.42	.39	.23	.53	.36
P14	.36	.32	.23	.33	.36
P15	.25	.33	.26	.34	.40
P16	.37	.38	.24	.42	.41
P17	.45	.48	.23	.58	.44
P18	.65	.54	.25	.58	.54
P19	.60	.67	.30	.53	.64
P20	.23	.26	.65	.31	.29
P21	.53	.51	.23	.67	.53
P22	.55	.66	.31	.61	.73
P23	.28	.27	.49	.38	.31
P24	.48	.47	.24	.44	.46
P25	.47	.44	.29	.39	.42
P26	.47	.43	.36	.44	.44
P27	.39	.37	.28	.52	.36
P28	.47	.43	.25	.38	.42
P29	.25	.29	.12	.26	.22
P30	.43	.37	.29	.53	.36
P31	.40	.42	.25	.40	.35
P32	.45	.42	.18	.43	.45
P33	.46	.42	.22	.43	.43
P34	.45	.39	.24	.53	.37
P35	.55	.43	.26	.51	.47
P36	.51	.54	.24	.50	.55
P37	.29	.27	.48	.33	.26
P38	.51	.48	.22	.59	.48
P39	.52	.57	.28	.52	.58
P40	.27	.25	.33	.38	.28
P41	.41	.39	.15	.35	.34
P42	.40	.34	.22	.36	.34
P43	.43	.38	.23	.42	.40
P44	.39	.34	.19	.46	.32
P45	.43	.39	.13	.39	.39
P46	.34	.28	.12	.28	.22
P47	.43	.36	.14	.46	.31
P48	.43	.37	.17	.40	.38
P49	.38	.33	.12	.40	.35

P50	.38	.36	.17	.39	.37
P51	.41	.36	.15	.50	.36
	P6	P7	P8	P9	P10
P6	-				
P7	.25	-			
P8	.33	.60	-		
P9	.35	.50	.79	-	
P10	.42	.43	.66	.71	-
P11	.20	.57	.56	.60	.55
P12	.13	.31	.26	.29	.25
P13	.42	.42	.53	.54	.70
P14	.27	.35	.40	.44	.43
P15	.21	.31	.38	.30	.43
P16	.27	.30	.43	.39	.41
P17	.41	.44	.48	.56	.66
P18	.34	.42	.48	.49	.45
P19	.31	.52	.49	.50	.48
P20	.59	.29	.30	.30	.40
P21	.42	.37	.46	.53	.61
P22	.38	.51	.48	.47	.50
P23	.72	.23	.33	.36	.52
P24	.29	.66	.47	.47	.43
P25	.28	.48	.69	.65	.58
P26	.35	.48	.68	.71	.64
P27	.41	.36	.53	.54	.74
P28	.25	.47	.49	.53	.48
P29	.15	.27	.26	.24	.22
P30	.39	.39	.46	.51	.68
P31	.17	.33	.36	.37	.46
P32	.28	.41	.46	.50	.53
P33	.31	.43	.49	.52	.57
P34	.37	.44	.49	.54	.67
P35	.33	.31	.41	.49	.46
P36	.21	.43	.37	.41	.39
P37	.50	.23	.24	.28	.38
P38	.36	.40	.42	.46	.55
P39	.29	.45	.36	.42	.42
P40	.56	.24	.26	.29	.41
P41	.18	.52	.43	.39	.38
P42	.23	.40	.53	.49	.48
P43	.24	.40	.50	.52	.51
P44	.27	.37	.46	.48	.60
P45	.18	.44	.37	.42	.41
P46	.14	.31	.23	.29	.26
P47	.31	.35	.41	.47	.62
P48	.19	.38	.34	.38	.48
P49	.24	.28	.31	.33	.46
P50	.31	.30	.36	.43	.49
P51	.31	.33	.40	.45	.58

	P11	P12	P13	P14	P15
P11	-				
P12	.24	-			
P13	.47	.36	-		
P14	.36	.34	.54	-	
P15	.36	.24	.42	.48	-
P16	.33	.21	.49	.43	.68
P17	.47	.29	.72	.53	.48
P18	.34	.33	.47	.40	.35
P19	.49	.29	.42	.43	.43
P20	.26	.09	.35	.25	.21
P21	.44	.20	.57	.39	.36
P22	.43	.24	.49	.39	.48
P23	.29	.19	.47	.33	.29
P24	.56	.29	.45	.39	.46
P25	.51	.33	.50	.44	.43
P26	.53	.28	.51	.48	.37
P27	.44	.26	.65	.49	.41
P28	.68	.24	.41	.38	.37
P29	.16	.86	.31	.33	.25
P30	.45	.31	.78	.58	.41
P31	.33	.28	.47	.68	.43
P32	.43	.25	.59	.57	.57
P33	.40	.30	.64	.55	.55
P34	.39	.23	.67	.54	.44
P35	.41	.32	.46	.43	.29
P36	.41	.32	.38	.37	.36
P37	.22	.21	.39	.34	.22
P38	.40	.22	.54	.38	.35
P39	.40	.31	.41	.42	.42
P40	.21	.15	.41	.29	.12
P41	.43	.24	.39	.35	.33
P42	.38	.28	.44	.43	.35
P43	.43	.24	.43	.45	.33
P44	.35	.24	.59	.49	.35
P45	.54	.23	.40	.37	.39
P46	.19	.78	.35	.31	.19
P47	.34	.30	.66	.50	.37
P48	.31	.32	.49	.58	.36
P49	.29	.29	.55	.48	.38
P50	.28	.29	.56	.42	.37
P51	.32	.29	.62	.50	.37

	P16	P17	P18	P19	P20
P16	-				
P17	.57	-			
P18	.38	.51	-		
P19	.40	.50	.70	-	
P20	.29	.36	.37	.37	-
P21	.37	.63	.61	.61	.35

P22	.41	.54	.60	.72	.39
P23	.28	.49	.44	.33	.69
P24	.39	.47	.49	.58	.32
P25	.46	.52	.50	.49	.37
P26	.42	.52	.52	.53	.39
P27	.48	.69	.46	.47	.44
P28	.38	.48	.40	.52	.33
P29	.26	.32	.29	.27	.11
P30	.48	.71	.49	.49	.43
P31	.36	.52	.44	.45	.28
P32	.52	.66	.42	.54	.26
P33	.58	.64	.45	.55	.30
P34	.46	.74	.48	.49	.39
P35	.34	.44	.60	.55	.32
P36	.32	.43	.56	.70	.29
P37	.24	.40	.34	.36	.63
P38	.41	.56	.51	.60	.34
P39	.42	.44	.55	.68	.29
P40	.22	.43	.40	.28	.53
P41	.36	.45	.35	.41	.23
P42	.38	.41	.38	.38	.27
P43	.39	.43	.37	.38	.24
P44	.40	.60	.42	.41	.28
P45	.39	.47	.40	.46	.25
P46	.21	.32	.29	.30	.12
P47	.44	.67	.41	.47	.30
P48	.28	.54	.43	.47	.24
P49	.34	.53	.39	.41	.21
P50	.47	.57	.46	.46	.29
P51	.46	.64	.43	.43	.28
	P21	P22	P23	P24	P25
P21	-				
P22	.73	-			
P23	.49	.42	-		
P24	.52	.62	.32	-	
P25	.41	.46	.39	.64	-
P26	.50	.44	.43	.65	.85
P27	.61	.48	.53	.47	.68
P28	.50	.50	.30	.63	.62
P29	.25	.27	.26	.33	.33
P30	.62	.52	.49	.49	.56
P31	.45	.45	.33	.37	.45
P32	.52	.54	.36	.51	.54
P33	.53	.60	.38	.55	.55
P34	.60	.51	.50	.47	.55
P35	.59	.49	.41	.47	.48

P36	.55	.63	.32	.54	.44
P37	.40	.31	.62	.32	.32
P38	.67	.56	.45	.45	.44
P39	.57	.65	.37	.55	.44
P40	.43	.29	.72	.26	.31
P41	.45	.45	.30	.59	.50
P42	.43	.33	.36	.44	.62
P43	.43	.38	.30	.45	.59
P44	.53	.39	.37	.41	.51
P45	.45	.41	.28	.51	.44
P46	.27	.28	.27	.29	.31
P47	.55	.47	.46	.40	.48
P48	.46	.49	.36	.39	.40
P49	.48	.41	.37	.30	.37
P50	.47	.43	.41	.37	.44
P51	.51	.45	.41	.42	.44
	P26	P27	P28	P29	P30
P26	-				
P27	.71	-			
P28	.67	.59	-		
P29	.31	.25	.23	-	
P30	.61	.77	.55	.32	-
P31	.47	.52	.41	.37	.60
P32	.56	.61	.49	.33	.70
P33	.58	.65	.49	.38	.72
P34	.61	.73	.50	.29	.76
P35	.49	.50	.49	.33	.55
P36	.47	.43	.53	.31	.47
P37	.37	.46	.36	.27	.50
P38	.49	.64	.53	.26	.65
P39	.51	.50	.55	.32	.52
P40	.39	.50	.32	.24	.51
P41	.51	.49	.51	.34	.47
P42	.63	.56	.50	.36	.52
P43	.63	.55	.51	.30	.50
P44	.58	.67	.44	.33	.67
P45	.48	.46	.63	.27	.44
P46	.28	.32	.27	.82	.40
P47	.53	.72	.49	.36	.79
P48	.44	.53	.42	.36	.60
P49	.39	.55	.39	.31	.62
P50	.47	.56	.41	.36	.62
P51	.52	.65	.44	.36	.70
	P31	P32	P33	P34	P35
P31	-				
P32	.59	-			
P33	.57	.85	-		
P34	.60	.67	.73	-	

P35	.47	.52	.54	.51	-
P36	.41	.47	.51	.46	.74
P37	.33	.37	.35	.42	.49
P38	.44	.56	.57	.63	.67
P39	.48	.52	.55	.47	.68
P40	.38	.37	.39	.48	.50
P41	.44	.46	.48	.46	.54
P42	.46	.46	.48	.48	.59
P43	.48	.46	.48	.47	.55
P44	.56	.60	.62	.68	.59
P45	.44	.49	.47	.50	.52
P46	.41	.36	.41	.34	.43
P47	.58	.65	.72	.72	.57
P48	.74	.57	.62	.62	.55
P49	.53	.63	.62	.57	.52
P50	.51	.64	.71	.64	.53
P51	.54	.65	.67	.70	.56
	P36	P37	P38	P39	P40
P36	-				
P37	.43	-			
P38	.70	.49	-		
P39	.81	.46	.76	-	
P40	.40	.72	.57	.45	-
P41	.60	.40	.59	.59	.47
P42	.52	.44	.56	.54	.51
P43	.50	.34	.57	.55	.46
P44	.51	.43	.65	.54	.55
P45	.56	.40	.52	.57	.44
P46	.40	.31	.37	.40	.36
P47	.54	.48	.67	.58	.54
P48	.56	.41	.56	.58	.48
P49	.49	.46	.58	.55	.48
P50	.49	.49	.58	.53	.58
P51	.50	.49	.63	.58	.55
	P41	P42	P43	P44	P45
P41	-				
P42	.69	-			
P43	.63	.85	-		
P44	.62	.73	.75	-	
P45	.68	.66	.69	.67	-
P46	.40	.41	.38	.44	.38
P47	.54	.58	.58	.77	.56
P48	.48	.53	.53	.66	.53
P49	.44	.49	.49	.64	.53
P50	.48	.53	.53	.65	.54
P51	.56	.60	.59	.74	.58
	P46	P47	P48	P49	P50
P46	-				
P47	.50	-			

P48	.53	.73	-		
P49	.48	.72	.72	-	
P50	.48	.72	.65	.82	-
P51	.46	.78	.68	.75	.81

Note. P = The persistent academic possible selves scale for adolescents (PAPSS).

APPENDIX E

IRB APPROVAL LETTERS

ASU Knowledge Enterprise Development

Office of Research Integrity and Assurance

To:	Jenefer Husman EDB
From:	Mark Roosa, Chair Soc Beh IRB
Date:	01/21/2011
Committee Action:	**Expedited Approval**
Approval Date:	01/21/2011
Review Type:	Expedited F7
IRB Protocol #:	1012005845
Study Title:	The Pilot Study of the Persistent Academic Possible Selves Scale for Adolescents
Expiration Date:	01/20/2012

The above-referenced protocol was approved following expedited review by the Institutional Review Board.

It is the Principal Investigator's responsibility to obtain review and continued approval before the expiration date. You may not continue any research activity beyond the expiration date without approval by the Institutional Review Board.

Adverse Reactions: If any untoward incidents or severe reactions should develop as a result of this study, you are required to notify the Soc Beh IRB immediately. If necessary a member of the IRB will be assigned to look into the matter. If the problem is serious, approval may be withdrawn pending IRB review.

Amendments: If you wish to change any aspect of this study, such as the procedures, the consent forms, or the investigators, please communicate your requested changes to the Soc Beh IRB. The new procedure is not to be initiated until the IRB approval has been given.

Please retain a copy of this letter with your approved protocol.

ARIZONA STATE UNIVERSITY
Knowledge Enterprise Development

Office of Research Integrity and Assurance

To: Jenefer Husman EDB

From: Mark Roosa, Chair Soc Beh IRB

Date: 12/30/2011

Committee Action: Renewal

Renewal Date: 12/30/2011

Review Type: Expedited F7

IRB Protocol #: 1012005845

Study Title: The Pilot Study of the Persistent Academic Possible Selves Scale for Adolescents

Expiration Date: 01/19/2013

The above-referenced protocol was given renewed approval following Expedited Review by the Institutional Review Board.

It is the Principal Investigator's responsibility to obtain review and continued approval of ongoing research before the expiration noted above. Please allow sufficient time for reapproval. Research activity of any sort may not continue beyond the expiration date without committee approval. Failure to receive approval for continuation before the expiration date will result in the automatic suspension of the approval of this protocol on the expiration date. Information collected following suspension is unapproved research and cannot be reported or published as research data. If you do not wish continued approval, please notify the Committee of the study termination.

This approval by the Soc Beh IRB does not replace or supersede any departmental or oversight committee review that may be required by institutional policy.

Adverse Reactions: If any untoward incidents or severe reactions should develop as a result of this study, you are required to notify the Soc Beh IRB immediately. If necessary a member of the IRB will be assigned to look into the matter. If the problem is serious, approval may be withdrawn pending IRB review.

Amendments: If you wish to change any aspect of this study, such as the procedures, the consent forms, or the investigators, please communicate your requested changes to the Soc Beh IRB. The new procedure is not to be initiated until the IRB approval has been given.

Please retain a copy of this letter with your approved protocol.

PO Box 876111 Tempe, AZ 85287-6111 ♠ 660 S. Mill Avenue, Suite 315 ♠ P 480 965 6788 ♠ F 480 965 7772
http://researchintegrity.asu.edu

ASU Knowledge Enterprise Development

Office of Research Integrity and Assurance

To:	Jenefer Husman EDB
From:	Mark Roosa, Chair Soc Beh IRB
Date:	12/31/2012
Committee Action:	**Renewal**
Renewal Date:	12/31/2012
Review Type:	Expedited F7
IRB Protocol #:	1012005845
Study Title:	The Pilot Study of the Persistent Academic Possible Selves Scale for Adolescents
Expiration Date:	01/18/2014

The above-referenced protocol was given renewed approval following Expedited Review by the Institutional Review Board.

It is the Principal Investigator's responsibility to obtain review and continued approval of ongoing research before the expiration noted above. Please allow sufficient time for reapproval. Research activity of any sort may not continue beyond the expiration date without committee approval. Failure to receive approval for continuation before the expiration date will result in the automatic suspension of the approval of this protocol on the expiration date. Information collected following suspension is unapproved research and cannot be reported or published as research data. If you do not wish continued approval, please notify the Committee of the study termination.

This approval by the Soc Beh IRB does not replace or supersede any departmental or oversight committee review that may be required by institutional policy.

Adverse Reactions: If any untoward incidents or severe reactions should develop as a result of this study, you are required to notify the Soc Beh IRB immediately. If necessary a member of the IRB will be assigned to look into the matter. If the problem is serious, approval may be withdrawn pending IRB review.

Amendments: If you wish to change any aspect of this study, such as the procedures, the consent forms, or the investigators, please communicate your requested changes to the Soc Beh IRB. The new procedure is not to be initiated until the IRB approval has been given.

Please retain a copy of this letter with your approved protocol.