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Development and Validation of a 2×2 Model of Time-Related Academic Behavior:

Procrastination and Timely Engagement

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Abstract

Procrastination is an educational concern for classroom instructors because of its negative psychological and academic impacts on students. However, the traditional view of procrastination as a unidimensional construct is insufficient in two regards. First, the construct needs to be viewed more broadly as time-related academic behavior, encompassing both procrastination and timely engagement. Secondly, the underlying motivation of these behaviors needs to be considered. Therefore, we developed and validated a 2×2 model of time-related academic behavior. The results of a confirmatory factor analysis supported a four-factor structure, and correlation with a unidimensional measure of procrastination also supported this model. Furthermore, the 2×2 model demonstrated significantly better fit to the data than potentially competing models. Structural equation modeling with achievement goals revealed that the 2×2 model unveiled relationships previously obscured in the traditional model, including that procrastination appeared to be used as a performance-enhancing strategy, while timely engagement was used to enhance mastery. The theoretical and practical implications of these new relationships are discussed.

KEYWORDS: Procrastination; Timely Engagement; Approach Motivation; Avoidance Motivation; Achievement Goals

Development and Validation of a 2×2 Model of Time-Related Academic Behavior:

Procrastination and Timely Engagement

1.1. Introduction

Academic procrastination has drawn research interest because of its prevalence and educational implications for classroom instructors and administrators (van Eerde, 2003). Researchers have consistently identified between 40% and 60% of students as involved in procrastination to a moderate or high degree (Onwuegbuzie, 2004; Rothblum, Solomon, & Murakami, 1986; Solomon & Rothblum, 1984). This high prevalence of procrastination appears to be observed similarly across cultures, as reported in the United States (Onwuegbuzie, 2004; Rothblum, Solomon, & Murakami, 1986; Solomon & Rothblum, 1984), Canada and Singapore (Klassen, Ang, Chong, Krawchuck, Huan, Wong, & Yeo, 2009), and Turkey (Ozer, Demir, & Ferrari, 2009). Procrastination is associated with a number of aversive physical and psychological outcomes. Individuals who procrastinate report more physical complaints (Rothblum, Solomon, & Murakami, 1986), more illness-related complaints, and visit healthcare providers more frequently (Tice & Baumeister, 1997). Anxiety and stress are also higher in those who procrastinate more. Previous research has demonstrated that people who delay starting or completing tasks to a greater degree tend to show higher levels of global anxiety (Tice & Baumeister, 1997), domain-specific anxiety such as test anxiety (Rothblum, Solomon, & Murakami, 1986), and math anxiety (Owens & Newbegin, 2000). In addition, procrastination has a negative impact on academic performance, such as math and English scores (Owens & Newbegin, 2000), and assignment grades in general (Howell, Watson, Powell, & Buro, 2006), although its impact on overall course grades is less clear (Howell, Watson, Powell, & Buro, 2006; Owens & Newbegin, 1997).

As such, prior research makes apparent that procrastination presents problems and challenges for learners such as aversive outcomes in psychological well-being, and poor performance. To better help students regulate time-related academic behaviors (e.g. procrastination or timely engagement), educators should assess the extent to which students procrastinate on their academic work and why the delayed behavior occurs. However, gaps in the previous literature prevent us from understanding student procrastination in a clear and comprehensive way.

Traditionally, procrastination was defined as any behavioral delay in starting or finishing a task (Beck, Koons, & Milgrim, 2000; Ferrari, O'Callaghan, & Newbegin, 2005; Klassen, Krawchuck, Lynch, & Rajani, 2008; Meyer, 2000; Rothblum, Solomon, & Murakami, 1986; Solomon & Rothblum, 1984). The traditional model of procrastination research is insufficient in two regards. The first issue with the traditional model of procrastination is related to restricted range of measurement. In the traditional model of procrastination, the construct of procrastination is measured with the assumption that the individual can be classified by the severity of his/her academic task-related behavioral delay. This assumption results in an implicit continuum of classification ranging from 'very little procrastination' to 'extreme procrastination'. Because timely engagement is not measured, 'very little procrastination' becomes vague and undefined, encompassing a wide range of responses from little procrastination to a high level of timely engagement. Students who rarely put off starting or completing tasks but demonstrate varying degrees of timely engagement might be different on a range of motivational, behavioral, and psychological characteristics. However, these students with potentially different patterns of time-related academic behaviors are constrained into the same category under 'little procrastination' in the traditional model of procrastination. From a

practical perspective, in their effort to cultivate students' adaptive patterns of time-related academic behaviors, educators are not only concerned about decreasing students' academic procrastination behaviors, but also facilitating timely engagement. Timely engagement, then, is the missing endpoint to the measurement continuum of time-related academic behaviors, and the more accurate and comprehensive measurement continuum needs to be extended from procrastination on one end to timely engagement on the other end. This extended measurement continuum provides a more complete picture of time-related academic behaviors.

The second issue with the traditional model relates to the view of procrastination as a unidimensional construct, capturing only the presence or absence of dilatory behaviors with little or no emphasis on underlying motivation for these behaviors. Various reasons or motivations may lead a person to procrastinate or actively engage in a task in a timely manner.

Understanding why a person delays performing a task, or why a person engages in a task in a timely manner is equally important as understanding the degree or severity of the procrastination or timely engagement. The traditional model and measures of procrastination, however, do not adequately account for the motivation behind the time-related academic behavior, thus leaving out important information about the behavior itself. Simply measuring whether or not an individual procrastinates or the degree to which an individual procrastinates does not create a comprehensive picture of the nature of procrastination. Although there has been some research that supports the idea that people have reasons to procrastinate (e.g., active versus passive procrastination; Choi & Moran, 2009, Chu & Choi, 2005; Schraw, Wadkins, & Olafson, 2007), little research has attempted to measure underlying motivation for time-related academic behaviors.

As mentioned above, some researchers have demonstrated the importance of considering motivation in procrastination (Choi & Moran, 2009; Chu & Choi, 2005) and have differentiated procrastination into two general types of behaviors: passive procrastination and active procrastination. Active procrastination involves the intentional delay of tasks to gain strategic advantage with the goal of improving performance, whereas passive procrastination involves the intentional delay of tasks to avoid particularly aversive tasks (Alexander & Onwuegbuzie, 2007; Burns, Dittman, Nguyen, & Mitchelson, 2000; Carden, Bryant, & Moss, 2004; Deniz, Tras, & Aydogan, 2009), or as a function of a failure to self-regulate (Brownlow & Reasinger, 2000; Klassien, Ang, Chong, Krawchuck, Huan, Wong, & Yeo, 2009; Klassen, Krawchuck, Lynch, & Rajani, 2008; Senecal, Koestner, & Vallerand, 1995). Similar to the concept of active procrastination, Schraw, Wadkins, and Olafson (2007) found a dominant theme in their qualitative work of students procrastinating to obtain a better state of flow in their work, or to increase the quality of their work under more time pressure. Prior research has provided empirical evidence that active and passive procrastination are distinct and independent (Choi & Moran, 2009; Chu & Choi, 2005) and that they show differential relationships with constructs in motivation. For instance, individuals high in active procrastination showed a higher level of self-efficacy and a lower level of extrinsic motivation than those high in passive procrastination (Chu & Choi, 2005). This empirical evidence speaks to the need to further differentiate the types of time-related academic behaviors by 1) incorporating the underlying motivation for procrastination and timely engagement, and 2) the need for viewing procrastination as a multidimensional construct.

Based on our thorough review of current literature on procrastination, we found that a new model of procrastination and timely engagement was needed to more comprehensively

conceptualize time-related academic behaviors. The purpose of the present study was two-fold. First, considering the two issues of the traditional model of procrastination reviewed above, we developed a new conceptual model and measure of time-related academic behaviors that include timely engagement as well as procrastination and consider underlying motivation for those time-related academic behaviors. Second, we tested psychometric properties of the 2×2 measure of procrastination and timely engagement and further tested construct validity by investigating how different types of procrastination and timely engagement differentially relate to achievement goals.

1.2. Development of a 2×2 Model of Procrastination and Timely Engagement

We incorporated the concept of ‘timely engagement’ into the existing model of procrastination to provide a comprehensive picture of possible time-related academic behaviors. In addition, we incorporated approach versus avoidance motivational valence into the model of time-related academic behaviors (i.e. procrastination and timely engagement) in order to conceptualize distinct types of time-related behaviors with different natures and functions. Elliot and Covington (2001) stressed the importance of approach versus avoidance distinctions in understanding human behavior. Approach motivation tends to drive human behavior through positive and/or desirable events or outcomes, whereas avoidance motivation tends to drive human behavior through negative and/or undesirable events or outcomes (Elliot, 1999). For example, when the approach versus avoidance distinction was applied to explain procrastination behaviors, procrastination behaviors with *approach* motivation might be driven by the desire to gain an advantage on a task, or because one feels one performs better under time pressure. On the other hand, the procrastination behaviors with *avoidance* motivation might be driven by the desire to avoid an unpleasant task, anxiety associated with a task or the possibility of failure.

This approach versus avoidance motivation provides a meaningful lens through which to examine the reasons for procrastination and timely engagement.

In the current study, therefore, we proposed a 2×2 model of procrastination and timely engagement that includes two dimensions: 1) the ‘time’ dimension indicating which time-related academic behaviors occur (i.e. procrastination versus timely engagement), 2) the ‘motivational orientation’ dimension indicating why the time-related academic behaviors occur (i.e. approach versus avoidance). This model provides the ability to conceptualize not only *what* time-related academic behavior occurs, but also *why* the time-related academic behavior occurs. The combination of the two dimensions resulted in four different ‘types’ of behavior (See Figure 1), specifically, procrastination-approach, procrastination-avoidance, timely engagement-approach, and timely engagement-avoidance, which are predicted to relate to a different constellation of behavioral and psychological characteristics.

Procrastination-approach refers to the behavior of delaying starting or completing tasks to obtain desirable outcomes. Procrastination-approach would be similar to what the literature has characterized as active procrastination: delaying tasks in order to gain a strategic advantage on the task (Choi & Moran, 2009; Chu & Choi, 2005). By contrast, *procrastination-avoidance* refers to the delay of tasks driven by the avoidance of undesirable outcomes, rather than the approach of desirable ones. Procrastination-avoidance would be similar to the traditional type of procrastination, given that it is normally driven by either self-regulatory failure (Brownlow & Reasinger, 2000; Klassen, Ang, Chong, Krawchuck, Huan, Wong, & Yeo, 2009; Klassen, Krawchuck, Lynch, & Rajani, 2008; Senecal, Koestner, & Vallerand, 1995) or avoidant coping style (Alexander & Onwuegbuzie, 2007; Burns, Dittman, Nguyen, & Mitchelson, 2000; Carden, Bryant, & Moss, 2004; Deniz, Tras, & Aydogan, 2009).

Incorporating the approach versus avoidance distinction into the construct of ‘timely engagement’, generates the same pattern of construct differentiation. *Timely engagement-approach* refers to the behavior of engaging in tasks in a timely manner with approach motivation, such as gaining an advantage on the task. *Timely engagement-avoidance* refers to the behavior of engaging in a timely manner with an avoidance motivation such as avoiding potential undesirable outcomes. A more thorough understanding of both procrastination and timely engagement, and the underlying motivations associated with these time-related academic behaviors may allow for further development of time-related academic behavior theory within motivational theory, and lead to enhanced educational practice surrounding these behaviors.

1.3. Relationship between Procrastination/Timely Engagement and Achievement Goals

Achievement goals, including mastery and performance goals, both with approach versus avoidance valence, have been of interest in educational research. They are associated with a number of variables such as views of self (Elliot, 2005), self-handicapping (Midgley & Urdan, 2001), sense of well-being (Kaplan & Maehr, 1999), and self-efficacy (Anderman & Young, 1994; Middleton & Midgley, 2002; Linnenbrink, 2005; Pajares, Britner, & Valiante, 2000). These relationships are relevant for educators working to increase student success and learning in the classroom. Because empirical research has shown that different types of achievement goals tend to motivate students to engage in different patterns of learning patterns, one would expect that different achievement goals may lead students to utilize different types of time-related academic behaviors. Accordingly, we investigated how the four types of time-related academic behaviors, based on the new 2×2 model of procrastination and timely engagement proposed in the present study, are differentially related to different types of achievement goals.

Achievement goals are defined as purposes for academic work, and the current literature on achievement goals discusses four types of goals: mastery-approach goals, mastery-avoidance goals, performance-approach goals, and performance-avoidance goals (Elliot & Church, 1997; Elliot & Murayama, 2008; Elliot & Thrash, 2001). Mastery-approach goals are characterized by striving to develop competence or progressing in learning; performance-approach goals are characterized by seeking to demonstrate competence or perform up to a normative standard; mastery-avoidance goals are characterized by striving to avoid failing to gain competence or to avoid losing competence; and performance-avoidance goals are characterized by seeking to hide a lack of competence based on normative standards (Elliot & Murayama, 2008).

Prior research examining the relationship between procrastination and achievement goals has utilized the traditional model of procrastination, in which procrastination is viewed as a unidimensional construct. Several empirical studies evidenced the significant role of achievement goals in predicting various levels of task-related delays, with mastery-approach and performance-approach goals predicting a lower level of procrastination and mastery-avoidance goals predicting a higher level of generalized procrastination (Howell & Buro, 2009; Howell & Watson, 2007; Seo, 2009). These studies have found an intriguing and consistent pattern regarding the relationship between achievement goals and generalized procrastination. Regardless of whether achievement goals are mastery-oriented or performance-oriented, the approach versus avoidance distinction emerged as a determining factor in the level of procrastination as defined in the traditional model.

In the 2×2 model of procrastination and timely engagement, hypotheses regarding the relationship between achievement goals and procrastination/timely engagement need to be reformulated. The new 2×2 model of procrastination and timely engagement enables us to

examine how different achievement goals are associated with different *types* of procrastination and timely engagement involving distinct underlying motivation. Although both mastery-approach goals and performance-approach goals had generally predicted lower procrastination in previous work, we hypothesized a different pattern of relationships, in conversation with previous research findings (e.g. Howell & Buro, 2009; Howell & Watson, 2007; Seo, 2009), while adjusting for the new conceptual framework of the 2×2 model of procrastination/timely engagement. In general, we predicted that procrastination would be positively related to performance goals, timely engagement would be positively related to mastery goals, and that procrastination/timely engagement with approach motivation would be positively related to achievement goals with approach orientation, while procrastination/timely engagement with avoidance motivation would be positively related to achievement goals with avoidance orientation. These general principles guided us to reformulate hypotheses regarding the relationship between time-related academic behaviors and achievement goals. Specifically, it was hypothesized that procrastination-approach would be predicted by performance-approach goals, performance-avoidance goals, and mastery-approach goals; that procrastination-avoidance would be predicted by performance-approach goals, performance-avoidance goals, and mastery-avoidance goals; that timely engagement-approach would be predicted by performance-approach goals, mastery-approach goals, and mastery-avoidance goals; and that timely engagement-avoidance would be predicted by performance-avoidance goals, mastery-approach goals, and mastery-avoidance goals. These hypothesized relationships are shown in Figure 2. In addition to these hypothesized structural relationships, we hypothesized that an existing, generalized measure for procrastination would be moderately positively correlated with both ‘types’ of

procrastination, while it would be moderately negatively correlated with both ‘types’ of timely engagement.

2. Method

2.1 Participants

The sample consisted of 1496 undergraduate students from a large Midwestern university, including 600 men and 891 women, with 5 participants not reporting gender. The breakdown by classification was: 535 freshman, 273 sophomores, 356 juniors, and 329 seniors, with 3 students not reporting classification. The mean age of participants was 20.61 ($SD = 3.16$), and mean GPA was 3.29 ($SD = .47$).

2.2 Measures

2.2.1. 2×2 measure of time-related academic behavior

The new 2×2 measure of procrastination and timely engagement was developed for this study. It contains four subscales: procrastination-avoidance (7 items, $\alpha = .81$, sample item: I delay starting tasks because they are overwhelming to me), procrastination-approach (7 items, $\alpha = .86$, sample item: I delay completing tasks to increase the quality of my work), timely engagement-avoidance (5 items, $\alpha = .87$, sample item: I begin working on a newly assigned task right away to avoid falling behind), and timely engagement-approach (7 items, $\alpha = .85$, sample item: I start working right away on a new task so that I can perform better on the task). These items were framed in a domain-general manner, asking participants to respond about their behavioral in the academic context in general. This was because one goal of the study was to validate the performance of the new measure with traditional measures of generalized procrastination. These measures have traditionally been framed in a domain general manner, so the 2×2 measure of procrastination and timely engagement was framed similarly (Lay, 1986,

Solomon & Rothblum, 1984). Three subject matter experts evaluated survey items and items with low inter-rater agreement were removed or rewritten for clarity. The pool of items to participants included 30 items but 5 items were subsequently removed as a result of the initial confirmatory factor analysis (Table 1). All items were rated on a 7-point Likert-type scale where 1 was “Strongly Disagree” and 7 was “Strongly Agree”.

2.2.2. Generalized measure of procrastination

Procrastination defined in the traditional model was measured using the Procrastination Scale for Students (Lay, 1986; sample item: I generally delay before starting on work I have to do.) in order to establish divergent and convergent validity of the 2×2 Measure of Procrastination and Timely Engagement. This scale was selected because of its common use in research on the traditional concept of procrastination. All items were rated on a 7-point Likert-type scale where 1 was “Strongly Disagree” and 7 was “Strongly Agree”. The Procrastination Scale for Students showed good reliability (DeVellis, 2003) in the current sample ($\alpha = .87$).

2.2.3. Measure of achievement goals

The Achievement Goal Questionnaire developed by Elliot and Murayama (2008) was used to assess the degree to which students pursue mastery-approach, mastery-avoidance, performance-approach, and performance-avoidance goals. This scale includes four subscales with three items each. All items were rated on a 7-point Likert-type scale where 1 was “Strongly Disagree” and 7 was “Strongly Agree”. In the present samples, the reliabilities for all scales were good, including mastery-approach ($\alpha = .81$), mastery-avoidance ($\alpha = .71$), performance-approach ($\alpha = .83$), and performance-avoidance ($\alpha = .79$).

2.3. Procedure

Volunteers were recruited from a variety of undergraduate classes for paper-based survey data collection administered during the class period. Participants were informed about the purposes of the research. Students who did not wish to participate were asked to return the packet blank. Participants returned the completed survey directly to the researcher, who remained in the room for data collection. Participants were not offered any inducement such as monetary compensation or extra credit for their participation. All participants were treated in accordance with APA ethical guidelines, and these procedures were approved by the university Institutional Review Board.

3. Results

We conducted a confirmatory factor analysis to examine the factor structure of the 2×2 measure of procrastination and timely engagement. CFA was chosen because of the strong theoretical basis for the instrument, as well as some exploratory factor analytic work done by Strunk (2011, May). The initial CFA resulted in the exclusion of seven items from the measure due to low factor loadings and lack of content validity as a result of item reviews. A resulting second CFA performed with the low-loading items removed revealed that the four-factor model is a good fit to the data (CFI = .92, TLI = .91, RMSEA = .07, SRMR = .05) with all indices beating conventional cutoffs (.90 for CFI and TLI, .07 for RMSEA and SRMR; Schreiber, Stage, King, Nora, & Barlow, 2006). The one exception was the chi-square test which was significant ($\chi^2_{203} = 1470.277, p < .001$). However, the chi-square statistic is often significant in large samples when differences are not substantive, so we interpreted the other fit indices as more relevant in this case due to the very large sample size (Byrne, 2012; Kline, 2011). The four factors include procrastination-approach, procrastination-avoidance, timely engagement-

approach, and timely engagement-avoidance. Table 1 displays survey items loaded on each factor and corresponding factor loadings.

Next, we further tested whether the 2×2 model of procrastination and timely engagement demonstrated empirical advantages over potentially competing theoretical models. The four potentially competing models considered and their model fit indices were as follows:

- Model 1: a two-factor model comprised of procrastination versus timely engagement factors, in which procrastination and timely engagement constructs are not differentiated by approach versus avoidance motivation. This model was tested because procrastination alone has been a subject of extensive study, so it was necessary to determine if this behavior dimension alone would be a good fit to the data ($\chi^2_{274} = 2361.18$, CFI = .78, TLI = .76, RMSEA = .10, SRMR = .09).
- Model 2: a two-factor model comprised of approach versus avoidance factors, in which procrastination and timely engagement constructs are not differentiated. This model was tested to determine if the differentiation of motivational valence alone without consideration of behavior would be a fit to the data ($\chi^2_{277} = 4739.45$, CFI = .36, TLI = .36, RMSEA = .17, SRMR = .29).
- Model 3: a three-factor model comprised of generalized procrastination, timely engagement-approach, and timely engagement-avoidance, in which timely engagement is differentiated by approach versus avoidance motivation while procrastination is not. This model was tested to determine if separation of procrastination on motivational valence was necessary, or if separation on motivational valence for timely engagement alone would be sufficient ($\chi^2_{272} = 2232.85$, CFI = .89, TLI = .89, RMSEA = .07, SRMR = .05).

- Model 4: a three-factor model comprised of procrastination-approach, procrastination-avoidance, and generalized timely-engagement, in which procrastination is differentiated by approach versus avoidance motivation while timely engagement is not. This model was tested to determine if separation on motivational valence for timely engagement was necessary for good fit to the data, or if separation on motivational valence for procrastination alone would be sufficient ($\chi^2_{272} = 4529.00$, CFI = .78, TLI = .76, RMSEA = .10, SRMR = .09).

Comparing the model fit indices revealed that the four-factor model (i.e., the 2×2 model of procrastination vs. timely engagement across approach vs. avoidance motivation) showed better model fit (CFI = .93, RMSEA = .06, SRMR = .05) than the competing models (See Table 2 for a direct comparison of model fit indices). To assess the empirical advantage of the 2×2 model over potentially competing models, a chi-square difference test was conducted. In the model comparison test between Model 1 and the 2×2 model, the chi-square difference test was significant ($\Delta\chi^2_9 = 727.25$, $p < .001$). The chi-square difference test was also significant when the 2×2 model was compared with Model 2 ($\Delta\chi^2_{12} = 3105.52$, $p < .001$). The chi-squared difference test was also significant when the 2×2 model was compared with Model 3 ($\Delta\chi^2_7 = 598.912$, $p < .001$), and with Model 4 ($\Delta\chi^2_7 = 2895.06$, $p < .001$). However, because the chi-square test can produce significant results in large samples that do not equate to substantive differences, the difference in Comparative Fit Index (CFI) was also assessed. It has been suggested that changes in CFI of over .01 are necessary for the difference to be interpreted as substantive (Byrne, 2008; Cheung & Rensvold, 2002; Little, 1997). The difference between model 1 and 2 far exceeded this threshold ($\Delta\text{CFI} = .57$), as did the difference between models 1 and 3 ($\Delta\text{CFI} = .15$), as did the difference between models 1 and 4 ($\Delta\text{CFI} = .15$), and the difference between models 1 and 5

was well in excess of this threshold ($\Delta\text{CFI} = .04$). Thus, both the chi-squared difference test and the difference in CFI values supported the empirical advantage of the 2×2 model. The model comparison results offered additional evidence that the 2×2 measure of procrastination and timely engagement is valid, and that the model is the best fit for the observed data among potentially competing models.

Reliabilities were then assessed for the four resulting scales using Cronbach's α . All scales showed good reliabilities (DeVellis, 2003) including procrastination-approach ($\alpha = .86$), procrastination-avoidance ($\alpha = .75$), timely engagement-approach ($\alpha = .87$), and timely engagement-avoidance ($\alpha = .87$). Descriptive statistics for the new scales can be found in Table 3.

Next, we tested how the new scales that make up the 2×2 measure of procrastination and timely engagement are correlated with an existing measure of procrastination which utilizes the unidimensional conceptualization of the construct, the Procrastination Scale for Students (Lay, 1986), to examine convergent and divergent validity. As expected, both timely engagement-approach ($r = -.61$) and timely engagement-avoidance ($r = -.60$) correlated negatively with the existing scale (Lay, 1986), while both procrastination-approach ($r = .46$) and procrastination-avoidance ($r = .46$) correlated positively with the scale (See Table 3). The magnitude of correlation indicated that these scales share significant variance to capture time-related academic behaviors while they appear to be distinct constructs (Cohen, 1988). The strong negative correlation of both timely engagement factors was expected due to their somewhat inverse nature to generalized procrastination. On the other hand, the moderate relationship of procrastination-approach and procrastination-avoidance was also expected due to the fact that theoretically the generalized concept of procrastination is now split between two factors, each measuring a

portion of that more generic construct. Thus, the moderate degree of correlation was expected and supportive of the underlying theory.

To further test content validity, we conducted Structural Equation Modeling (SEM) in Mplus version 6.11 using maximum likelihood estimation to examine the relationship between four types of time-related academic behaviors and achievement goals. In this analysis, we modeled the relationships between latent variables. Figure 2 shows a hypothesized model in which performance goals were generally predicted to be related more strongly to procrastination, mastery goals more strongly to timely engagement and that approach goals would be more strongly related to procrastination/timely engagement with approach motivation, while avoidance goals were predicted to be more strongly related to procrastination/timely engagement with avoidance motivation. While the initial analysis showed acceptable fit to the data ($\chi^2_{502} = 2185.44$, $\chi^2/df = 4.35$, CFI = .93, TLI = .92, RMSEA = .05, SRMR = .04), there were a number of non-significant paths in the model that were removed one at a time until all remaining paths were significant. The path with the smallest standardized path coefficient was removed first, which was that of performance approach goals predicting procrastination-approach ($\beta < .01$). The model was retested and the path with the smallest standardized coefficient was removed, which was that of performance avoidance goals predicting timely engagement-avoidance ($\beta < .01$). The smallest remaining standardized path coefficient was that of performance approach goals predicting timely engagement-approach ($\beta = -.01$), and it was removed next. The smallest remaining coefficient was that of mastery avoidance goals predicting timely engagement-avoidance ($\beta = -.02$), and it was removed next. Finally, the only remaining non-significant path was that of performance-avoidance predicting procrastination-approach ($\beta = .03$), and it was

removed from the model. The final SEM model was a good fit to the observed data ($\chi^2_{507} = 2188.48$, $\chi^2/df = 4.31$, CFI = .93, TLI = .92, RMSEA = .05, SRMR = .04).

Procrastination-approach was negatively predicted by mastery approach goals ($\beta = -.16$). Procrastination-avoidance was negatively predicted by performance-approach goals ($\beta = -.33$) and mastery-avoidance goals ($\beta = -.21$) but was positively predicted by performance-avoidance goals ($\beta = .36$). Timely-engagement approach was negatively predicted by mastery-avoidance goals ($\beta = -.04$), but positively predicted by mastery-approach goals ($\beta = .44$). Finally, timely engagement-avoidance was positively predicted by mastery-approach goals ($\beta = .38$). This pattern of prediction was generally in line with the hypothesized model, with the exception of the hypothesized paths that were not significant.

4. Discussion

Procrastination and timely engagement are practically important concepts for educators and researchers to consider for enhancing efficiency and effectiveness of students' learning behaviors. Empirical research has evidenced that these time-related academic behaviors are significantly related to academic and psychological outcomes (Howell, Watson, Powell, & Buro, 2006; Owens & Newbegin, 1997; Owens & Newbegin, 2000; Rothblum, Solomon, & Murakami, 1986; Tice & Baumeister, 1997). This attests to the importance of attending to these time-related academic behaviors in research toward promoting students' timely engagement while discouraging their engagement in procrastination behaviors. Therefore, the purpose of the present study was the development and validation of a new conceptual model that considers both procrastination and timely engagement as time-related academic behaviors, and differentiates these behaviors on the basis of motivational orientation (i.e. approach versus avoidance motivation).

The 2×2 model of procrastination and timely engagement challenges the traditional model of procrastination in which procrastination is viewed as a unidimensional construct. The construct validity of the 2×2 model was empirically tested using a new 2×2 measure of procrastination and timely engagement, and was tested against competing models that reflect theoretically possible variants of factor structures. The results demonstrated that the 2×2 model offered the best fit with the observed data, while the alternative models showed relatively poorer fit. Taken together, these findings demonstrated that neither the time-related behavior dimension (i.e. procrastination versus timely engagement) nor the motivation dimension (i.e. approach versus avoidance) alone is sufficient; it is necessary to consider these two dimensions simultaneously. Adding timely engagement to the procrastination measurement continuum seems to resolve the restriction of range issue that has characterized traditional procrastination research, and considering underlying motivation of delayed or timely engagement helped advance our understanding of different types of time-related academic behaviors.

To further test the validity of the new 2×2 model of time-related academic behaviors (i.e., procrastination and timely engagement), we examined how the constructs included in the new measurement model were associated with traditionally defined generalized procrastination. The traditional, generalized, measure of procrastination showed positive relationships with procrastination-approach and procrastination-avoidance, while it showed negative relationships with timely engagement-approach and timely engagement-avoidance. This correlation pattern showed that the traditional view of procrastination as a unidimensional construct partially captured the difference between procrastination and timely engagement by revealing opposite directions of relationships with these constructs, but failed to differentiate approach versus

avoidance motivation, as indicated by similar relationships with both procrastination-approach and procrastination-avoidance.

The traditional model of procrastination does not consider timely engagement as an extended construct of time-related academic behaviors. Therefore, in the traditional model of procrastination, people who report low procrastination could vary from a low level of timely engagement to a high level of timely engagement. This means a person high in timely engagement-approach would be classified simply as a person low in procrastination under the unidimensional construct of procrastination (c.f., Lay, 1986; Rothblum, Solomon, & Murakami, 1986; Solomon & Rothblum, 1984). The 2×2 model of procrastination and timely engagement was developed to clarify these restricted measurement issues. Consistent with our hypothesis, the data based on the 2×2 model revealed that mastery-approach goals were positively associated with both timely engagement constructs, while there was a null relationship between performance-approach goals and both timely engagement constructs. Previous studies, where the traditional model of procrastination was used, found that both mastery-approach and performance-approach goals were related to low levels of procrastination, but were unable to provide information about their relationship with timely engagement. The 2×2 model used in the present study helped clarify that timely engagement coupled with avoidance motivation was positively linked to mastery-approach goals, which was not the case for performance-approach goals. People with mastery-approach goals would be aware that delaying work would not help them master skills and learn as much as possible, and are thus more inclined to engage in tasks in a timely manner. In contrast, people with performance-approach goals were not necessarily involved in timely engagement, perhaps because they tend to perceive that timely hard work might signal their lack of ability. This differential pattern of relationships clearly demonstrated

the empirical validity of incorporating timely engagement into the model. The present study provides valuable information about the phenomena of time-related academic behaviors, namely procrastination and timely engagement.

In addition, we tested whether the incorporation of approach versus avoidance motivation plays a meaningful role in the relationship with existing motivational constructs such as achievement goals. A great deal of research has shown that people adopting different achievement goals tend to show different learning patterns and employ different self-regulated learning strategies (Howell & Watson, 2007). As expected, achievement goals were differentially related to different ‘types’ of procrastination and timely engagement. Unlike the traditional model of procrastination, in which a unidimensional construct of generalized procrastination was considered, the four constructs measured in the 2×2 model of procrastination and timely engagement revealed a number of novel and meaningful relationships that offer important implications in the area of time-related academic behaviors.

In the traditional model of procrastination, approach types of achievement goals, regardless of whether they are performance or mastery goals, were found to predict lower levels of procrastination (Howell & Buro, 2009; Howell & Watson, 2007; Seo, 2009). The result of the present study was consistent with prior studies using the traditional model of procrastination in that both performance-approach and mastery-approach goals were associated with lower levels of procrastination. However, what is noteworthy is that these two goals were linked to lower procrastination with different motivation, meaning that both performance-approach oriented students and mastery-approach oriented students tend to procrastinate less, but for different reasons. Performance-approach goals were likely to result in a lower level of procrastination with an *avoidance* motivation, while mastery-approach goals were likely to result in a lower level of

procrastination with *approach* motivation. Performance-oriented students may intentionally use procrastination-approach as a performance-enhancing strategy. In other words, delaying a task until closer to the deadline is believed to offer a strategic advantage, which the individual uses so that they can demonstrate superior performance resulting from innate high ability rather than hard work. In contrast, people adopting mastery-approach goals try to learn as much as possible, without reference to external performance standards, so that they would not be likely to use procrastination as a performance enhancement strategy (i.e. would be low in procrastination-approach) because they do not consider procrastination-approach as an effective strategy for gaining skills and learning. Further, a strong negative relationship between performance-approach goals and procrastination-avoidance demonstrated that students adopting performance-approach goals do not employ procrastination as a strategy to avoid failure or negative experiences.

Previous research indicated positive relationships of traditionally defined procrastination with avoidance types of achievement goals (i.e., both performance-avoidance and mastery-avoidance goals) (Howell & Buro, 2009; Howell & Watson, 2007; Seo, 2009). Consistent with prior research, the present study found that performance-avoidance goals are positively related to procrastination-avoidance. However, mastery-avoidance goals showed the opposite pattern demonstrating a negative relationship with procrastination-avoidance. Unlike the findings from prior studies, this result indicated that students with avoidance types of achievement goals do not always employ procrastination-avoidance strategies. Given that students adopting performance-avoidance goals tend to strive to not perform worse than others is viable that they are likely to use procrastination-avoidance as a strategy to avoid negative experiences such as fear of failure and mask their lack of ability. Conversely, students with mastery-avoidance goals are not likely

to delay starting and completing tasks because those with this achievement goal are not afraid of poor performance, but rather are concerned about not being able to learn and improve as much as they could. Therefore, the separation of procrastination into procrastination-approach versus procrastination-avoidance helped elucidate the nuanced nature of the relationship between mastery-avoidance goals and procrastination.

The 2×2 model of procrastination and timely engagement revealed more distinct and differentiated relationships with achievement goals, providing empirical evidence that considering the underlying motivation of procrastination helped illuminate the unique nature and function of different types of procrastination and timely engagement. Taken together, while previous research found that approach versus avoidance goals play a determining role in predicting procrastination (Howell & Buro, 2009; Howell & Watson, 2007; Seo, 2009), the findings in the present study demonstrate that mastery versus performance goals, as well as approach versus avoidance goals, play an important role in predicting procrastination with distinct motivations. These relationships were obscured within the traditional model of procrastination because the traditional model subsumes all time-related behaviors and motivations under a single unidimensional construct.

We should note a few limitations of the study. Timely engagement-approach and timely engagement-avoidance demonstrated a strong correlation, indicating a high degree of shared variance in the underlying constructs. This may have attenuated the predictive relationships in the structural equation model. However, collapsing timely engagement into a single factor produced poorer fit with the observed data. Further, distinctive relationships of performance-avoidance goals with timely engagement constructs (e.g. negative relationships with timely engagement-approach and a null relationship with timely engagement-avoidance) provide

supporting evidence toward the separation of timely engagement constructs. Nevertheless, the apparent overlap between these constructs observed in the present study warrants more future work to further differentiate these two variables empirically, perhaps through revising and developing survey items that tap into more distinctiveness in the two time engagement scales.

5. Conclusions

The empirical data presented in the current study demonstrated the validity of the 2×2 model of procrastination and timely engagement and its empirical advantages over the traditional model of procrastination, and provided important information for further development and refinement of this model. The development and validation of the new 2×2 model of procrastination and timely engagement has many theoretical and practical implications. In terms of theoretical implications, it is clear that conceptualizing various types of time-related academic behaviors involving different motivations gives a significant theoretical advantage, as indicated by additional specificity and accuracy in predictive relationships with motivation constructs such as achievement goals. Different ‘types’ of time-related academic behavior, as specified in the 2×2 model, might be associated with a constellation of learning- and achievement-related variables and differentially predict academic success among students. This research offers a promising opportunity for future studies investigating time-related academic behaviors, their antecedents, and their consequences, which may offer important insights for educators. Future studies should also seek to replicate and expand on the results of the present study, and may also seek to include academic performance as an outcome variable of interest.

From a practical stance, the 2×2 model of procrastination and timely engagement also presents a potential for significant advance in intervention-based research on procrastination, enabling researchers and educational practitioners to tailor interventions for students with time

management issues by considering not only the time-related academic behavior, but also the underlying motivational orientation. The implications of such interventions would potentially extend into student success, retention, and motivation.

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Table 1

2×2 Measure of Time Related Academic Behavior: Items by Scales with Factor Loadings

Procrastination-Approach		Loading	S.E.	Residual
1.	I more effectively utilize my time by postponing tasks.	.68	.02	.53
2.	I delay completing tasks to increase the quality of my work	.63	.02	.60
6.	I put off starting tasks to increase my motivation	.71	.02	.49
9.	I feel a stronger state of “flow” in my tasks when working closer to a deadline.	.68	.02	.54
14.	I intentionally wait until closer to the deadline to begin work to enhance my performance.	.80	.01	.37
21.	I delay tasks because I perform better when under more time pressure.	.84	.01	.29
29.	I rarely have difficulty completing quality work when starting a task close to the deadline.	.50	.02	.75
Procrastination-Avoidance				
5.	I put off tasks for later because they are too difficult to complete.	.59	.02	.66
23.	I avoid starting and completing tasks.	.56	.02	.69
24.	I often delay starting tasks because I am afraid of failure.	.71	.02	.50
25.	I delay starting tasks because they are overwhelming.	.77	.02	.41
Timely engagement-Approach				
4.	I work further ahead of the deadline, at a slower pace, because it helps me perform better.	.73	.01	.46
8.	I believe I can successfully complete most tasks because I start work immediately after being assigned a task.	.74	.01	.46
19.	I do my best work well ahead of the deadline.	.72	.01	.49
22.	I start working right away on a new task so that I can perform better on the task.	.81	.01	.34
27.	I complete my tasks prior to their deadlines to help me be successful.	.58	.02	.66
28.	I begin working on difficult tasks early in order to achieve positive results.	.80	.01	.36
Timely engagement-Avoidance				
7.	I start my work early because my performance suffers when I have to rush through a task.	.80	.01	.37
10.	I do not start things at the last minute because I find it difficult to complete them on time.	.67	.02	.55
11.	I begin working on a newly assigned task right away to avoid falling behind.	.81	.01	.34
17.	When I receive a new assignment, I try to complete it ahead of the deadline to avoid feeling overwhelmed.	.79	.01	.38
18.	On extremely difficult tasks, I begin work even earlier so I can avoid the consequences of putting it off for later.	.72	.01	.48

Table 2

Comparisons of Model Fit Indices among Competing Models

	χ^2/df	$\Delta\chi^2$	Δdf	CFI	ΔCFI	TLI	RMSEA	SRMR
1. 2×2 Model of Time Related Academic Behavior	4.86	-	-	.92	-	.91	.07	.05
2. 2 Factor Model of Procrastination and Engagement	15.87	727.25	9	.78	.15	.76	.10	.09
3. 2 Factor Model of Approach and Avoidance	44.57	3105.52	12	.36	.57	.36	.17	.29
4. 3 Factor Model of Procrastination with Two Motives and Engagement	8.20	598.91	7	.89	.04	.89	.07	.05
5. 3 Factor Model of Engagement with Two Motives and Procrastination	16.65	2895.06	7	.78	.15	.76	.10	.09

Note. The $\Delta\chi^2$ statistics and ΔCFI statistics compare the potentially competing models (2 through 5) to the hypothesized model (1). All difference statistics are statistically significant at the $p < .001$ level.

Table 3

Correlations Between Key Variables and Descriptive Statistics

Measure	<i>SD</i>	1.	2.	3.	4.
1. Procrastination-Approach	.74	-			
2. Procrastination-Avoidance	.75	.23*	-		
3. Timely Engagement-Approach	.78	-.59*	-.23*	-	
4. Timely Engagement-Avoidance	.81	-.60*	-.19*	.87*	-
5. Procrastination Scale for Students	.54	.46*	.46*	-.61*	-.61*

Note. * indicates significance at the $p < .01$ level. All means are zero due to unit-weighted factor score calculations.

Figure 1

2x2 Model of Time-Related Academic Behavior

Figure 2

Hypothesized Model of Time-Related Academic Behavior with Achievement Goals

Figure 3

Final Model of Time-Related Academic Behavior with Achievement Goals