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**Understanding Perfectionism in Academic Contexts from a
Motivational Perspective**

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Abstract

Understanding Perfectionism in Academic Contexts from a Motivational Perspective

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Research on perfectionism has developed rapidly since the 1990s (Frost et al., 1990; Hewitt & Flett, 1991). The more adaptive perfectionistic strivings refer to excessively high standards and expectations whereas the more maladaptive perfectionistic concerns tap critical evaluation and dissatisfaction towards one's performance (Frost et al., 1993; Stoeber & Otto, 2006). Compared to the extensive body of perfectionism research in the mental health and sports fields, the examination of perfectionism within the academic context is relatively rare. However, studies show that the degree of perfectionism among college students has increased over the past three decades (Curran & Hill, 2019) and academics was found to be one of the areas most influenced by perfectionism (Haase et al., 2013; Stoeber & Stoeber, 2009). Thus, a further examination of perfectionism in academic contexts is necessary.

The goal of this dissertation is to extend what we know about perfectionism as it functions in academia by conducting two studies connecting perfectionism with achievement motivation (Eccles, 2005; Wigfield & Eccles, 2020). The first study examined whether perfectionism is domain-specific in academic contexts. Specifically, I

used mean comparisons and factor analysis to reveal that perfectionism exhibits as domain-specific within academic settings. Moreover, the patterns between perfectionism and several motivational constructs from the expectancy-value theory (Wigfield & Eccles, 2020) were assessed to support its domain-specific nature. The second study adopted a person-centered approach (i.e., latent profile analysis) to examine how individuals' perfectionistic tendencies and achievement value beliefs cohere simultaneously in generating various profiles. Four profiles were identified in this study. Further, the results showed that academic outcomes differed across the various profiles. Lastly, this study revealed that students with certain demographic backgrounds were over- or under-represented within some profiles.

Table of Contents

List of Tables	xi
List of Figures	xii
Chapter One: Introduction	1
Chapter Two: General Literature Review	3
Perfectionism	3
Unidimensional Perfectionism.....	3
Multidimensional Perfectionism.....	4
Perfectionism in Academic Settings	6
Perfectionism and Students' Academic-related Outcomes.....	6
Perfectionism and Academic Motivation	8
Motivation: Achievement Values	9
Chapter Three (Study One): Examining the Domain-Specificity of Perfectionism from a Motivational Perspective	13
Literature Review	15
Domain-Specificity	15
Domain-Specific Perfectionism	15
Domain-Specific Approach in Academic Settings	16
The Significance of Investigating Domain-Specific Perfectionism in Academic Settings	17
Explanation of Domain-Specific Perfectionism from the Expectancy- Value Theory Standpoint.....	18
Current Study	21
The Contributions of the Current Study	21

Research Questions and Hypotheses	23
Method	25
Participants and Procedures	25
Measures	25
Data Analyses	27
Results.....	29
Descriptives	29
Mean-Level Differences	31
Confirmatory Factor Analysis	32
Parallel Correlations	32
Discussion.....	34
Domain Specificity of Perfectionism.....	35
Domain Specificity of Perfectionism from the Expectancy-Value Theory ..	36
Implications	38
Implications for Research	38
Implications for Practice	39
Limitations and Future Directions	40
Chapter Four (Study Two): An Examination of Perfectionism and Achievement Value Profiles Among College Students	42
Literature Review	44
Theoretical Background.....	44
Why Perfectionism and Motivation?	44
Multidimensional Perfectionism.....	47
Motivation: Achievement Values	49

Variable-Centered Approach and Person-Centered Approach	53
Variable-Centered Approach	53
Person-Centered Approach	54
Outcomes and Demographic Background	56
Academic Outcomes: Behavior and Emotion.....	56
Demographic Background: Gender and Underrepresented Minorities Status	58
Current Study.....	59
Research Questions and Hypotheses	59
Method.....	61
Participants.....	61
Measures	61
Behaviors	62
Emotions	62
Data Analyses	63
Results.....	65
Descriptives	65
Latent Profile Solutions	68
Academic Outcomes Across Profiles	71
Behaviors	71
Emotions	72
Demographic Characteristics of Profiles	75
Discussion.....	75
Profiles of Perfectionism and Motivation.....	75

Outcomes Linked to Profiles	78
Behaviors	78
Emotions	79
Demographics Across Profiles.....	81
Implications	82
Implications for Research	82
Implications for Practice	83
Limitations and Future Directions	84
Appendix - Measures	86
References.....	91

List of Tables

Table 1:	Study 1 Scale Means, Standard Deviations, Reliabilities, and Intercorrelations	30
Table 2:	Study 1 T test of Parallel Constructs across Domains	31
Table 3:	Study 1 Fit Indices for Two Models	32
Table 4:	Study 2 Scale Means, Standard Deviations, Reliabilities, and Intercorrelations	67
Table 5:	Study 2 Fit Indices for Profile Structures	68
Table 6:	Study 2 Standardized Means for Grouping Variables by Profiles	69
Table 7:	Study 2 Three-Step Results for Outcomes Across Different Profiles.....	73

List of Figures

Figure 1:	Study 1 Two Competing Models Assessing Domain Generality and Domain Specificity	28
Figure 2:	Study 2 Latent Profile Analysis Solution with Four Groups	71
Figure 3:	Study 2 Self-Reported Behavioral Outcomes Across Four Profiles	74
Figure 4:	Study 2 Self-Reported Emotional Outcomes Across Four Profiles	74

Chapter One: Introduction

Perfectionism is a disposition characterized by setting excessively high standards (perfectionistic striving) and expressing critical evaluations of one's performance (perfectionistic concerns) (Flett & Hewitt, 2002; Frost et al., 1990; Stoeber & Otto, 2006). The association between perfectionism and psychological maladjustments and disorders have been extensively studied over the past three decades (see Stoeber, 2012 for a review). A recent, cross-temporal meta-analytic publication (Curran & Hill, 2019) showed that the levels of perfectionism among college students in Western countries (e.g., the United States, Canada, and the United Kingdom) have increased linearly from 1989 to 2016. This finding indicates that recent generations are more likely to adopt a perfectionistic disposition, perhaps, in response to the increase in social and economic pressures. Some have argued that because perfectionism has become more intense, educators should pay more attention to this disposition (Bong et al., 2014; Rice et al., 2016).

In educational settings, some students may consider an A- adequate, but a group of students may regard this grade as indicative of deficiency. Such students, who strive for excellence and leave no room for a “good enough” performance, are usually described as perfectionistic students. Are perfectionistic tendencies beneficial for students' academic achievement? The answer is complex because of the multidimensional nature of perfectionism. According to the latest meta-analysis (Madigan, 2019), while students' perfectionistic strivings have been found to be positively associated with academic achievement, students' perfectionistic concerns have been found to correlate with lower academic achievement. Despite the apparent relevance of perfectionism to academic achievement, however, relatively little research has been conducted to better understand

the links between perfectionism and academics (e.g., Bong et al., 2014; Fletcher & Neumeister, 2017; Rice et al., 2016). This dissertation aims to expand what we know about perfectionism, as it operates in academic contexts, by conducting two studies linking perfectionism with the academic motivational theory (i.e., achievement values; Eccles, 2005; Wigfield et al., 2009; Wigfield & Eccles, 2020).

The first study explores the dimensionality of perfectionism in academic contexts. In other words, this study examined if perfectionism is domain-specific (i.e., levels of perfectionism varying by course) or domain-free (i.e., levels of perfectionism remaining stable across all courses) using mean comparisons and factor analysis. Next, this study investigated the degree to which levels of domain-specific achievement values were related to perfectionism in different academic domains.

The second study investigates how the two aspects of perfectionism (perfectionistic strivings and perfectionistic concerns) interact with two components of achievement values (positive achievement values and perceived cost) to predict achievement-related educational behaviors and well-being. In order to examine this interaction, a latent profile analysis (a person-centered approach) was conducted to identify profiles based on students' responses to perfectionism and achievement values. Subsequently, I examined how various profiles were linked to a variety of educational outcomes. Lastly, I investigated how students' demographic backgrounds were linked to each profile.

In this dissertation, I first provide a general literature review for the two core theoretical frameworks (i.e., perfectionism and achievement values) in Chapter One. Chapters Two and Three cover Studies One and Two, respectively. As these two studies were written in an article format, a more specific introduction, literature review, and methods will be discussed within each study.

Chapter Two: General Literature Review

In this chapter, I first review the development of perfectionism, from a unidimensional perspective to the now widely recognized multidimensional approach. Second, I focus on literature regarding perfectionism in the academic setting, including learning outcomes and underlying achievement motivation, respectively. Last, I review the motivational theory—achievement values—which serves as the motivational framework for both studies included in this dissertation.

PERFECTIONISM

Unidimensional Perfectionism

Historically, perfectionism has been viewed as a maladaptive and undesirable psychological disposition. For instance, Horney (1950), one of the earliest psychologists to address perfectionism, regarded perfectionists as neurotic individuals adopting excessively high standards, attempting to mold themselves in accordance with an unattainable image, and failing to accept imperfection. Similarly, Pacht (1984) viewed perfectionism as an unhealthy motive that drives individuals to inner turmoil. Correspondingly, early empirical research on perfectionism found it to be associated with elevated levels of pathologies, such as depression, obsessive-compulsive disorder, and suicide (Rasmussen & Eisen, 1992; Rosen et al., 1989) within clinical populations, as well as higher levels of distress and interpersonal problems for nonclinical populations (Flett et al., 1989; Thompson et al., 1987).

During the 1980s, some argued that perfectionism was associated with various negative outcomes because it was measured as a single dimension that focused on negative consequences (Stoeber & Otto, 2006). For example, perfectionism was included as a subscale of the Eating Disorders Inventory (Garner et al., 1983) to assess anorexia

nervosa and bulimia. Moreover, Burns's (1980) perfectionism scale consisted of items from the Dysfunctional Attitude Scale (Weissman & Beck, 1978), which was originally developed to measure the attitudes of clients diagnosed with depression.

Multidimensional Perfectionism

At the start of the 1990s, a more differentiated perspective emerged arguing the need to conceptualize perfectionism as multidimensional (Frost et al., 1990; Hewitt & Flett, 1991; see Enns & Cox, 2002 for a review). Two research teams developed two multidimensional perfectionism models and scales, independent of each other, (Frost et al., 1990; Hewitt & Flett, 1991) to address the many facets of perfectionism. Frost and his colleagues (1990) viewed perfectionism as consisting of six dimensions, four of them reflecting perfectionism imposed by the self and two dimensions reflecting perfectionism imposed by parents. The four dimensions of self-perfectionism consisted of concern over mistakes, personal standards, doubts about actions, and organization. The two parental-demand dimensions reflected high parental expectations and parental criticism. Meanwhile, Hewitt and Flett (1991) identified three types of perfectionism including self-oriented, other-oriented, and socially prescribed perfectionism, indicating that perfectionists may set high standards for themselves, for others, or perceive high standards from others, respectively.

However, additional research found that these two measures of perfectionism were closely related and shared considerable overlap (Frost et al., 1993). For instance, the self-oriented aspect of perfectionism in Hewitt and Flett was highly similar to Frost et al.'s perfectionism construct of personal standard. When examined using factor analysis, a consensus was reached that two major higher-order dimensions of perfectionism be further distinguished from the nine dimensions in the two models (Frost et al., 1993;

Stoeber & Otto, 2006). Although the two dimensions were originally named by different investigators, they are currently labeled as *perfectionistic strivings* and *perfectionistic concerns* (see Stoeber & Otto, 2006 for a review). This work inspired a shift in understanding perfectionism as a two-dimensional construct. Specifically, perfectionistic strivings emphasize an individual's motive for perfection along with the setting of excessively high standards of performance. Perfectionistic concerns, on the other hand, involve critical evaluation of failures and the perceived discrepancy between an individual's expectations and performance. Later, researchers replicated these two higher-order dimensions in their studies using different multidimensional scales of perfectionism (e.g., Hill et al., 2004) as well as with combined items sourced from different perfectionism measures (e.g., Stairs et al., 2012). Since then, perfectionism studies have been guided by these two dimensions of perfectionism—perfectionistic strivings and perfectionistic concerns—as the basic conceptual framework.

After the two-dimensional nature of perfectionism was identified, understanding the difference between perfectionistic strivings and perfectionistic concerns gained central focus in expanding our knowledge of perfectionism. The relationship patterns between these two dimensions and other psychological constructs have, thus, been extensively investigated. Studies have demonstrated that only perfectionistic concerns consistently hold positive relations with maladaptive characteristics and processes (e.g., neuroticism, negative affect, and avoidance-oriented coping), psychological distress (e.g., depression and anxiety) and lower achievement (e.g., GPA). In contrast, perfectionistic strivings have been found to be positively related to adaptive characteristics and processes (e.g., conscientiousness, positive affect, and task-oriented coping), psychological adjustment (e.g., life satisfaction), and greater achievement (e.g., musical awards) (see Stoeber & Otto, 2006, for a review). Consequently, researchers no longer

emphasize only the negative aspects of perfectionism but have since started to examine the positive aspects of perfectionism as well. According to the above relationship patterns, perfectionistic strivings were often labeled as the “adaptive/functional” aspect of perfectionism while perfectionistic concerns were often labeled as the “maladaptive/dysfunctional” aspect of perfectionism (Slaney et al., 2001; Rhéaume et al., 2000). This labeling was in keeping with Hamachek’s (1978) suggestion of distinguishing perfectionism as normal and neurotic. That is, normal perfectionists are individuals who derive enjoyment from doing well on challenging tasks. In contrast, neurotic perfectionists never feel satisfied by their efforts since they believe their performance is never good enough (Stoeber & Otto, 2006).

Guided by the findings of these two higher-order perfectionism measures, many more valid and reliable multidimensional measures of perfectionism were created and developed over the past two decades (see Stoeber, 2018 for a review). The five most frequently used perfectionism measures include the Multidimensional Perfectionism Scale (FMPS; Frost et al., 1990), the Multidimensional Perfectionism Scale (HF-MPS; Hewitt & Flett, 1991), the Almost Perfect Scale-Revised (APS-R; Slaney et al., 2001), the Perfectionism Inventory (PI; Hill et al., 2004), and the Multidimensional Inventory of Perfectionism in Sports (MIPS; Stoeber et al., 2006). Recently, the Big Three Perfectionism Scale (Smith et al., 2016) has been gaining popularity.

PERFECTIONISM IN ACADEMIC SETTINGS

Perfectionism and Students’ Academic-related Outcomes

The literature on perfectionism in the academic setting is not as abundant as its extension in other contexts (Fletcher & Neumeister, 2017; Rice et al., 2016). Resulting from the original negative emphasis in clinical/counseling psychology and psychiatry that

perfectionism is an undesirable personality trait requiring treatment (Burns, 1980; Pacht, 1984), a large number of studies have centered on revealing how perfectionism is an indicator of an individual's psychological distress and psychopathological symptoms (Flett & Hewitt, 2002). Compared to the number of studies investigating perfectionism in contexts other than academics, the paucity of perfectionism literature in the academic context appears stark. For instance, a meta-analysis (Limburg et al., 2017) examining the relationship between perfectionism and psychopathology retrieved 284 relevant studies conducted from 1990 to 2013. Comparatively, excluding qualitative studies, Madigan's (2019) recent meta-analysis investigating the relationship between perfectionism and academic achievement only identified 37 available studies conducted from 1990 to 2018. Though the meta-analyses excluded some relevant studies that failed to meet their inclusion criteria, and despite the fact that a direct comparison between the number of studies conducted in various contexts is not statistically meaningful, it highlights the limited examination of perfectionism and academics in the literature.

Building on the multidimensional nature of perfectionism, studies have shown that perfectionism is relevant to a range of academic outcomes (see Rice et al., 2016 for a review). Specifically, perfectionistic strivings are mostly related to positive indicators of academic success, including positive classroom affect, lower academic procrastination, and academic engagement (e.g., Lee & Anderman, 2020; Rice et al., 2012; Shih 2011). That is, perfectionistic strivings "to be the best" do not impair students' academic performance. Indeed, students with high perfectionistic strivings are motivated to aim for the best possible achievement, exert their best effort, spend more time, and overcome difficult challenges. In contrast, perfectionistic concerns are usually associated with negative indicators of academic success, like test anxiety, perceived course difficulty, academic burnout, and fear of failure (e.g., Rice et al., 2013; Stoeber et al., 2014; Zhang

et al., 2007). In other words, this aspect of perfectionism represents a problem because the students with harsh critical evaluations and concerns over mistakes often perceive self-inadequacy in meeting the excessively high standards they set for themselves. Furthermore, Madigan (2019)'s meta-analysis added more evidence to the above patterns. Specifically, Madigan (2019) reviewed the relationship between two dimensions of perfectionism and academic achievement, using test performance, grades, and grade point average (GPA) as indicators of academic performance. A similar pattern emerged from the meta-analysis, revealing that perfectionistic strivings are associated with higher academic achievement whereas perfectionistic concerns are related to lower academic achievement.

Perfectionism and Academic Motivation

Among other topics, the relationships between perfectionism and academic motivation have been explored to deepen our understanding of why the two dimensions of perfectionism exhibit different correlational patterns with students' academic outcomes in schools (e.g., Bong et al., 2014; Miquelon et al., 2005; Stoeber et al., 2009; Stoeber & Rambow, 2007). Recently, Stoeber and his colleagues (2018) reviewed the relationship between two higher-order perfectionism and motivational constructs. In the academic context, the achievement goal orientation framework (i.e., mastery-approach, mastery-avoidance, performance-approach, and performance-avoidance; e.g., Bong et al., 2014; Eum & Rice, 2011; Wang et al., 2012) is one of the most commonly used. Other studies have adopted self-determination (e.g., Chang et al., 2016; Miquelon et al., 2005; Nguyen & Deci, 2016; Vansteenkiste et al., 2010), achievement motives (e.g., Stoeber & Rambow, 2007), and self-efficacy (e.g., Locicero & Ashby, 2000) as motivational frameworks to study perfectionism in academia.

Specifically, Stoeber et al.'s (2018) review argued that the two dimensions of perfectionism apparently have distinctive “motivational footprints” (p. 36) and are associated with different motivational qualities. Based on patterns in the literature, Stoeber et al. (2018) proposed that perfectionistic striving is primarily approach-oriented considering its positive relationships with mastery-approach and performance-approach goals. In contrast, perfectionistic concern is mainly avoidance-oriented given its positive associations with mastery-avoidance and performance-oriented goals. This synthesis provided overarching insight into the two dimensions of perfectionism and their corresponding motivational orientations. The authors called for more studies to examine the role of other motivational constructs in understanding multidimensional perfectionism.

The suggestion by Stoeber et al., (2018) to explore perfectionism through other motivational lens is supported by existing motivational literature. Indeed, the term “motivation” in academia covers a variety of motivation-related constructs. For example, Pintrich (2003) categorized motivational constructs in education into five basic “families”: Efficacy and competence beliefs, attributes and control beliefs, intrinsic motivation, achievement values, and achievement goals. Furthermore, academic motivation scholars highlighted the distinct emphases and different operations of each motivational construct in educational settings (e.g., Linnenbrink-Garcia & Patall, 2015; Wigfield et al., 2015). Thus, it seems likely that other motivational approaches would contribute to a more nuanced understanding of multidimensional perfectionism.

MOTIVATION: ACHIEVEMENT VALUES

Achievement values denote a motivational construct, from the perspective of expectancy-value theory (EVT; Eccles, 2005; Wigfield & Eccles, 1992), which refers to

an individual's perceived relative worth of various achievement tasks (Wigfield & Eccles, 1992; Wigfield & Eccles, 2020). Simply put, when students value specific achievement tasks, they have strong motivation to strive for success. There are two main features of achievement values in EVT. First, it focuses on domain-specific tasks rather than a broad domain-free approach. For example, some students may value their achievement in math, but not in language. Second, achievement values are subjective, which means different students may assign different values to the same task. For instance, success in math may be valuable to some students but not to others.

According to EVT, student's achievement values for a task is a function encompassing three components: attainment value, intrinsic value, and utility value (Eccles, 2005; Wigfield & Eccles, 1992; Wigfield & Eccles, 2020). Attainment value, or importance, refers to the importance of performing well in a given task (e.g., engaging in a task because it is important to one's identity). Intrinsic value is the enjoyment one may have from working on the task (e.g., engaging in a task one is passionate about or interested in). Utility value, or usefulness, refers to how useful the task may be to students' future plans (e.g., engaging in a task because it fulfills one's degree requirements). In previous studies, Eccles and colleagues found that attainment value, intrinsic value, and utility value were all positively related (e.g., Eccles & Wigfield, 1995; Wigfield et al., 1997). Thus, many studies created composite scores, made of the average of these three components, to represent students' achievement value (e.g., Fong & Kremer, 2019; Jacobs et al., 2002; Perez et al., 2014; Saw & Chang, 2018).

The fourth construct that influences achievement value is the perceived cost (Barron & Hulleman, 2015; Eccles, 2005; Wigfield et al., 2017). It refers to what the student has to give up in order to complete a given task (e.g., engaging in a task may require sacrificing social life with friends). In other words, students may consider the

cost-benefit ratio of various tasks and choose not to engage in it if a given task's "cost" is too high (Eccles, 2005; Wigfield et al., 2017).

Cost was originally labeled as a component of achievement value along with importance, interest, and utility in Eccles' EVT framework (Wigfield & Eccles, 1992; Eccles, 2005). However, in recent years, some scholars have proposed that cost operates differently from the other three values (see Barron & Hulleman, 2015 and Wigfield et al., 2017 for a review). For example, empirical studies have found that cost was negatively correlated with the above three sub-components of achievement value (Jiang et al., 2018; Luttrell et al., 2010; Trautwein et al., 2012). Furthermore, multiple studies employed confirmatory factor analysis to demonstrate that cost, importance, intrinsic, and utility components of value are separate factors (Conley, 2012; Kosovich et al., 2015; Trautwein et al., 2012). Although Wigfield and colleagues (2017) agreed with the argument that cost influences achievement value rather than being a component, they suggested that researchers continue to include cost within the EVT model while simultaneously calling for more studies to further examine the relations between the first three sub-components of achievement value and cost.

As far as the relations of the other three components of attainment value—importance, intrinsic, and utility components—on academic outcomes, extensive studies have established their importance for positive outcomes like achievement-related choices and persistence (Wigfield et al., 2009; Wigfield et al., 2017). However, more examination of the role of cost in predicting academic outcomes is necessary. Due to the fact that few cost measures were available before 2010, a small number of researchers included cost in their studies based on the EVT framework. The available body of work suggests that cost is relevant to maladaptive academic outcomes such as drop-out intentions, disorganization, and procrastination (Jiang et al., 2018; Perez et al., 2014). Moreover,

more detailed measures have been developed to assess cost recently. For example, Perez and colleagues (2014) developed a measure to tap different aspects of cost including effort cost, opportunity cost, and psychological cost among college students.

Regarding the nature of the four constructs in EVT, Eccles and Wigfield (1995) proposed that “the first three components are best thought of as attracting characteristics that affect the positive valence of the task ... cost, in contrast, is best thought of as ... the negative valence of the activity” (p. 216). The concept of “valence” (mentioned in the text quoted) has been viewed as meaningful in describing the positive and negative aspects of the task (Feather, 1982; Rokeach, 1980). Motivational scholars proposed that in achievement contexts, positive valence is mainly relevant to an individual’s approach-oriented behaviors whereas negative valence is usually relevant to one’s avoidance-oriented behaviors (Elliot & Covington, 2001; Pintrich, 2003). Applying this framework to the achievement values of the EVT framework, the first three sub-components of achievement value are affirming motivational constructs tied to approach-oriented motivation. In contrast, cost is an undermining motivational construct linked to avoidance-oriented motivation (Atkinson, 1964; Jiang et al., 2018; Lewin, 1938; McClelland et al., 1976).

Chapter Three (Study One): Examining the Domain-Specificity of Perfectionism from a Motivational Perspective

On comparing perfectionism across different life domains, researchers found that college students reported academics to be one of the areas most influenced by perfectionism (Haase et al., 2013; Stoeber & Stoeber, 2009). However, there is a paucity of literature on perfectionism in academic contexts (Fletcher & Neumeister, 2017; Rice et al., 2016). Recently, scholars pointed out an important factor potentially contributing to the dearth of perfectionism studies in academics—a disagreement regarding the structure and measurement of perfectionism in academic settings (Fletcher & Neumeister, 2017; Rice et al., 2016). In other words, given the wide range of topics and subjects within the academic context, researchers are finding it hard to agree about whether students exhibit the same levels of perfectionism across all academic domains or different degrees of perfectionism in different academic domains. This lack of clarity warrants a further examination of the specific nature of perfectionism in academia.

Whereas perfectionism was traditionally viewed and assessed as a global personality disposition trait impacting all life domains (e.g., Hewitt & Flett, 1991), an emerging body of research has demonstrated that an individual's perfectionism level may differ across various domains (e.g., Dunn et al., 2012; Stoeber & Stoeber, 2009). For instance, gifted students display higher perfectionism levels in the academic domain than the sports domain; varsity student-athletes, on the other hand, express higher perfectionism in sports rather than the academic domain (Dunn et al., 2012; McArdle, 2010).

However, to my knowledge, no studies to date have investigated whether perfectionism is domain-specific within academic settings (e.g., Mathematics vs. English; major courses vs. non-major courses). In all existing studies, the academic domain is

viewed as a whole and compared to other domains (e.g., academics vs. sports; Dunn et al., 2012; McArdle, 2010). Furthermore, it is unclear if the domain-specific nature of perfectionism applies only to select student groups who display predominant domain affinities, like student-athletes, rather than a general group of students. Consequently, the main goal of this study is to explore whether perfectionism is best measured and understood as a global (domain-free) personality trait or as a domain-specific construct in academic settings. Specifically, this study will aim to clarify whether students experiencing high levels of perfectionism in certain academic domains, have lower perfectionistic tendencies in other academic domains, or, whether intraindividual levels of perfectionism are similar across all domains and subjects in school settings?

The second goal of this study is to explore the reasons why students may exhibit different or similar levels of perfectionism in various academic achievement domains. It is possible that individuals are likely to experience higher perfectionistic tendencies in domains they consider more valuable and important. Most of the previous studies merely focused on comparing domain-specific perfectionism levels across different areas, and much less is known about the underlying interpretation of this phenomenon. Thus, I aim to further integrate inclusive components from EVT (Eccles, 2005; Wigfield et al., 2017; Wigfield & Eccles, 2020), a widely-used motivational framework, to explore how domain-specific or general perfectionism relates to the corresponding concept of domain-specific motivation.

LITERATURE REVIEW

Domain-Specificity

Domain-Specific Perfectionism

The domain-specificity of perfectionism was first suggested in a study comparing perfectionism levels at work and home. Participants were “career mothers” who worked outside the home and had at least one child under nine years of age (Mitchelson & Burns, 1998). This study found that career mothers reported greater perfectionistic tendencies in the work environment versus at home with their children. Taking a similar approach with student populations, subsequent studies found that gifted youth reported higher perfectionism in the domain of academics compared to sports whereas the opposite was found to be true for student-athletes who reported higher perfectionistic tendencies in the sports domain (Dunn et al., 2005; Dunn et al., 2012; McArdle, 2010). These studies provided preliminary evidence indicating that individuals’ perfectionistic tendencies in one domain differ from and may not transfer to other domains.

In addition to comparing the levels of perfectionism between two distinct domains, other studies compared individuals’ perfectionistic tendencies across multiple life domains. Slaney and Ashby (1996) conducted the earliest qualitative interview study that addressed the domain perspective of perfectionism by asking participants which life domain self-identified perfectionists viewed as most affected by perfectionism. They found that academic work was the most frequently mentioned life domain among participants. Similarly, using a quantitative approach, two studies (Haase et al., 2013; Stoeber & Stoeber, 2009) found that the academic domain, compared to other life domains like social relationships, ways of speaking, and appearance, was more likely to be identified as an area of perfectionism by most college students.

The above studies point out that academia has become a particular domain where students develop perfectionistic tendencies while striving for higher standards. However, even as researchers in the field recognized the significant role of academic areas in students' perfectionism development, all the current studies relating to domain specificity of the academic domain were designed using the *between*-domain approach, which involves comparing perfectionism between the academic domain and other domains (e.g., academics vs. sports). It would be misleading for scholars to interpret perfectionism as domain-specific *within* academia too based on evidence from the above between-domain studies, because distinct domains like academics (as a whole), sports, and music are naturally more clear-cut compared to the different domains encompassed by the academic domain (Martin, 2008). Thus, it is still unclear whether the domain-specific nature of perfectionism from prior relevant studies applies to the academic domain. The proposed study will be the first to take further steps to examine the domain specificity of perfectionism across different areas *within* the academic domain.

Domain-Specific Approach in Academic Settings

The examination of the domain-specificity of educational constructs within academic settings is not rare in the literature. A comprehensive discussion exists about whether students' academic beliefs are similar or different across various academic domains (e.g., Alexander et al., 1991; Buehl & Alexander, 2001). Educational researchers have tended to focus more on developing domain-specific approaches and measures to better understand the role of context and situation in students' academic beliefs (e.g., Buehl et al., 2002; Wigfield, 1997). Most of these studies examined domain-specificity among various school areas (e.g., subjects, majors) using factor analytic techniques. For example, Buehl and colleagues (2002) found that college students' responses to the

Domain-Specific Beliefs Questionnaire—an assessment to measure students’ beliefs about the nature of knowledge—on history and math generated distinct factors with confirmatory factor analysis. Similar research has also highlighted the domain-specific aspect of academic motivation constructs such as self-concept (e.g., Guo et al., 2018), self-efficacy (e.g., Usher et al., 2018) and interest (e.g., Alexander et al., 1995) across different school subjects and domains.

Moreover, literature that examined the domain-specificity of educational constructs argued that the domain-specificity of similar constructs may suggest important clues about whether the construct of interest functions differently in school domains or subjects (Schwinger, 2013). Indeed, many academic construct correlates of perfectionism have been demonstrated to be domain specific, like self-handicapping (Schwinger, 2013) and procrastination (Klingsieck, 2013). If these important correlates of perfectionism operate variously across academic domains, then perfectionism itself may present the same nature too.

The Significance of Investigating Domain-Specific Perfectionism in Academic Settings

Examining the domain-specific nature of perfectionism in academia is an essential research task for three reasons. First, Alexander’s (1997, 2004)’s model of domain learning suggested that student’s academic development should be conceptualized as subject-specific or domain-specific. Due to the nature of learning, a domain-general analysis of perfectionism in academics may fail to capture the unique characteristics of different learning domains and lead to biased results. Second, cogent interpretations and conclusions regarding the associations between perfectionism and significant academic outcomes cannot be made without a sound degree of specificity. For instance, if students’ perfectionistic concerns in Mathematics are only negatively related to their Mathematics

course performance, but not relevant to achievement in other subjects, a domain-general approach to examine the relationship between perfectionism and achievement would be misleading. Meanwhile, if perfectionism varies across different academic domains, domain-specific instruments of perfectionism may have stronger predictive power than instruments that address general levels of perfectionism in academia. Third, this study will deliver information crucial for developing efficient perfectionism interventions, particularly ones against perfectionistic concerns. For example, if perfectionism in academics is domain-specific, designers of interventions should take into consideration the underpinning domain-relevant facets, such as domain-specific problem-solving and coping strategies. In contrast, if perfectionism in academics is proven to be domain-general, it would be more efficient for the intervention to target student's perfectionism traits, which are relatively stable across different settings and disciplines.

Explanation of Domain-Specific Perfectionism from the Expectancy-Value Theory Standpoint

As mentioned previously, most of the current studies are solely limited to comparing perfectionism levels across different domains. Thus, much less is known about the underlying reasons why individuals may exhibit higher perfectionism in one domain than the other. Focusing on two aspects of motivation, expectancies for success and achievement value, Eccles's EVT (Eccles, 2005; Wigfield et al., 2009; Wigfield & Eccles, 2020) may provide insights that explain domain-specificity (for a more general literature review about EVT, please see Chapter One). As suggested by EVT, students are more motivated to engage in domains they believe they have the competence to succeed in (expectancies for success) and they personally view as valuable and important (achievement values). The domain-specific nature of expectancies for success and

achievement value has been established in the literature. For example, using confirmatory factor analysis, Eccles and colleagues (1993) found that the structures of first grade students' perceived valuing of different school subjects (i.e., math, reading, sports, and music) are distinct from each other. It provides evidence that students value domains in academia distinctively even in first grade. Meanwhile, several other studies have examined the strong links between domain-specific expectancies for success and domain-specific academic outcomes (Eccles et al., 1998). Thus, in accordance with the motivational constructs from EVT, I hypothesize that individuals who develop higher perfectionism levels in one particular domain compared to others may do so because they (a) perceive higher competence to succeed in that domain, and (b) perceive that domain as more valuable.

There are some clues in the perfectionism literature that link expectancies for success, achievement value, and domain-specific perfectionism. Regarding perceived competence, Flett et al. (2002) proposed that if individuals cannot see a realistic chance to attain perfection in a particular domain, it would be irrational for them to engage in developing perfectionistic tendencies in the given domain. Similarly, Flett et al. (2002) also stated that “perfectionists will be most likely to strive for personal goals of perfectionism in areas that involve feelings of competence and foster the sense that perfectionism is possible” (p. 111). In terms of valuing domains, Shafran et al. (2002) argued that “people with perfectionism have high standards in domains of life that have personal significance but not in domains of little or no personal relevance” (p. 779). Moreover, from the perfectionism intervention (e.g., cognitive-behavioral treatment) perspective, Shafran and colleagues (2018) suggested that cognitive strategies should focus on the area that is most valued by perfectionists because it encompasses most parts of their critical evaluations.

Although the above links were indicated in the literature, yet, to date, only two empirical studies have partly addressed perceived competence and achievement value to understand the domain-specificity of perfectionism. In McArdle (2010)'s study, other than the finding that talented students experienced higher levels of perfectionism in academic domains compared to the sports domain, McArdle (2010) used the patterns of correlations between perceived competence, achievement value, and perfectionism within and between domains to support the domain-specificity of perfectionism. Specifically, McArdle (2010) found that the correlations between the three indicators within the same domain were stronger than the parallel correlations across domains (e.g., the lowest correlation within domain was similar to the highest correlation across domain). Positive correlation patterns between these variables indicated that when the perceived competence and achievement value in a given domain increased, the levels of perfectionism in the corresponding domain increased as well. Similarly, Dunn et al., (2015) also found evidence that the within-domain correlations among perceived competence, achievement value, and perfectionism were stronger than parallel, between-domain correlations among student-athletes in college.

Notably, both McArdle (2010) and Dunn et al. (2015) made significant contributions to explain the domain-specificity of perfectionism by utilizing the domain-specific nature of perceived competence and achievement value. Nevertheless, theoretically, it seems that the two studies missed some essential parts that comprise perfectionism and achievement value. For example, McArdle (2010) only included maladaptive perfectionism in his study, leaving the question of whether the relationship patterns between adaptive perfectionism (e.g., perfectionistic strivings) and achievement value support domain-specificity unanswered. Moreover, regarding achievement value, both works relied on the composite score of attainment value, intrinsic value, and utility

value as the indicator. However, this aspect only represents the positive valence of achievement value, indicating the perceived benefits of the domain. Yet, the negative valence of achievement value, the perceived cost (i.e., what an individual has to give up), was not empirically examined in prior studies. According to EVT, individuals not only think about the benefits of a domain, but also consider the cost when they engage in any given domain. If the domain is too “costly”, individuals are less likely to be involved in it (Eccles, 2005; Wigfield & Eccles, 2020) and to develop perfectionistic tendencies. Thus, in addition to the three positive valences in achievement values, it’s important to explore from a negative valence standpoint to further investigate relationship patterns between cost and perfectionism.

Therefore, I intend to include these unexamined components in the current study to better understand the motivational aspect of domain-specific perfectionism in academia. Hence, I will add adaptive perfectionism and perceived cost to examine the correlation patterns between perfectionism and achievement value at the domain-specific level.

CURRENT STUDY

The Contributions of the Current Study

Although there have been a few studies exploring the domain-specificity of perfectionism as well as its correlates to perceived competence and achievement value, this current study aims to extend prior between-domain approach research to different domains *within* educational settings by adding three factors to consider.

First and foremost, this study will be the first to explore the levels of perfectionism in different domains within the academic setting in contrast to existing relevant studies, which regarded academia as a general domain and compared it to other

life areas (e.g., sports). As mentioned previously, exploring the operationalization of perfectionism in academia is an important topic due to the rising need to incorporate the domain-specific nature of learning, develop more suitable perfectionism measures, as well as design more efficient perfectionism interventions. Furthermore, this investigation is an opportunity to test the soundness of the domain-specific nature of perfectionism. Compared to the more clear-cut life domains (e.g., academia vs. sports), domains within academia may have less distance from each other. Therefore, if students present different levels of perfectionism across different academic domains, it will provide even stronger evidence to demonstrate the existence of domain-specific perfectionism.

Second, regarding the choice of the domains in the current study, perfectionism across courses in one's major field *versus* non-major courses will be assessed. Although most of the prior domain-specific investigations among middle- and high-school students adopted particular school subjects (e.g., Mathematics vs. English) as comparison domains, these specific school subjects may not be applicable at the college level. In college, students have a more customized curriculum and increased autonomy in choosing their own course path. Thus, college students may view their majors as an important indicator in developing distinct learning domains (Jehng et al., 1993; Lonka & Lindblom-Ylänne, 1996; Paulsen & Wells, 1998). Prior research categorized major courses and non-major courses as two distinct domains in college and found that students have different motivation and engagement in the two courses (Shell & Soh, 2013). Accordingly, the domains selected in this study reflect students' actual learning context. The underlying processes of these two seldom studied domains in academia will shed light on future domain-specificity research.

Third, this study aims to examine domain-specific perfectionism with a broader sample of students. Most of the prior domain-specificity evidence of perfectionism was

generated from a sample of students with one predominant domain over the other. For example, McArdle (2010) found domain-specific perfectionism among gifted students by comparing their perfectionism levels across the academic and sports domains. However, the academic domain may have been more salient for the participants in McArdle's study as suggested by their relative high mean ($M = 6.03$; on a 7-point Likert Scale) of perceived academic competence. Similarly, Dunn et al., (2012) drew the same conclusion based on a group of intercollegiate-level student-athletes who had extremely high achievement in sports. Specifically, the participants in Dunn et al's study came from 11 teams and eight of these eleven teams ranked in the top ten nationally in Canada. Taken together, these findings may limit researchers from the bigger picture, which is to develop measures and interventions for a more general student population. As suggested by Martin (2008), in order to fully examine domain-specificity, both domains should be "clear and present" to the participants (p. 792). In the current study, students will have both exposure and access to their major courses as well as non-major courses in college. Thus, other than focusing on a selected group of students, this study will also test if domain-specific perfectionism applies to a more inclusive student group.

Research Questions and Hypotheses

Research Question 1: The main purpose of this study is to explore the domain specificity of perfectionism across different domains in the educational setting. The first research question is: What evidence is there that perfectionism is domain-general or domain-specific across major and non-major courses in a sample of college students? It will be the first study to investigate the domain-specificity of perfectionism within academia.

Hypothesis 1: I hypothesize that perfectionism will present as domain-specific across major and non-major courses. The evidence of domain specificity will be drawn from comparisons of (a) the mean perfectionism level across two domains, and (b) the fit indices for the domain-specific perfectionism model to the fit indices of the domain-general perfectionism model.

Research Question 2: This study intends to investigate the relationship patterns between domain-specific perfectionism and motivational constructs from EVT. That is, it aims to test if the emerging correlational trends can provide further support for the domain specificity of perfectionism. Accordingly, the research question is: How do the two dimensions of domain-specific perfectionism relate to perceived competence, achievement value, and cost in the domains of major and non-major courses?

Hypothesis 2.1: In terms of the directions of correlations, I hypothesize that perceived competence and achievement value will be positively correlated with perfectionistic strivings, because they both represent positive valence in their respective theories. In contrast, regarding cost, which has thus far not been examined in the perfectionism literature, I hypothesize that it will be positively correlated with perfectionistic concerns. I argue that individuals exhibit more dissatisfactions towards task performance if they perceive the task in the given domain as less beneficial and more costly for them.

Hypothesis 2.2: In relation to the within- and between-domain correlation patterns between perfectionism and motivation, I hypothesize that the emerging patterns will further support the domain specificity of perfectionism. Specifically, the within-domain correlations will be higher than the parallel between-domain correlations. For instance, perfectionistic strivings in the domain of major courses will have a stronger association with achievement value in the same domain (within-domain correlation) than

its relationship with achievement value in the domain of the non-major course (between-domain correlation).

METHOD

Participants and Procedures

Data were collected from the subject pool of a large public university in Southwestern United States. Students completed a one-time online survey for course credit. In the online survey, after signing the consent form, the participants completed two parallel sets of questions. One set of questions pertained to their major courses, and the questions in the other set were relevant to their non-major courses. The two sets of questions were presented to the students in random order to control for order effects. In the last section, information about students' majors (or the majors they were planning to undertake) and demographic backgrounds were collected.

The sample ($N = 585$; $M_{age} = 20.64$, $SD = .05$; 61.03% female; 37.09% STEM majors) included 44.1% Non-Hispanic Whites, 23.59% Hispanic/Latinos, 22.05% Asians, 4.1% African Americans, and 6.15% mixed or other participants.

Measures

Perfectionism: I used the short form of the Almost Perfect Scale-Revised (short APS-R; Rice et al., 2014) to measure two major dimensions of perfectionism. Several previous studies have demonstrated the sound psychometric features of the short APS-R (e.g., Chang et al., 2016; Suh et al., 2017).

The two dimensions in the scale, standards and discrepancy, represent the two higher-order aspects of perfectionism, perfectionistic strivings and perfectionistic concerns respectively. Specifically, the standards subscale (4 items) measures

participants' high standards for achievement and performance. Recently, some scholars expressed concerns about the conceptual distinction between perfectionistic standards and excellencism (see Flett & Hewitt, 2020 and Gaudreau, 2019 for more details). Specifically, they argued that some items (e.g., standards in APS-R; personal standards in FMPS) measuring the adaptive dimension of perfectionism may merely tap individuals' pursuit of excellence, instead of a strong perfectionistic emphasis. In order to capture the "perfectionistic" elements in the personal standards, I modified some items in the short APS-R per the recommendations of Hewitt and Flett's research team (Blasberg et al., 2016). For example, a sample item from the original short APS-R standards subscale is "I have a strong need to strive for *excellence*." The modified sample item was worded as "I have a strong need to strive for *perfection*." The discrepancy (dissatisfaction) subscale (4 items) from the original short APS-R measures participants' self-critical performance evaluation. One sample item is "My performance rarely measures up to my standards." Both of the subscales use a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). I modified all the items in a domain-specific manner by adding the given domain at the end of the sentence. For example "I am hardly ever satisfied with my performance in the courses in my major field."

Perceived Competence, Achievement Value, and Cost: Similarly, I modified all items from the remaining scales to reflect a specific domain. For example, for perceived competence (Midgley et al., 2000), I modified one item to read: "I'm certain I can master the skills taught in my major course." In terms of achievement value, I selected nine items in total from Conley's (2012) study, with three items under each achievement value (attainment value, intrinsic value, and utility value). Sample items are "Being good in my major courses is an important part of who I am" (attainment value), "I enjoy the courses in my major" (intrinsic value), and "My major courses are useful for me to learn" (utility

value). In accordance with prior studies, I created a composite score by adding the three values together to generate a total achievement value score.

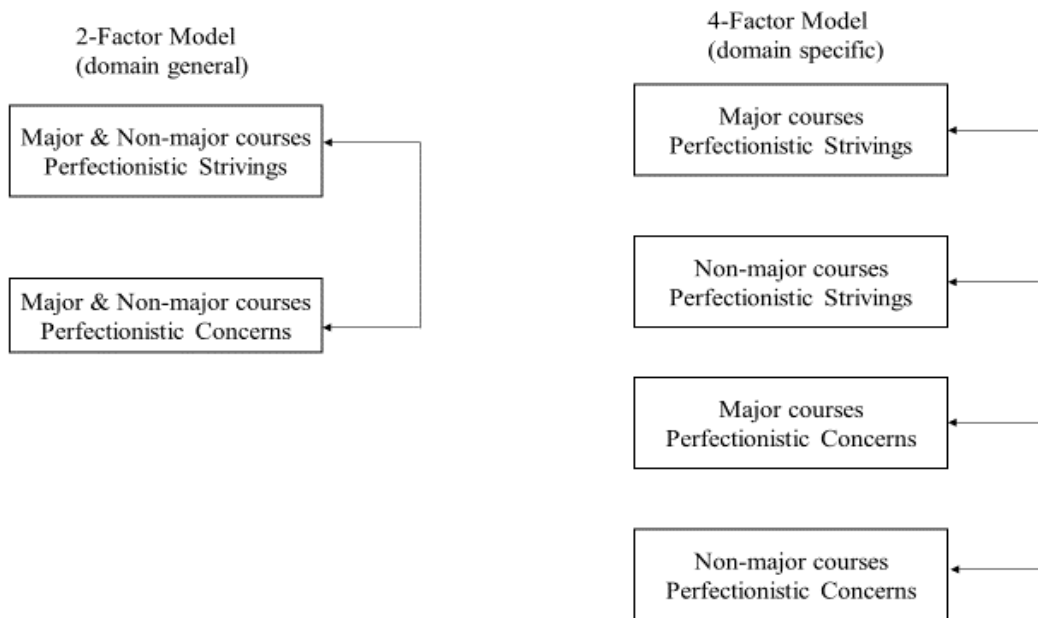
Last, for cost, I selected nine items from Jiang et al.'s (2018) study, with three items under each cost dimension (effort, opportunity, and emotional costs). Example items are "It requires too much effort for me to get good grades in my major courses" (effort cost), "To do well in my major courses requires that I give up other things I enjoy" (opportunity cost), and "Studying my major courses makes me feel stressed" (emotional cost). A composite score was created by adding the three costs together to produce a total cost score.

Data Analyses

First, the means of the two dimensions of perfectionism and the three facets of motivation across both domains were compared by a series of paired sample *t*-tests. Second, two different confirmatory factor models (Figure 1) were tested in Stata version 16 (StataCorp, 2019). As shown in Figure 1, the first model is a two-factor model with perfectionistic strivings in major and non-major courses loaded in one factor and perfectionistic concerns in major and non-major courses in another factor. This model corresponds to domain generality. The second model is a four-factor model in which the two dimensions of perfectionism, perfectionistic strivings, and perfectionistic concerns, were loaded in each of the two domains. This model represents domain specificity. The Maximum Likelihood (ML) algorithm was employed for parameter estimation. Missing data were processed by Full Information Maximum Likelihood (FIML). Two factor models were compared based on a series of fit indices, including the χ^2 difference test, AIC, CFI, and RMSEA (see McDonald & Ho, 2002). Values of CFI \geq .90, RMSEA \leq .08, and SRMR \leq .09 will suggest an acceptable model fit (Hu & Bentler, 1999; Jackson

et al., 2009). As suggested by Bong (2001), the measurement errors of parallel items in each factor model were correlated.

Figure 1. Study 1 Two Competing Models Assessing Domain Generality and Domain Specificity



Furthermore, to answer the second research question in terms of the correlation patterns among constructs of interest, I first included a correlation table to show the *within-domain* (i.e., within major courses and within non-major courses) and *between-domain* (i.e., between major and non-major courses) correlations among perfectionistic standards, perfectionistic concerns, perceived competence, positive achievement value, and cost. Second, I compared the correlation coefficient between *within-domain* correlations and *between-domain* correlations. Specifically, I used the CORTESTI procedure in Stata to test if the parallel correlations are significantly different from each other.

RESULTS

Descriptives

Means, standard deviations, internal consistencies, and correlations of all the observed variables are displayed in Table 1. All the measures presented good reliability, with the α level ranging from .86 to .93. The correlation patterns between various perfectionism and motivation, within- and between- domain factors, are extensively addressed in the parallel correlations section below to facilitate the interpretation of the domain specificity of perfectionism. The MANOVA result suggested that perfectionistic tendencies did not differ by students' major (STEM vs. non-STEM), Wilks' $\Lambda = .99$, $F(4, 580) = 1.19$, $p = .31$.

Table 1. Study 1 Scale Means, Standard Deviations, Reliabilities, and Intercorrelations

Variable	1	2	3	4	5	6	7	8	9	10
1. PS_M	--									
2. PC_M	-0.18***	--								
3. ES_M	0.49***	-0.44***	--							
4. TV_M	0.59***	-0.14***	0.39***	--						
5. CT_M	-0.19***	0.60***	-0.44***	-0.23***	--					
6. PS_NM	0.33***	-0.13**	0.16***	0.15***	-0.05	--				
7. PC_NM	-0.05	0.33***	-0.13**	0.00	0.19***	-0.05	--			
8. ES_NM	0.12**	-0.10*	0.34***	0.01	-0.02	0.40***	-0.34***	--		
9. TV_NM	0.07	-0.01	0.10*	0.03	0.01	0.49***	-0.12**	0.47***	--	
10. CT_NM	-0.01	0.13**	-0.09*	0.04	0.16***	-0.15***	0.52***	-0.43***	-0.26***	--
No. of items	4	4	5	9	9	4	4	5	9	9
M	6.01	3.45	5.82	5.83	3.66	4.91	3.15	5.22	4.53	3.34
SD	1.06	1.56	0.93	1.02	1.46	1.50	1.17	1.13	1.31	1.09
α	0.91	0.87	0.86	0.92	0.93	0.90	0.86	0.88	0.93	0.92

Note. PS = Perfectionistic Strivings, PC = Perfectionistic Concerns, ES = Expectancy for Success, TV = Task Value, CT = Cost; M represents the variables in major course domain; NM represents the variables in non-major course domain.

* $p < .05$. ** $p < .01$. *** $p < .00$

Mean-Level Differences

One basic approach on specificity is to examine mean-level differences on parallel variables across two domains (Martin, 2008; McArdle, 2010). Therefore, several paired-sample *t*-tests were employed to examine whether the means of the variables of interest differed across domains. According to Table 2, as the central interest of this study, the parallel comparisons on two dimensions of perfectionism showed that students reported higher perfectionistic strivings, $t(584) = 17.44$, $p < .001$, and lower perfectionistic concerns, $t(584) = 4.51$, $p < .001$, on their major courses in comparison to their non-major courses. This finding suggests that perfectionistic tendencies were perceived differently across domains. Additionally, the three facets of motivation, perceived competence, achievement value, and cost, were also found to be varied across different domains. Specifically, students reported higher perceived competence— $t(584) = 11.92$, $p < .001$ —and achievement value— $t(584) = 19.17$, $p < .001$ —but lower perceived cost— $t(584) = 4.6$, $p < .001$ —for the major course domain compared to the non-major course domain. This result is consistent with previous EVT literature in terms of the domain-specific nature of these motivational constructs (Gaspard et al., 2018).

Table 2. Study 1 T test of Parallel Constructs across Domains

	Major courses <i>M (SD)</i>	Non-Major courses <i>M (SD)</i>	<i>t</i> Test (<i>df</i> = 584)	
Perfectionistic Strivings	6.01 (.04)	4.91 (.06)	17.44	***
Perfectionistic Concerns	3.45 (.06)	3.15 (.05)	4.51	***
Expectancy for Success	5.82 (.04)	5.22 (.05)	11.92	***
Task Value	5.83 (.04)	4.53 (.05)	19.17	***
Cost	3.66 (.06)	3.34 (.05)	4.6	***

Note. *** $p < .001$

Confirmatory Factor Analysis

Further, two different confirmatory factor models (Figure 1) were tested and then compared based on several fit indices (see Table 3). First, the two-factor model, representing domain generality, failed to show a satisfactory fit ($\chi^2 = 1991.67$, $df = 95$, CFI = .65, RMSEA = .19). Second, the four-factor model, representing domain specificity, yielded an excellent fit to the data ($\chi^2 = 139.76$, $df = 90$, CFI = .99, RMSEA = .03). Next, the χ^2 difference test showed, the four-factor model had significant improvement in model fit compared to the two-factor model, $\Delta \chi^2(5) = 1854.91$, $p < .001$. Accordingly, the result demonstrates that perfectionism in academic settings is domain-specific given that the better fitting model is the one when two domains and two facets of perfectionism within each domain are separated.

Table 3. Study 1 Fit Indices for Two Models

	χ^2 (df)	AIC	CFI	RMSEA	SRMR
Two-factor model (domain generality)	1991.67 (95)	30860.18	0.65	0.19	0.13
Four-factor model (domain specificity)	136.76 (90)	29015.27	0.99	0.03	0.04

Parallel Correlations

As guided by previous literature (Martin, 2008; Schwinger, 2013), the domain specificity of a construct should not be indicated by factor analytic results alone, but should also be additionally supported by divergent correlations to related constructs. In this study, three motivational constructs from the EVT framework were used to provide some clues concerning why individuals exhibit different levels of perfectionism across domains.

First, I examined the correlational patterns between the two facets of perfectionism and the three facets of motivation within each domain. In the domain of major courses, perfectionistic strivings were weakly and negatively related to perfectionistic concerns ($r = .18, p < .001$). However, in the domain of non-major courses, perfectionistic strivings were not relevant to perfectionistic concerns ($r = -.05, p = .20$). This finding is consistent with the literature, which reported that the two dimensions of perfectionism are either unrelated or weakly related to each other (Rice et al., 2016). Further, in both domains, perfectionistic strivings were positively related to perceived competence ($r_{\text{major}} = .49, r_{\text{non-major}} = .40$) as well as achievement value ($r_{\text{major}} = .59, r_{\text{non-major}} = .49$), and negatively related to costs ($r_{\text{major}} = -.19, r_{\text{non-major}} = -.15$). On the other hand, perfectionistic concerns were negatively related to perceived competence ($r_{\text{major}} = -.44, r_{\text{non-major}} = -.34$) as well as achievement value ($r_{\text{major}} = -.14, r_{\text{non-major}} = -.12$), and positively related to costs ($r_{\text{major}} = .60, r_{\text{non-major}} = .52$). The associations found between perfectionism and perceived competence and achievement value align with previous relevant studies (Dunn et al., 2015). Moreover, although this study is among the first to document the links between perfectionism and cost, the finding is consistent with suggestions in the literature (Stoeber et al., 2018). That is, perceived cost, a negative valence of motivation, was negatively correlated with the positive valence of perfectionism (i.e., perfectionistic strivings), and positively related to the negative valence of perfectionism (i.e., perfectionistic concerns).

Next, one of the major interests in the present study, the within- and between-domain correlation patterns between perfectionism and motivation were explored. As shown in Table 1, the within-domain correlations were mainly medium in size, whereas the between-domain correlations were primarily not significant or small. Accordingly, it was found that the within-domain correlations were consistently higher than the parallel

between-domain correlations. For instance, perfectionistic strivings in the domain of major courses had a stronger association with achievement value in the same domain (within-domain correlation: between major-course perfectionistic and major-course achievement value; $r = .59, p < .001$) than its relationship with achievement value in the domain of the non-major course (between-domain correlation: between major-course perfectionistic and non-major-course achievement value; $r = .07, p = .11$).

Given that a few parallel within- and between- domain correlations were significant, in order to further determine if the within-domain correlations were statistically larger than the between-domain correlations, the CORTESTI procedure in Stata was conducted to examine the correlation coefficient comparisons. The results confirmed that all the correlation coefficients of within-domain correlations were significantly higher than the parallel between-domain correlations. For example, in terms of major-course perfectionistic concerns, the correlation to major-course perceived cost ($r = .60, p < .001$) was significantly larger than the non-major-course perceived cost ($r = .13, p < .01$). Altogether, the results suggest greater within-domain relatedness in comparison to between-domain relatedness, further demonstrating the domain specificity of perfectionism in different domains in academia.

DISCUSSION

Prior literature has shown that perfectionism is more salient in academics compared to other life areas among college students (Haase et al., 2013; Stoeber & Stoeber, 2009). However, how perfectionism functions within academic settings has yet to be explored. For example, although researchers have a long history of employing a domain-specific approach in studying psychological constructs in the academic setting (Buehl & Alexander, 2001; Schwinger, 2013; Guo et al., 2018), it has been unclear until

now whether students' perfectionistic tendencies vary across different academic domains. Therefore, this current study aimed to investigate the domain specificity of perfectionism *within* the educational setting and how perfectionism associates with several motivational constructs in a specific domain. Altogether, the findings demonstrate the domain-specific nature of perfectionism in the academic context through the comparisons of means between parallel constructs, fit indices between two confirmatory factor models, and the sizes of parallel correlations.

Domain Specificity of Perfectionism

This study is one of the first to reveal the domain-specific characteristics of perfectionism in academic settings. According to the results, students perceived different levels of perfectionistic strivings and perfectionistic concerns across two academic domains. Further, the domain specificity model fitted the data much better than the domain generality model. Moreover, the correlations between constructs within the same domain were stronger than the parallel correlations across domains. Together, these substantial pieces of evidence suggest that individuals hold different degrees of perfectionistic tendencies in different domains within academic settings.

This important finding not only extends the current literature on the domain-specificity of perfectionism, but also contributes to the soundness of the domain-specific nature of perfectionism. Previous reports on domain-specific perfectionism often used distinct, whole, clear-cut life domains as comparison groups (e.g., academic vs. sports; Dunn et al., 2012; McArdle, 2010). However, the current study examined the domain specificity of perfectionism between two domains within the same life area (i.e., academics). Thus, the findings of this study provides even stronger evidence confirming the domain-specific nature of perfectionism.

According to Alexander's (1997, 2004) model of domain learning, individuals' academic development and performance are subject-specific or domain-specific. Each learning domain may have its unique features. Given this domain-specific nature of learning itself, students may develop different levels of perfectionistic strivings and perfectionistic concerns toward different fields of academics. Moreover, the domain-specific characteristics of some important academic construct correlates of perfectionism provide additional external validation for the domain specificity of perfectionism. For example, self-handicapping (Schwinger, 2013) and procrastination (Klingsieck, 2013), the two variables closely related to perfectionism, have both been demonstrated to vary across different academic domains. Besides these two explanations, this current study found some explanations for the domain-specific perfectionism from the EVT standpoint detailed in the following section.

Domain Specificity of Perfectionism from the Expectancy-Value Theory

Unlike most previous domain-specific perfectionism studies that exclusively focused on comparing perfectionism degrees across domains or relied on factor analytical results (Haase et al., 2013; Stober & Stoeber, 2009), the current study took a step further to understand how motivation plays a role in the presence of perfectionistic tendencies across domains. Specifically, three domain-specific motivational facets (i.e., perceived competence, task values, and cost) from the EVT (Eccles, 2005; Wigfield & Eccles, 2020) were correlated to perfectionism in corresponding domains. This procedure mainly served two purposes (a) to further support the domain-specific nature of perfectionism in academics, and (b) to explain the underlying reasons why individuals exhibit higher perfectionism in one domain than the other.

First, this procedure provided additional support for the domain-specificity of perfectionism. According to the results (see Table 1), within-domain correlations between motivation and perfectionism were consistently higher than the parallel between-domain correlations. Take one comparison as an example, task values in major courses were positively correlated with perfectionistic standards in the same domain ($r = .59, p < .001$), but not related to perfectionistic standards in another domain ($r = .07, p = .11$). The present findings are noteworthy because the domain-specific nature of perfectionism is reflected in extensive motivational constructs, which demonstrate domain-specificity in academics.

Moreover, based on the results (see Table 1), perceived competence, task value, and cost within one domain was related to the greater (or lower) perfectionistic tendencies within that specific domain. Additionally, certain facets of motivation are more likely to be associated with the different dimensions of perfectionism. That is, within each specific domain, the two positive valences of EVT (i.e., perceived competence and task value), were positively correlated with perfectionistic strivings (ranging from $r = .40$ to $.59$). On the other hand, cost, the negative valence in EVT, was positively related to perfectionistic concerns (ranging from $r = .52$ to $.60$).

What do these strong within-domain correlations mean? First, it indicates that those who perceive higher confidence in their ability to succeed in that course domain *or* perceive the courses in that domain as valuable and useful are more likely to set higher perfectionistic standards in that specific domain. Meanwhile, individuals who regard courses in a domain as too psychologically costly (e.g., too much effort or time investment) may tend to experience more perfectionistic concerns in that corresponding domain. These motivational mechanisms are consistent with some hints in the perfectionism literature. For instance, Flett et al. (2002) argued that it would be senseless

for an individual to establish an extremely high standard if they had no confidence in achieving it. Further, Shafran et al. (2002) stated that individuals would only develop perfectionistic goals in areas that are personally significant and meaningful to them, and not in fields with little or no personal relatedness. Although this theory suggests causation, we should be cautious in positioning motivation as the antecedent of perfectionism given the cross-sectional design of this current study.

Implications

Implications for Research

Like other personality traits, perfectionism was traditionally viewed as stable across various contexts (Hewitt & Flett, 1991). For instance, Flett and Hewitt (2002) stated that individuals who experience extreme perfectionistic tendencies attempt to be perfect in *all* life domains. However, a growing number of studies in the past two decades have shown that perfectionism may vary across domains (Dunn et al., 2012; McArdle, 2010). For instance, it is easy to conceptualize a mother who sets high standards at the workplace but becomes more flexible at home with her children (Mitchelson & Burns, 1998). Therefore, from a theoretical perspective, this research adds more soundness to the domain specificity of perfectionism by demonstrating the existence of this feature between two less distinct domains within one single life area (i.e., academics). However, though the conclusion favors domain specificity, perfectionism is still related across different domains. That is, although levels of perfectionism between the two domains are not identical, they are related. This linkage between domains suggests that while perfectionism has some variability across domains, there is also some degree of stability.

Taken together, this study extends the emerging debate in the personality field about whether personality is global and stable or context-dependent (e.g., Diehl, 2015;

Dunlop, 2015). The conclusion of this study aligns with the contextualized approach to personality (e.g., Donahue et al., 1993; Roberts, 2007; Wood & Roberts, 2006), which states that individuals' personality characteristics differ across various contexts. As the results of this study indicate, an individual may pursue high standards in their major courses but set lower standards in non-major courses. Such an individual, perhaps, freely expresses a perfectionistic trait more in one domain than another (Levine & Milyavskaya, 2018). In other words, given the variability and complexity of each domain, the expression of one's personality may vary from one domain to the next.

Further, when it comes to explaining contextualized personality beyond the trait level, the motivation aspect of personality, i.e., "Why do I want to do this?" (Wigfield & Cambria, 2010) may offer a better view of how personality operates (McAdams, 2013). Specifically, in McAdams's (2013) model, trait-level personality was regarded as the "actor" while motivation was considered the "agent." According to the above results, individuals tend to set a higher standard in domains they have a higher expectation of success in, that they perceive as being more valuable, and that they perceive as being less costly. In this meaning-making process, the motivated "agent" has a hand in moving the "actor" to commit more to a certain domain than others.

Implications for Practice

This study confirms the domain-specific structure of perfectionism in the academic context, and therefore may provide researchers with some suggestions for measuring perfectionism among students. For example, researchers interested in students' perfectionistic tendencies should consider using domain-specific scales of perfectionism or modifying instructions and items to study perfectionism in a target subject or domain. A domain-general approach may fail to capture the nuances of perfectionism.

This study also delivers an essential message for how to design efficient perfectionism interventions, especially ones against perfectionistic concerns. That is, focused perfectionism interventions that are domain-specific may be more effective than global efforts. Accordingly, when designing and implementing an intervention to help students struggling with perfectionistic tendencies in academics, for example, researchers and school counselors may approach the task by connecting certain salient facets (e.g., more memorization required in a subject like history) to strategies (e.g., domain-specific problem-solving and coping strategies) within that domain.

Limitations and Future Directions

Several limitations of this study should be noted. First, although the two selected comparison domains (i.e., courses within the major vs. non-major courses) in this research reflect individuals' actual learning experience in college, students may have somewhat predominant domain affinities to their major courses. Also, this approach may exclude those whose majors are still undecided.

Second, this research only focuses on college students, leaving the question of whether perfectionism is domain-specific among younger students unanswered. An exploration of the perfectionism structure in schools during students' earlier academic life is necessary for future studies, because it will provide guidance for more effective interventions in these critical periods. Given that perfectionistic concerns are closely related to psychological distress (Stoeber & Otto, 2006), they may contribute to students' lower academic achievement or even their choice of dropping out of school before they enter college.

Third, this study depends on the perfectionism measure developed by Slaney and colleagues (Rice et al., 2014; Slaney et al., 2001), which examines how perfectionistic

strivings and perfectionistic concerns respectively perform across and within two domains. The domain-specific nature of perfectionism in the educational context should also be addressed by other types of perfectionism measures. For example, the newly developed perfectionism measure, The Big Three Perfectionism Scale (Smith et al., 2016), that contains three subscales (i.e., rigid perfectionism, self-critical perfectionism and narcissistic perfectionism) may be a good approach to further assess the domain specificity of perfectionism in academics.

Lastly, this research used a cross-sectional design, which may leave the stability of the domain-specific structure of perfectionism unexplored. Additionally, the motivational constructs were posited as the underlying facets explaining the formation of domain-specific perfectionism. However, although this argument was indicated in the literature (Flett et al., 2002), we should be cautious when interpreting this mechanism given the cross-sectional design of this study. Future studies should take a longitudinal approach to documenting the stability of domain specificity and the antecedents that contribute to it.

Chapter Four (Study Two): An Examination of Perfectionism and Achievement Value Profiles Among College Students

Perfectionism has been regarded as a two-factor, higher-order personality trait encompassing (1) striving for excessively high *standards* and (2) excessively high *concerns* regarding the discrepancy between one's expectations and actual performance (Frost et al., 1993; Slaney et al., 2001; Stoeber & Otto, 2006). Over the past three decades, the association between perfectionism and individuals' well-being and mental health has been widely examined (see Stoeber, 2018 for a review). This examination has also resulted in a growing body of research that explores how perfectionism relates to students' performance in academic settings (Bong et al., 2014; Lee & Anderman, 2020; Rice et al., 2016; Ståhlberg et al., 2019). In general, prior research suggests that perfectionistic strivings are positively related to adaptive indicators of academic outcomes (e.g., engagement and positive classroom affect; Lee & Anderman, 2020; Shih 2011). On the contrary, perfectionistic concerns are mainly associated with maladaptive indicators of educational outcomes (e.g., procrastination and burnout; Stoeber et al., 2014; Zhang et al., 2007). This body of work has demonstrated that dispositional perfectionism may play the role of a double-edged sword, capable of both enhancing and/or hampering students' academic behaviors or performance.

That said, some scholars have brought to attention the relative simplicity of the contrary patterns of the two perfectionism dimensions in terms of academic outcomes. Thus, they have emphasized the necessity to further examine the underlying constructs that contribute to the respective influences of the two dimensions of perfectionism on students' achievement outcomes in academia (Bong et al., 2014; Fletcher & Neumeister, 2012). One such factor is achievement motivation (Bong et al., 2014; Hewitt & Flett, 1990; Miquelon et al., 2005). Motivation in the achievement setting motivates students to

perform in various contexts and addresses their beliefs enumerating the reasons they are working towards the academic goals they are striving for (Eccles et al., 1998; Pintrich, 2003). Accordingly, there has been an emerging stream of research examining the complex links between the different angles of perfectionism and various types of achievement motivation (e.g., self-efficacy, achievement goal orientations, and self-determination) that underlie students' educational outcomes (Bong et al., 2014; Nguyen & Deci, 2016; Stoeber et al., 2009). So far, all existing studies exploring this line of research have employed a variable-centered approach (e.g., regression, analysis of variance, and structural equation modeling) in the examination of how perfectionism and motivation interact and predict academic outcomes. Yet, this approach represents a statistically explained "averaged individual" (Roeser et al., 1998) rather than viewing students as realistic "whole individuals" (Lau & Roeser, 2008). In other words, the variable-centered approach merely highlights separate variables rather than a coherence of multiple variables, and consequently may be insufficiently or inaccurately interpreting how perfectionism functions together with motivation among individual students.

An alternative approach is person-centered analysis, which focuses on how different variables cohere into profiles and relate to different outcomes and involves the use of latent profile analysis (Bergman & Magnusson, 1997; Howard & Hoffman, 2018). It echoes Snow's (1992) reflection that "Human beings are not lists of independent variables; they are coordinated wholes" (p.10). Research into profiles has been widely used in grouping students into various perfectionist categories based on the two-factor model of perfectionism comprising the higher order dimensions of perfectionistic strivings and perfectionistic concerns (e.g., Gaudreau & Thompson, 2010; Rice et al., 2012; Smith et al., 2016). In addition, although the person-centered approach is comparatively uncommon in motivational research, a growing number of researchers

have identified various motivational profiles among students (e.g., Linnenbrink-Garcia et al., 2018; Lazarides et al., 2020; Xie et al., 2020). These existing studies reveal that multiple aspects of perfectionism (e.g., perfectionistic strivings and perfectionistic concerns) and/or various facets of motivation (e.g., task values and cost) can be present concurrently within individuals. However, although the complex relationship between perfectionism and motivation has been indicated by prior variable-centered approach studies, few studies thus far have viewed perfectionism and motivation as profiles that characterize the simultaneous function of integrated patterns of perfectionism disposition and motivational beliefs within individual students. Thus, the present study will employ a person-centered approach (i.e., latent profile analysis) to identify profiles based on the combination of perfectionism and motivation and investigate how different profiles link to academic outcomes. In addition, I will further examine how students' demographic backgrounds (i.e., gender, and underrepresented minorities status) relate to profile membership to investigate the underrepresentation or overrepresentation of particular student groups in different profiles.

LITERATURE REVIEW

Theoretical Background

Why Perfectionism and Motivation?

The current study integrates achievement motivation with the complexity of perfectionism in academic achievement settings in order to expand our understanding of the interplay between motivation and perfectionism. I focus on achievement motivation to extend our knowledge in perfectionism due to the following reasons. First, traditionally, the construct of perfectionism exhibits motivational roots in its formation

and development. The earliest explicit investigation of motivation in perfectionism can be traced to Hewitt and Flett's (1990) "perfectionism motivation" view, which initially explicated the need for a multidimensional perfectionism model. They argued that apart from cognitive manifestation, the motivational side of perfectionism should also be considered, because aspects of perfectionism were originally derived from the achievement motivation field (e.g., Atkinson & Feather, 1966).

Second, there is an emerging body of research currently shedding light on the motivational footprint in perfectionism, suggesting that perfectionism and motivation work side-by-side in a complex manner in school settings. For example, one longitudinal study found that the development of perfectionistic strivings in academia is not only influenced by academic outcomes, but also by self-efficacy (Damian et al., 2017). Further, other studies have suggested that motivation plays the role of either a mediator (Bong et al., 2014; Miquelon et al., 2005) or moderator (Nguyen & Deci, 2016; Shim et al., 2016) in the links between perfectionism and key learning outcomes. Lately, Lee and Anderman (2020) categorized college students into four perfectionist groups and subsequently found that parts of the 12 interactions between perfectionist groups and achievement goal orientations predict academic outcomes.

Third, in Flett and Hewitt's (2020) reflections on three decades of research on perfectionism, they noted that the complex nature of perfectionism is especially salient when perfectionism is viewed from a motivational perspective. In particular, the internal conflict caused by the contrasting valences of motivation contribute to the complexity of perfectionism (Flett & Hewitt, 2020). For example, Covington (1989) portrayed perfectionistic over-strivers as driven by strong and simultaneous approach and avoidance motivational tendencies when they attempt to succeed and avoid mistakes in academic contexts. Consequently, "learning becomes a highly conflicted process" (p. 93)

for them. Hofmann et al. (2012) also observed the motivational conflicts inherent in perfectionism in their experience sampling study. They found that perfectionists often experience motivational conflicts while reducing self-regulatory capabilities during the process of striving for excessively high standards.

More recently, Stoeber and colleagues (2018) attested a clearer pattern in matching motivational conflicts with the two dimensions of perfectionism respectively. Through a review of studies examining perfectionism and achievement goal orientations—the most widely adopted motivational framework in perfectionism and motivation research—they argue that perfectionistic striving is mostly approach-oriented whereas perfectionistic concern is mainly avoidance-oriented. This finding adds more evidence to the conflicts and complexities of motivation underlying perfectionism.

Taken together, achievement motivation plays an important role in understanding how perfectionism operates in the achievement context. Also, it is possible that the interplay between multiple facets of perfectionism and motivational conflicts may be much less straightforward and far more complex than is generally expected. However, almost all the studies investigating perfectionism and motivation used a variable-centered approach, which primarily focuses on the isolated main effect or interactions of predictor variables. This approach may be inadequate in capturing the complex patterns of interactions among multiple perfectionism and motivational facets. Thus, a person-centered approach, that addresses how a constellation of constructs occur simultaneously, may be a better method to enhance our knowledge about the coherence of perfectionism and motivation among individual students.

In the following sections, I introduce the theoretical frameworks underpinning perfectionism and motivation. I then identify their links to academic outcomes from the standpoint of existing research on both variable- and person-centered approaches.

Multidimensional Perfectionism

Since the proposal of multidimensional perfectionism in the 1990s (Frost et al., 1990; Hewitt & Flett, 1991), researchers have taken the positive aspect of perfectionism into consideration along with the traditional negative view. Accordingly, several perfectionism models and measures have been developed to facilitate improved understanding among researchers and practitioners alike (Frost et al., 1990; Hewitt & Flett, 1991; Slaney et al., 2001; Smith et al., 2016). Given the complexity of perfectionism, prior studies in perfectionism and motivation captured different angles of perfectionism in their own ways. For example, some studies highlight the origin of the various aspects of perfectionism (e.g., self-oriented perfectionism vs. social-prescribed perfectionism in HF-MPS; Bong et al., 2014; Miquelon et al., 2005) whereas others mainly emphasize a single positive dimension of perfectionism (e.g., personal standards; McArdle, 2010; Nguyen & Deci, 2016). In the current study, I intend to focus on the multidimensional nature of perfectionism based on the two extensively acknowledged higher-order dimensions—perfectionistic strivings and perfectionistic concerns (Frost et al., 1993; Stoeber & Otto, 2006).

Slaney and his colleagues conceptualized both positive and negative aspects of perfectionism and developed a measure called the Almost Perfect Scale-Revised (APS-R; Slaney et al., 1996; Slaney et al., 2001). In the APS-R, the “Standards” subscale measures individuals’ high expectations of performance (representing perfectionistic strivings) whereas the “Discrepancy” subscale assesses the degree of dissatisfaction in one’s perceived ability to meet the expected standards (representing perfectionistic concerns). Compared to other perfectionism measures, it sets out clear conceptual distinctions between the positive and negative dimensions of perfectionism (Slaney et al., 2001). That is, the “Standards” and “Discrepancy” subscales are mostly independent, or at most

minimally related to each other (Rice et al., 2016; Slaney et al., 2001). Thus, in the present study, in order to distinguish the two sides of perfectionism clearly, I used the perfectionism framework based on the APS-R and its two subscales.

Methodologically, scholars have used either a dimensional (variable-centered approach) or group-based categorical approach (person-centered approach) to address the distinctions between the positive and negative aspects of perfectionism. In the context of perfectionism and learning, the variable-centered approach mainly focused on the influence of perfectionistic strivings and perfectionistic concerns on academic outcomes respectively. As mentioned previously, a recent meta-analysis (Madigan, 2019) showed that perfectionistic strivings are mostly positively associated with academic achievement whereas perfectionistic concerns are usually negatively linked to academic achievement (also see Rice et al., 2016 for a review).

On the other hand, the person-centered approach, focusing on groups of perfectionists (adaptive or maladaptive) and non-perfectionists, has been extensively used in perfectionism literature. In general, most researchers identified a tripartite group model based on combinations of perfectionistic strivings and perfectionistic concerns among a wide range of students (Rice & Ashby, 2007; Rice et al., 2011; Wang et al., 2009). Specifically, the three groups included adaptive perfectionists (high strivings and low concerns), maladaptive perfectionists (high strivings and high concerns), and non-perfectionists (low on strivings and concerns). In other words, perfectionistic strivings can be used to distinguish between perfectionists and non-perfectionists. Meanwhile, perfectionistic concerns play a role in differentiating between adaptive- or maladaptive-perfectionism. The reasoning behind the different labels of perfectionist groupings (adaptive or maladaptive) is not limited to the positive or negative aspects of compositional perfectionistic dimensions, but also attributed to each group's

corresponding academic outcomes. Individuals in the adaptive perfectionist group were more likely to report better learning outcomes (e.g., GPA, engagement, and affect) than those in the maladaptive perfectionist group (Gilman & Ashby, 2003; Rice & Mirzadeh, 2000). Contrarily, inconsistent findings have often been found when comparing the associated learning outcomes between perfectionist and non-perfectionist groups. Further, aside from the above-mentioned tripartite group, several studies have found a fourth group comprising individuals demonstrating low strivings but high concerns (Gaudreau & Thompson, 2010; Rice et al., 2011; Wang et al., 2007). Some researchers viewed the characteristics of this group as similar to those of the non-perfectionist group but merely with stronger self-evaluation (Rice et al., 2011). Some researchers, however, regard this fourth group as most problematic because the outcomes associated with this group are considerably worse than those in the maladaptive perfectionist group (Gaudreau & Thompson, 2010).

Motivation: Achievement Values

In terms of motivation constructs in the current study, achievement values from Eccles's expectancy-value theory (EVT; Eccles, 2005; Wigfield & Eccles, 1992, 2020) are included. I selected this theory as the motivational framework for several reasons. First, the two contrasting components (i.e., positive achievement values vs. perceived cost) that constitute achievement values may well represent the motivational conflict inherent in perfectionism (Covington 1989; Flett & Hewitt, 2020). Although most prior studies have extensively endorsed achievement goal orientations, an alternate motivational framework that includes contrasting motivational components (approach-oriented vs. avoidance-oriented) to examine perfectionism and motivation (Bong et al., 2014; Eum & Rice, 2011; Wang et al., 2012), far less is known about how perfectionism

functions in conjunction with the complex motivational constructs from achievement values. To my knowledge, only three studies have examined perfectionism and achievement values so far, but they either included only a single dimension of perfectionism or excluded the cost component in achievement values (Dunn et al., 2012; McArdle, 2010; Mills & Blankstein, 2000). Second, theoretically, both achievement goal orientations and achievement values answer the same core question—“*Why* do I want to do this?”—in motivation, but with different emphasis (Wigfield & Cambria, 2010). Goal orientations underscore the purpose or focus of students’ engagement while achievement values primarily center on students’ emotional involvement and subjective evaluation of a task regarding its importance and relevance (Linnenbrink-Garcia et al., 2018; Wigfield & Cambria, 2010). Additionally, the perceived cost component in achievement values also assesses students’ beliefs on “*Why don’t* I want to do this?” Thus, studying achievement values in perfectionism will add a valuable supplement, answering the “*Why*” question in motivation. Further, given the close relationship between perfectionism and well-being, the emotional experience component from achievement values will potentially provide insights relevant to perfectionism interventions like cognitive emotional regulation (Rudolph et al., 2007).

In general, achievement values refer to individuals’ perceptions about the subjective worth of different achievement tasks (Wigfield & Eccles, 1992; Wigfield et al., 2017). The first three achievement value components are: (a) *attainment value* (the perceived importance of a task); (b) *intrinsic value* (the enjoyment one may have in engaging in a task or domain); and (c) *utility value* (the usefulness of a task to one’s future goal). As strong positive relationships among these three values were often observed in empirical research, many studies generated composite scores by averaging these three components as an indicator of students’ achievement value (e.g., Fong &

Kremer, 2019; Perez et al., 2014). The fourth factor within the EVT framework is *perceived cost*, which refers to what the individual has to sacrifice in order to achieve a task. That is, students may think about the cost-benefit ratio of certain tasks or domains and prefer not to engage with them if they are too “costly” (Eccles, 2005; Wigfield et al., 2017).

Traditionally, most researchers have used the variable-centered approach to examine the relationship between achievement values and academic outcomes. Established patterns show that the first three achievement value components—attainment value, intrinsic value, and utility value—were highly relevant to positive academic outcomes, including achievement-related choices and persistence (Wigfield et al., 2017). Consequently, scholars labeled them as the positive valence in achievement values that represents approach-oriented motivation (Eccles & Wigfield, 1995). In contrast, due to the limited development of cost measures before 2010, only a handful of studies tapped perceived costs. The existing research indicates that cost is negatively correlated with the above three components and associated with maladaptive learning outcomes like drop-out intentions and procrastination (Jiang et al., 2018; Perez et al., 2014). Correspondingly, scholars labeled perceived cost as the negative valence in the achievement value framework that ties to avoidance-oriented motivation (Eccles & Wigfield, 1995; Jiang et al., 2018).

Lately, the person-centered approach has been gaining increasing popularity in exploring how different achievement values cohere into motivational profiles, and how these profiles link to achievement outcomes (e.g., Conley, 2012; Fong et al., 2021; Guo et al., 2018; Linnenbrink-Garcia et al., 2018; Perez et al., 2019). Although the selection of variables within profiles differed across studies, at least four general types of motivational profiles were identified by previous research (Dietrich et al., 2019;

Linnenbrink-Garcia et al., 2018). The first three types are featured by symmetric *high*, *moderate*, and *low* levels of motivational constructs respectively. For instance, high expectancy for success goes along with positive achievement values in the “highly motivated” profile (Lazarides et al., 2020; Linnenbrink-Garcia et al., 2018). In contrast, average levels of motivational constructs are all comparatively low in the “amotivated” profile (Dietrich et al., 2019; Perez et al., 2019). Meanwhile, the fourth type—“mixed” or “discordant combination” motivational profile—has been extensively identified in several studies. Unlike the previously described profiles with symmetric and clear patterns of motivational levels, the “mixed” profile often includes combinations of multiple levels of inconsistent motivation constructs that have to be examined case by case. For instance, task values are usually expected to be high when individuals have high expectancy beliefs, but Rosenzweig and Wigfield (2017) identified an uncommon “high efficacy and devalue” reading motivation profile among middle school students in the U.S., indicating that students within this group had strong expectancy beliefs in reading, but may have believed the subject was irrelevant or unimportant to them. In contrast, an unexpected motivational profile of low self-concept but high interest was identified among a group of Finnish children in the reading domain (Viljaranta et al., 2017).

Most of the motivational profiles using the EVT framework were built on the three positive achievement values whereas perceived cost, which represents negative value, was rarely included. Conley’s (2012) is the first study to include cost along with expectancy beliefs and task values, and goal orientations in a cluster analysis. The study found that given similar degrees of other motivational constructs (i.e., at average level), students in the group with lower levels of cost reported more positive affect in math class than their peers in the group with high cost. It indicates that perceived cost differentiates between more-adaptive and less-adaptive motivational profiles. Similarly, two more

recent studies (Dietrich et al., 2019; Perez et al., 2019) also suggest that cost plays a significant role in distinguishing various levels of adaptive motivational profiles, especially when the motivational profile is complex and mixed. For instance, of the two profiles with both relatively high competence and achievement values, the group which perceived lower effort cost completed significantly more STEM courses in college compared to the group that perceived higher effort cost (Perez et al., 2019). Thus, in order to further explore the role of perceived cost in composing motivational profiles, and the associated outcomes, perceived cost will be included in the current study.

Variable-Centered Approach and Person-Centered Approach

Variable-Centered Approach

As noted above, most prior studies investigating associations between perfectionism and motivation exclusively employed a variable-centered approach based on linear model frameworks like regression, analysis of variance, or structural equation models. The traditional and dominant approach in social science, variable-centered analyses describe relationships among variables. “The focus of interest is the relation between individuals’ positions on latent dimensions, statistically studied across individuals” (Magnusson, 2003, p. 14). Accordingly, this approach produces a single set of averaged parameters based on the assumption that all members are homogeneous (Howard & Hoffman, 2018). Thus, variable-centered approach is well suited for studies that examine the effects of predictors in explaining variance on dependent variables (Magnusson, 2003; Laursen & Hoff, 2006).

However, a variable-centered approach may not be the best statistical method in studies looking at multiple variables simultaneously with the intent of understanding how their combinations predict outcomes. Within this approach, in order to investigate the

performance of one factor (e.g., perfectionism) on an outcome based on another one (e.g., motivation), interaction terms have to be included. However, the “fitted value” presented by the interaction patterns may fail to capture some rarely displayed combinations of individuals’ perfectionism dispositions and motivational beliefs (e.g., high perfectionistic strivings but low achievement value). It indicates that the variable-centered approach may insufficiently or inaccurately represent all the possible patterns of variables. Further, statistical methods within the family of variable-centered approach are rarely capable of processing an excessive number of interactions (i.e., four-way interactions as is the case in this study) on the predictor side (Pastor et al., 2007; Schwinger et al., 2012). Meanwhile, researchers have to recruit relatively large sample sizes to achieve sufficient statistical power to detect the effect of multiple interaction terms; these effects are also sometimes challenging to interpret in a joint manner (Hofmans et al., 2020; Howard & Hoffman, 2018).

Person-Centered Approach

An alternative statistical approach that may extend the findings of the variable-centered approach is the person-centered approach. Specifically, the person-centered approach describes how various variables are linked to each other in individuals: “the identification of groups of individuals who function in a similar way at the organism level and in a different way relative to other individuals at the same level” (Magnusson, 2003, p. 16). This approach aims to identify the dynamics of emergent subgroups in a sample based on multiple substantive variables. Hence, it is able to accurately and extensively describe all individuals in the sample (Collins & Lanza, 2009; Howard & Hoffman, 2018). Correspondingly, unlike the single set of population parameters produced by the variable-centered approach, several sets of parameters are generated in the person-

centered approach classifying heterogeneous individuals in the sample to different optimal subgroups (Laursen & Hoff, 2006). Thus, this approach of analysis is suitable for research studies intending to categorize individuals with similar characteristics into subgroups and compare the associated outcomes across different groups.

Compared to the variable-centered approach, the person-centered approach is more appropriate for the current study and has some advantages in addressing the above limitations in variable-centered analysis. First, results based on the person-centered approach may better grasp the reality of a wider range of students' actual learning experience. A few existing research studies on perfectionism and EVT using the variable-centered approach indicate a positive relationship between perfectionistic strivings and achievement value (Dunn et al., 2012; McArdle, 2010; Mills & Blankstein, 2000). In reality, however, it is possible that the relationship between perfectionistic strivings and positive achievement values is more complex than this linear relationship. Although students who set higher standards of performance in school tended to perceive academic tasks as more valuable and important, the corresponding correlations were weak among middle school ($r = .25$ in McArdle, 2010) and college ($r = .17$ in Mills & Blankstein, 2000) students. These results indicate that the linear relationship between perfectionism and achievement value may insufficiently represent certain subgroups in the population, such as the uncommon group of students with high perfectionistic standards but low achievement values. In contrast, the person-centered approach assumes the existence of various identifiable subpopulations in the sample and the result yields a more nuanced description of the individuals (Howard & Hoffman, 2018; Hofmans et al., 2020).

Moreover, when taking application into consideration, the person-centered approach provides a more feasible and clear way to portray the prominent patterns observed among students in academic settings. Specifically, the patterns displayed

through this approach can easily be mapped into an actual reality (a whole individual) rather than an abstract entity (an averaged individual defined by a single statistical parameter) (Lau & Roeser, 2008; Roeser et al., 1998). Put differently, the underlying rationale and presenting custom of the person-centered approach cohere to the case-by-case reasoning manner of practitioners, and consequently, this approach will be more efficient in translating theoretical research to practice.

Last, the person-centered approach enables researchers to examine the complex configuration of multiple variables simultaneously influencing individuals (Bergman & Magnusson, 1997; Howard & Hoffman, 2018). The main goal of the current study is to explore how two facets of perfectionistic disposition and two valences of achievement value beliefs work together within an individual and jointly impact learning outcomes. The variable-centered approach, is incapable of addressing this research question because it merely depicts how a single predictor explains unique variance in outcomes (Bergman & Trost, 2006; Laursen & Hoff, 2006). Additionally, the person-centered approach may avoid statistical concerns like multicollinearity or statistical suppression in relatively complex variable-centered models, such as multiple regression with two or more highly correlated predictors (Lewis-Beck et al., 2004; Linnenbrink-Garcia et al., 2018).

Outcomes and Demographic Background

Academic Outcomes: Behavior and Emotion

As the second purpose of the current study is to understand how different profiles link to students' learning experiences in school, I briefly describe the academic outcomes I have selected in this section. I included academic behaviors and emotion, the two commonly used outcome categories in prior perfectionism (Flett et al., 2009; Rice et al., 2012) and achievement value research (e.g., Conley, 2012; Linnenbrink-Garcia et al.,

2018). Within each outcome category, variables representing both positive and negative valences were examined to better capture a nuanced combined operationalization.

In terms of academic behaviors, I included engagement and procrastination. First, in regard to the two types of academic engagements, behavioral engagement refers to students' participation and persistence in academic tasks (Linnenbrink, 2005) whereas cognitive engagement emphasizes the strategic aspects of engagement like planning, monitoring, and evaluation (Connell & Wellborn, 1991; Fredricks et al., 2006). Second, in the academic setting, procrastination is described as an irrational tendency to voluntarily delay and disengage from tasks that should be completed (Lay, 1986; Rice et al., 2012). Meta-analytical works have shown that procrastination is negatively correlated with academic performance (Kim & Seo, 2015) and prevalent among college students (Steel, 2007). In sum, engagement is a positive indicator of academic behaviors whereas procrastination indicates the negative aspect of academic behaviors.

Furthermore, I included outcomes of classroom affect and burnout to assess students' emotions in class. First, classroom affect encompasses both positive and negative classroom affects (Kaplan & Maehr, 1999; Watson et al., 1988). Positive classroom affect corresponds to students' enjoyable and pleasurable experiences in the classroom. In contrast, negative classroom affect implies students' distressed and frustrated experiences in the learning environment. Second, burnout is viewed as a psychological syndrome, which comprises emotional exhaustion, decreased accomplishment, and changed attitude (Schaufeli et al., 1996). In order to remain consistent with the outcome of emotion, I only included the emotional exhaustion dimension of burnout in this study. Emotional exhaustion highlights students' fatigued experience and has been found to be particularly relevant to perfectionistic tendencies (Lee & Anderman, 2020; Zhang et al., 2007). In short, among the above constructs,

positive classroom affect represents the positive valence of subjective emotion while negative classroom affect and emotional exhaustion reflect the negative sides of emotion.

Demographic Background: Gender and Underrepresented Minorities Status

The last aim of this study is to examine if students from particular demographic backgrounds are over- or under-represented in different groups. The two demographic variables I included were gender and underrepresented minorities status (URM). Underrepresented minorities include African American, Native American, and Hispanic/Latinx students, who are underrepresented in the STEM workforce compared to Non-Hispanic White and Asian students (National Center for Science and Engineering Statistics, 2019).

In the literature, there are inconsistent findings regarding gender differences in relation to perfectionism. Some studies identified gender differences (Flett et al., 1994) whereas others found males and females have similar levels of perfectionism (Stoeber & Stoeber, 2009).

In the achievement value literature, because EVT emphasizes the significant role of contextual variables, like personal characteristics and cultural milieu (Eccles et al., 1983; Wigfield & Eccles, 2020), gender and ethnic variations within the context of achievement value have been extensively studied in prior research (Tonks et al., 2018; Wang & Degol, 2013). Studies have suggested that female students often perceive lower values in the STEM domains than male students (Chow & Salmela-Aro, 2011; Thoman et al., 2015). Further, research found that racial/ethnic minorities view STEM domains as less relevant and important to themselves (Ball et al., 2017; Carter et al., 2014).

CURRENT STUDY

The main goal of the current study is to identify integrative profiles based on college students' perfectionistic dispositions and achievement value beliefs. As prior research suggests the domain-specific nature of perfectionism (Conclusion from Dissertation Study 1) and achievement value (Eccles et al., 1993; Wigfield & Eccles, 1992) in the academic context, this study focused on students' experiences in math-related college courses (e.g., algebra, calculus, probability, and statistics). One reason for choosing math-related courses is that the domain of math is commonly regarded as difficult and has a high course drop-out rate at the college level (Beilock & Carr, 2005; Larose et al., 2011). Research suggests that perfectionism may tend to be more salient when the task is challenging (Besser et al., 2008), but little is known about how perfectionism functions in this challenging domain in academia. Second, as students' motivational beliefs decrease especially strongly in the math domain when they grow older (Jacobs et al., 2002; Spinath & Spinath, 2005), more study is needed to better understand the operation of math motivation in college, particularly from a perspective that integrates perfectionism. Third, it is feasible to assess college students' math-relevant learning experiences because most of them have to take at least one math-related course to fulfill their core curriculum requirements, regardless of their majors.

Research Questions and Hypotheses

Research Question 1: How do two dimensions of perfectionism and two valences of achievement value cohere together to generate different profiles among college students enrolled in math-related courses?

Hypothesis 1: I hypothesize that multiple profiles will be generated, including mainly adaptive (e.g., high in both positive/approach-oriented components from the two

constructs; that is high in perfectionistic strivings and positive achievement values) and maladaptive (e.g., high in both negative/avoidance-oriented components from the two constructs; that is both high in perfectionistic concerns and perceived cost) combinations. Besides these two types of profiles with relatively clear patterns of combination, other profiles with varying levels of perfectionism and achievement value will emerge as well. Due to the complex characteristics of both indicators and the exploratory nature of this research question, I did not pose a specific hypothesis regarding the formation of these profiles with mixed levels of indicators.

Research Question 2: How do different profiles link to a constellation of outcomes that represent academic behavior and emotion?

Hypothesis 2: Based on prior research, I hypothesize that the adaptive profile (high perfectionistic strivings and achievement values) will link to relatively higher levels of positive outcomes and lower levels of negative outcomes. In contrast, the maladaptive profile (high perfectionistic concerns and perceived cost) will be associated with comparatively lower degrees of positive outcomes and higher levels of negative outcomes. However, as the composition of the other profiles with mixed levels of indicators is complex, I refrained from making hypotheses about the outcomes associated with them.

Research Question 3: Are students from a particular demographic group (i.e., gender and URM status) over- or under-represented in each profile?

Hypothesis 3: Based on prior research, I expect that more female and URM students will be categorized into profiles with relatively low math motivation. Other than the above hypothesis, I do not pose other predictions as there is little relevant research in the literature.

METHOD

Participants

Data were collected from the subject pool of a large public university located in Southwestern United States. Students completed a one-time online survey for course credit. The sample ($N = 741$; $M_{age} = 20.28$, $SD = .04$; 62.62% female) included 36.71% Non-Hispanic Whites, 34.55% Asians, 16.60% Hispanic/Latinos, 5.80% African Americans, and 6.33% mixed or other participants. Three hundred and forty-three (46.29%) students were enrolled in lower-division math-related courses and 398 (53.71%) students were enrolled in higher-division math-related courses.

Measures

First, the participant answered if s/he was enrolled in a math-related course (e.g., algebra, calculus, probability, and statistics) this semester. If “yes” was selected, they were asked to write down the course name.

In terms of the survey, I used the full version of the Almost Perfect Scale-Revised (APS-R; Slaney et al., 2001) instead of the shorter one used in Study 1. Similar to Study 1, some items in the perfectionistic standards subscale were modified in order to capture “perfectionistic” components (Blasberg et al., 2016). Second, the two components of achievement values (i.e., achievement value and perceived cost) were assessed using the same scales as in Study 1. Below I describe the measures of academic outcomes in this study. All survey items, except for the demographic background, were assessed using a self-reported 7-point Likert scale, ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). All survey items were modified according to the context of math-related courses. Also, participants were asked to report their experiences pertaining to the math-related course they identified at the beginning of the survey when answering subsequent

questions. Table 1 shows the internal consistency for each measure (α level ranges from .85 to .95). I present all the measures in the Appendix.

Behaviors

Engagement. I included two types of engagement in this study, including behavioral engagement and cognitive engagement. Behavior engagement was assessed using four items from the behavior engagement scale (Linnenbrink, 2005) that primarily measures students' participation and persistence in a course. Here is an example of a sample item: "Even when I don't want to do my class readings and assignments, I force myself to do the work." Cognitive engagement was modified based on Linnenbrink-Garcia et al., (2018) which included four items tapping the strategic-using aspect of students' engagement, such as course planning, monitoring, and evaluation. These items were originally adopted from the MSLQ (Pintrich et al., 1993). A sample item is "When reading for this course, I make up questions to help focus my reading."

Procrastination. Academic procrastination assesses students' irrational tendency to voluntarily delay academic tasks (Lay, 1986; Rice et al., 2012). I selected four items from Wolters' (2003) and Zusho & Barnett's (2011) studies. A sample item is "I am too lazy to work on assignment ahead of the deadlines in this course."

Emotions

Classroom Affect. The positive and negative affect scales were adopted from Jiang et al. (2018). Three items were used to assess positive affect, which represent students' enjoyable and pleasurable experiences in the classroom (e.g., "Most of the time, being in this class puts me in a good mood."). Four items were used to measure negative

affect, which reflect students' distressed and frustrating experiences in the class environment (e.g., "This class often makes me feel bad.").

Emotional Exhaustion. The 5-item emotional exhaustion subscale from the Maslach Burnout Inventory-General Survey (MBI-GS; Schaufeli et al., 1996) was used to assess students' levels of perceived fatigue related to the course. A sample item is "I feel emotionally drained by this class."

Data Analyses

In the current study, latent profile analysis (LPA) was used to classify students into different subgroups according to their responses concerning perfectionism and achievement values. Both under the mixture modeling category—different from the latent class analysis (LCA) which reveals hidden group patterns based on categorically observed variables—LPA aims to recover group patterns based on continuous variables (Meyer et al., 2013). I used factor scores on each of the variables as input variables for the LPA analysis. Compared to other traditional grouping techniques such as median splits or cluster analysis, latent profile analysis depends on more objective and accurate fit indices to identify the number and the nature of the subgroups in the sample (Meyer et al., 2013; Stanley et al., 2017). The statistics under a series of fit indices in latent profile analysis is probability-based. Specifically, the posterior probabilities used to identify the optimal latent profile model suggest the likelihood of a participant belonging to one particular group rather than the rest of the groups (Stanley et al., 2017). Recently, latent profile analysis has been increasingly used in the field of educational psychology for studies aiming to assign individuals to homogeneous subgroups (e.g., Marsh et al., 2009; Linnenbrink-Garcia et al., 2018).

To conduct this analysis, two- to six-profile models were sequentially estimated, and the optimal number of profiles was selected in accordance with several statistical fit indices (Nylund et al., 2007). Consistent with Linnenbrink-Garcia et al. (2018), I examined the following fit indices: Akaike Information criteria (AIC), Bayesian information criterion (BIC), the sample size adjusted BIC (ABIC), and entropy. There are no cutoff points for these fit indices. In general, the patterns of lower AIC, BIC, and ABIC, along with higher entropy, imply a better model fit when comparing one model to its neighbor (Collins & Lanza, 2009). In particular, BIC is often regarded as the most reliable model fit indicator (Nylund et al., 2007).

All analyses in the study were conducted in Mplus version 8 (Muthén & Muthén, 1998-2015) using the maximum likelihood (ML) estimator. The automatic three-step approach (see Asparouhov & Muthén, 2014, for more details) was used to model auxiliary variables (i.e., antecedents and outcomes; Asparouhov & Muthén, 2014). In the first step, the latent profile analysis was performed according to the steps described in the previous paragraph to identify the number of subgroups that could best represent the data (i.e., profile enumeration). In the second step, the most likely membership (i.e., the group into which a participant most likely falls) was achieved according to the posterior distribution in the first step. Specifically, this second step explains “the estimated probability that each individual has of belonging to each of the profiles” (Morin et al., 2011, p.66). Last, the profile solution was regressed on the auxiliary variables, taking into consideration the most likely class membership and classification error rate. It is important to note that the main advantage of this three-step approach is that the latent profile model is not affected by the secondary model (i.e., the model with auxiliary variables) (Gabriel et al., 2014; Vermunt, 2010). Specifically, unlike the three-step approach, the standard approach to model profiles with auxiliary variables is to take

together the latent profile model and the latent profile regression model *or* the outcome model into a combined model which can be estimated with the ML estimator (Asparouhov & Muthén, 2014). However, such an approach has drawbacks because latent profile formation may be affected by the secondary model and therefore lose the original meaning of the grouped pattern. Thus, the three-step approach in Mplus was considered appropriate for the current research. A more comprehensive discussion of the three-step approach can be found in Asparouhov and Muthén (2014) and Lanza et al., (2013).

The last step in the above three-step approach answered the second and third research questions of the current study. In terms of the second research question (whether each profile is different from each other on academic behaviors and well-being) I used the DCON procedure in Mplus (Asparouhov & Muthén, 2014) to compare the associated outcomes across different profiles. To address the third research question (whether students with a particular demographic background are over- or under-represented in certain profiles), I used the R3STEP procedure in Mplus (Asparouhov & Muthén, 2014). This procedure performed several multinomial logistic regressions to determine if an increase in an antecedent (i.e., gender and URM status) leads to the higher likelihood of a participant falling into one profile versus another.

RESULTS

Descriptives

Means, standard deviations, internal consistencies and inter-correlations are displayed in Table 4. The scales in this study showed good internal consistency (α level ranged from .85 to .95). Correlations were in line with theories and prior research. For instance, perfectionistic strivings and concerns were not correlated, which is consistent

with what would be expected from the theory (Rice et al., 2016; Slaney et al., 2001). Perfectionistic strivings and achievement values were strongly correlated. Likewise, perfectionistic concerns and cost were correlated. The motivation variables were all related to self-reported outcomes of academic behavioral and emotional outcomes, with one exception between cost and behavioral engagement. These results altogether support the validity of the constructs used in the study. The MANOVA result suggested that perfectionistic tendencies did not differ by the level of math courses (lower- vs. higher-division), Wilks' $\Lambda = 1.00$, $F(2, 738) = .85$, $p = .43$.

Table 4. Study 2 Scale Means, Standard Deviations, Reliabilities, and Intercorrelations

Variable	1	2	3	4	5	6	7	8	9	10
1. Perfectionistic standards	--									
2. Perfectionistic concerns	0.01	--								
3. Task value	0.63***	-0.11**	--							
4. Cost	0.18***	0.69***	0.25***	--						
5. Behavioral engagement	0.37***	-0.03	0.21***	-0.07	--					
6. Cognitive engagement	0.42***	-0.04	0.30***	-0.12**	0.65***	--				
7. Procrastination	0.26***	0.23***	0.15***	0.26***	0.31***	0.41***	--			
8. Positive affect	0.17***	-0.12**	0.28***	0.21***	0.11**	0.20***	-0.05	--		
9. Negative affect	-0.07	0.50***	0.21***	0.57***	0.14***	0.19***	0.24***	0.50***	--	
10. Burnout	-0.10**	0.54***	0.19***	0.61***	0.12***	0.18***	0.41***	0.39***	0.75***	--
Number of items	7	12	9	9	4	4	4	3	5	5
<i>M</i>	5.15	3.79	5.00	4.08	5.39	5.17	3.95	3.63	3.90	4.08
<i>SD</i>	1.24	1.45	1.43	1.51	1.21	1.15	1.64	1.43	1.42	1.67
α	0.90	0.95	0.95	0.94	0.86	0.85	0.90	0.87	0.85	0.93

Note. * $p < .05$. ** $p < .01$. *** $p < .001$.

Latent Profile Solutions

Table 5 displays the fit indices for two to six latent profile solutions. Based on statistical inspection and theoretical considerations, a four-profile solution was chosen as the best fit. Compared to the three-profile solution, the four-profile solution displayed lower AIC, BIC, ABIC and entropy value. Although the five-profile solution had a better entropy value than the four-profile solution, indicating that profiles in this solution were more distinct from each other, the LMR likelihood ratio test was not significant, suggesting that a four-profile solution was sufficient. Additionally, in the four-profile solution, the average posterior probabilities of individuals belonging to a certain profile and no other profile solution were .90, .93, .81 and .87, which were all higher than the suggested value of .70 (Stanley et al., 2017), denoting a clear classification. Moreover, one profile in the five-profile solution only featured 3.64% of the sample, and this profile was highly similar to another profile that also had low group membership.

Table 5. Study 2 Fit Indices for Profile Structures

No. of profiles	AIC	BIC	ABIC	Entropy	LMR (<i>p</i>)	PBLR (<i>p</i>)	Class size
2	7752.674	7812.578	7771.299	0.689	<.001	<.001	426-315
3	7618.584	7701.528	7644.371	0.772	<.001	<.001	187-206-348
4	7377.795	7483.779	7410.746	0.811	0.25	<.001	39-249-178-275
5	7297.839	7426.863	7337.953	0.832	0.10	<.001	27-43-249-262-160
6	7233.515	7385.579	7280.792	0.815	0.49	<.001	26-38-218-217-132-110

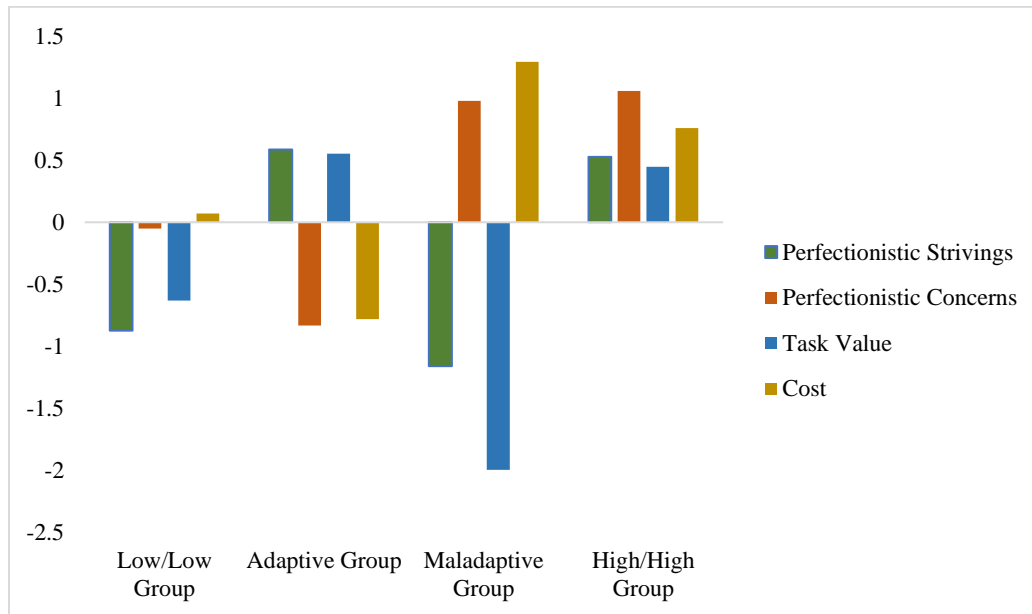
Note. Values in bold indicate the selected model. *AIC* = Akaike information criteria, *BIC* = Bayesian information criteria, *ABIC* = sample-size adjusted BIC, *LMR* = Lo-Mendel-Rubin test, *PBLR* = parametric bootstrap likelihood ratio test.

Table 6. Study 2 Standardized Means for Grouping Variables by Profiles

Group variables	Low/Low		Adaptive		Maladaptive		High/High	
	(Low perfectionism, Low motivation)		(Adaptive perfectionism, Adaptive motivation)		(Maladaptive perfectionism, Maladaptive motivation)		(High perfectionism, High motivation)	
	33.60%		37.11%		5.26%		24.02%	
	M	(SE)	M	(SE)	M	(SE)	M	(SE)
Perfectionistic strivings	-0.87	0.10	0.59	0.04	-1.16	0.66	0.53	0.06
Perfectionistic concerns	-0.05	0.08	-0.83	0.06	0.98	0.23	1.06	0.08
Task value	-0.63	0.07	0.55	0.05	-1.99	0.35	0.45	0.11
Cost	0.07	0.08	-0.78	0.06	1.29	0.16	0.76	0.09

The four profiles are displayed in Figure 2, and the standardized means and standard deviations of each perfectionism and motivation variable by profile are presented in Table 6. To label the profiles, I considered the means of each grouping variable and the guidelines from theory and prior research. The most common profile was labeled the *Adaptive* group (adaptive perfectionism–adaptive motivation; $n = 275$, 37.11%). Students in this profile simultaneously exhibited high perfectionistic standards and achievement value and low perfectionistic concerns and cost. That is, they were consistently high in positive facets and low in negative facets of perfectionism and motivation, indicating the best possible combination. In contrast, another profile was labeled *Maladaptive* group (maladaptive perfectionism–maladaptive motivation; $n = 39$, 5.26%). Students in this profile scored low in positive valences (i.e., perfectionistic standards and achievement value) and high in negative valences (perfectionistic concerns and cost), exhibiting a pattern opposite to the above *Adaptive* profile. Next, a profile was labeled *High/High* (high perfectionism–high motivation; $n = 178$, 24.02%) as students in this group were high in all four grouping variables. Lastly, I named the second most common profile *Low/Low* (low perfectionism–low motivation; $n = 249$, 33.60%). Students in this group did not express perfectionistic tendencies. However, they reported low achievement value and average cost (0.07 *SD* above the mean), suggesting that they were generally unmotivated.

Figure 2. Study 2 Latent Profile Analysis Solution with Four Groups



Academic Outcomes Across Profiles

Behaviors

Figure 3 displays how self-reported academic behaviors differ across profiles, and Table 7 presents the standardized means and standard deviations of each behavior. The two positive behaviors, behavioral and cognitive engagement, varied similarly across the four profiles. Specifically, students in the *Adaptive* and *High/High* profiles scored similarly, indicating high behavioral and cognitive engagement. The *Maladaptive* and *Low/Low* profiles also scored similarly, exhibiting significantly lower engagement than the above mentioned high-engagement profiles.

As to the negative aspect of self-reported behaviors, procrastination showed a slightly different pattern across the four profiles in comparison to engagement. The *Adaptive* profile had the slightest tendency to procrastinate, which was significantly

lower than all the other groups. The other three profiles, *Maladaptive*, *High/High* and *Low/Low*, all reported similarly high procrastination.

Emotions

Although academic behaviors are essential to achievement, students' emotional well-being should be not ignored. Figure 4 presents the emotional outcomes across profiles, and Table 7 displays standardized means and standard deviations of each emotion. Individuals in the *Adaptive* profile experienced the highest positive affect, which was significantly higher than that of the other three profiles. The *High/High* and *Low/Low* profiles similarly exhibited lower positive affect. Last, students in the *Maladaptive* profile scored the lowest in positive affect.

Regarding the two negative aspects of emotions, negative affect and burnout, all four profiles showed similar patterns. That is, each profile's negative emotions were different from each other. Specifically, the *Adaptive* profile exhibited the lowest negative affect and burnout, whereas the *Maladaptive* profile experienced the highest negative emotions. The *Low/Low* profile exhibited relatively low negative affect and burnout, making it the second lowest negative emotion group. Last, students in the *High/High* profile had fairly high negative affect and burnout, making it the second highest negative emotion group.

Table 7. Study 2 Three-Step Results for Outcomes Across Different Profiles

Academic outcomes	Low/Low (Low strivings, Low concerns) 33.60%		Adaptive perfectionism (High strivings, Low concerns) 37.11%		Maladaptive (Low strivings, High concerns) 5.26%		High/High (High strivings, High concerns) 24.02%		χ^2
	M	SE	M	SE	M	SE	M	SE	
Behavior									
Behavioral engagement	-0.35 _b	0.08	0.20 _a	0.06	-0.55 _b	0.27	0.28 _a	0.12	39.23***
Cognitive engagement	-0.45 _b	0.07	0.30 _a	0.06	-0.59 _b	0.21	0.29 _a	0.09	76.25***
Procrastination	0.16 _b	0.07	-0.36 _a	0.06	0.50 _b	0.20	0.21 _b	0.08	49.87***
Emotion									
Positive affect	-0.06 _b	0.06	0.24 _a	0.06	-0.78 _c	0.16	-0.10 _b	0.08	42.84***
Negative affect	-0.04 _b	0.06	-0.59 _a	0.06	1.09 _d	0.18	0.67 _c	0.08	212.64***
Burnout	-0.03 _b	0.06	-0.68 _a	0.06	1.33 _d	0.11	0.73 _c	0.07	360.87***

Note. All analyses were run utilizing the DU3STEP procedure in Mplus. All the outcome scores are z-standardized. Values with different subscripts are significantly different at $p < .05$.

*** $p < .001$.

Figure 3. Study 2 Self-reported Behavioral Outcomes Across Four Profiles

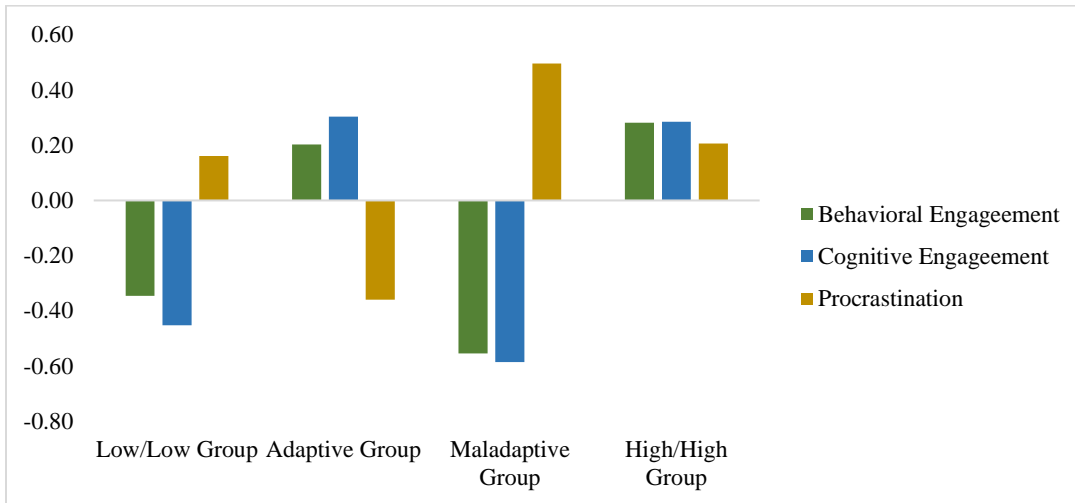
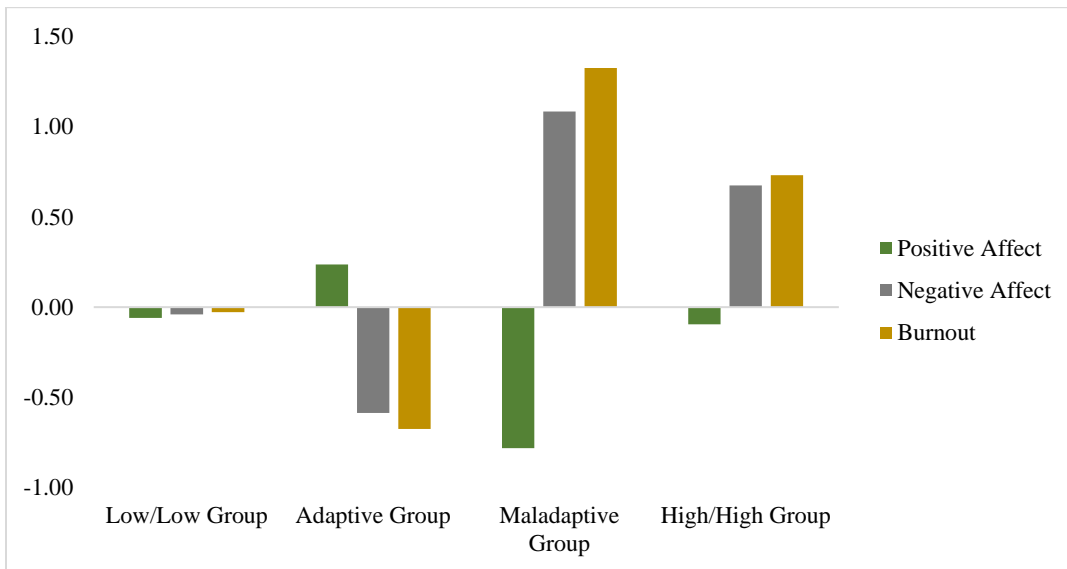


Figure 4. Study 2 Self-reported Emotional Outcomes Across Four Profiles



Demographic Characteristics of Profiles

This section will discuss the relationship between gender or URM (i.e., underrepresented minorities) status and profile membership. As for gender, the results showed that females were overrepresented in the *High/High* profile (70.79%) compared to the *Adaptive* (58.55%, Est. = .596, *SE* = .238, *p* = .012) and *Low/Low* (59.44%, Est. = .601, *SE* = .252, *p* = .017) profiles. Regarding URM status, students who identified as URM were underrepresented in the *Adaptive* profile (19.27%) compared to the *Maladaptive* (35.90%, Est. = -.937, *SE* = .420, *p* = .026) profile.

DISCUSSION

Considering that the relationship between perfectionism and motivation may be far more complex from an “averaged individual” variable-centered perspective, this study aimed to further explore how these two constructs function simultaneously within individuals via a person-centered approach. The findings suggest that there are multiple ways in which perfectionism disposition works with motivational beliefs and is linked to several self-reported academic outcomes. In addition, the results reveal that students from particular demographics are overrepresented in certain profiles.

Profiles of Perfectionism and Motivation

Four *Perfectionism–Motivation* profiles were identified in this study. One major novelty of this study is that it adds motivational beliefs to perfectionism profiles. And, it adds more evidence to the traditional person-centered perfectionism and motivation research. The perfectionism grouping patterns in all four profiles were in line with the findings of previous literature. The three groups, high-perfectionistic strivings (PS) and low-perfectionistic concerns (PC), low-PS and high-PC, and low-PS and low-PC, have

been commonly identified in person-centered perfectionism literature (e.g., Rice & Ashby, 2007; Rice et al., 2011; Wang et al., 2009). The additional group, high-PS and high-PC, has also been identified by several studies (Gaudreau & Thompson, 2010; Lee & Anderman, 2020) although researchers have not yet formed a consensus on the nature of this group. Furthermore, as to the person-centered motivation research based on EVT, only two prior studies (Conley, 2012; Perez et al., 2018) included achievement value and cost together. The motivation patterns (achievement value–cost) in this study only replicated two profiles (high achievement value–low cost and high achievement value–high cost) from the above research. However, it is important to note that these two prior studies also contained other constructs in the profile analyses and focused on different student samples, making it harder to compare their findings to this study.

The central goal of this study was to provide insight into how perfectionism and motivation work together. If researchers only posit motivational beliefs as correlates to perfectionism, they will fail to capture the complexity of how motivation itself naturally functions with perfectionism, which reflects students' everyday learning experiences. Four patterns of *Perfectionism-Motivation* were identified in this study: *Adaptive*, *Maladaptive*, *Low/Low* and *High/High* profiles. Some of the profiles reflect what we know from variable-centered works in perfectionism and EVT. Meanwhile, other patterns shed light on the characteristics of students' perfectionistic tendencies and motivational beliefs infrequently addressed in theoretical models and prior studies.

The patterns of the *Adaptive* and *Maladaptive* profiles were consistent with what would be expected from prior perfectionism and EVT-based motivation variable-centered research. Previous studies suggested that perfectionistic standards were usually in conjunction with task value (Dunn et al., 2015) while perfectionistic concerns often fluctuated with cost (Dissertation Study 1). In this study, the *Adaptive* profile (i.e.,

adaptive perfectionism–adaptive motivation) scored high in both positive components (i.e., *perfectionistic strivings* in perfectionism and *achievement values* in motivation) and low in both negative components (i.e., *perfectionistic concerns* in perfectionism and *cost* in motivation). Similarly, the *Maladaptive* profile (i.e., maladaptive perfectionism–maladaptive motivation) scored low in both positive components and high in both negative components. Using the *Adaptive* profile as an example, if a student regards math as valuable and less costly, they will tend to set high standards in math while not experiencing perfectionistic concerns. Contrarily, in the *Maladaptive* profile, if a student perceives math as not valuable and psychologically costly, they are more likely to place lower standards in math but experience higher perfectionistic concerns.

The other two profiles provide a more comprehensive understanding of perfectionism and motivation because they are not commonly identified by variable-centered works. Students in the *Low/Low* profile neither set high standards nor expressed concerns in math, indicating that they are non-perfectionistic and unmotivated; they reported low achievement value and a fair amount of cost. This result reveals an important finding that the motivational nature of non-perfectionists is amotivation. It seems that students in this group are not committed to math courses.

Last, the pattern in the *High/High* profile was unexpected because all four grouping variables were comparatively high, making it the most interesting profile. Unlike the EVT’s suggestion that achievement value and cost tend to be inversely correlated (Wigfield et al., 2017), students in this profile simultaneously scored high in achievement value and cost, as well as in perfectionistic strivings and concerns. However, this type of profile was documented in previous person-centered perfectionism and motivation research as “mixed” or “discordant combination.” To some degree, it reveals Flett and Hewitt’s (2020) suggestion that the internal conflict caused by the

contrasted valences of motivation pairs with the complexity of perfectionism. That is, students set high standards for their math course but also perceived high concerns in achieving such high standards. They were simultaneously very interested in and valued math; however, they also experienced high costs (e.g., effort cost or time cost) associated with doing well. Therefore, in this case, “learning becomes a highly conflicted process” for students (Covington, 1989; p. 93).

Outcomes Linked to Profiles

Behaviors

After identifying *Perfectionism-Motivation* profiles, the next goal of this study was to investigate how different profiles link to self-reported behavioral and emotional outcomes. The *Adaptive* profile was associated with the best academic outcomes. That is, students in the *Adaptive* profile consistently reported the highest behavioral and cognitive engagements and the lowest procrastination. Surprisingly, the *High/High* profile also scored high in behavioral and cognitive engagements, at a level similar to the *Adaptive* profile. This finding indicates that despite experiencing high perfectionistic concerns and cost, which are usually related to low engagement, students in the *High/High* profile were still extensively involved in their math courses. It is possible that striving for excellence *or* interest in math compensated for the negative influence of perfectionistic concerns and cost. On the other hand, students in the *High/High* profile were more likely to procrastinate compared to those in the *Adaptive* profile, indicating that they also had some behavioral issues. One explanation for this seemingly contradictory behavioral pattern may be that individuals in this group adopt performance-oriented goals to demonstrate their competences. Future studies should consider adding goal orientations

to the perfectionism profile to further explore the additional motivational components of this profile.

The *Maladaptive* profile exhibited a dysfunctional behavioral pattern characterized by low engagement and high procrastination. It is possible that the combination of strong negative (perfectionistic concerns and cost) and weak positive grouping variables (perfectionistic strivings and achievement value) hindered students' involvement in math. Likewise, the *Low/Low* profile also exhibited an unhealthy behavioral pattern, with similar low engagement and high procrastination scores to the above *Maladaptive* profile. However, the reason for this maladjusted behavioral tendency may be different. Given that students in this group lacked the motivation to learn math, it is not surprising that they did not actively undertake their math tasks or assignments.

Emotions

Academic success should not be evaluated by academic behaviors alone, but should also take students' emotional well-being into consideration. In conjunction with behaviors, exploring emotions associated with each profile provides a fuller picture of students' learning experiences. Students in the *Adaptive* profile again consistently experienced the highest positive affect and lowest negative affect and burnout towards their math courses. This finding is in line with this group's adaptive behavioral patterns. To some extent, it indicates the reciprocal relationship between engagement and emotion in learning (Skinner et al., 2014), although this argument is beyond the scope of this research. In contrast, students belonging to the *Maladaptive* profile expressed extremely dysfunctional feelings, with the lowest positive affect and highest negative affect of all the groups. Together with its maladaptive behavioral patterns, this group consistently

displayed the most problematic academic outcomes. Although membership in this profile is small (5.26%), it is worthy of attention.

The *Low/Low* profile consistently expressed near mean-level feelings across three emotional outcomes. Although the *Low/Low* profile's degrees of behaviors were low compared to the *Maladaptive* profile, its emotional well-being was not as dysfunctional as the *Maladaptive* group. Unlike the *Maladaptive* profile with high perfectionistic concerns and cost, students in the *Low/Low* profile did not perceive such strong negative valences, which may have protected them from experiencing unpleasant emotions. From another perspective, lacking motivation and being disengaged are salient characteristics of the *Low/Low* profile, which may partially explain why they experienced neither strong positive nor negative affect in math learning.

Lastly, examining the emotional well-being associated with the *High/High* profile provides more nuance in understanding this group. The *High/High* group exhibited relatively low positive emotions but fairly high negative emotions. Students belonging to this profile struggled with anxiety, frustration, or even emotional exhaustion in their math classes. Despite this, students in this group still had high engagement in their math learning. Considering these two outcomes together reveals an important finding that although students in the *High/High* profile exhibited high engagement, they suffered from various negative emotions. This result indicates that it would be erroneous to only use the adaptive behavioral pattern to describe the characteristics of the *High/High* profile. Given that instructors and researchers often overestimate students' involvement in class, more attention should be paid to this emotional cost alongside high engagement.

Demographics Across Profiles

In addition to investigating the outcomes associated with each profile, I also explored whether certain student demographic backgrounds were over or underrepresented in profiles. Specifically, I examined gender and URM status, considering the underrepresentation of females and certain racial/ethnic minorities in STEM-related fields (National Center for Science and Engineering Statistics, 2019). In terms of gender, female students were overrepresented in the *High/High* profile compared to the *Adaptive* and *Low/Low* profiles. This indicates that female students tend to experience a discordant pattern of perfectionism and motivation. This group valued math as an important subject, but also expressed high costs associated with doing well. Prior research shows that females are more interested in non-STEM domains like English than males (Eccles et al., 1998). It is possible that females view spending extra effort and time in math at the expense of non-STEM subjects that they like more as too psychologically costly.

As for URM status, URM students were underrepresented in the *Adaptive* profile compared to the *Maladaptive* profile. Similar patterns were found in some of the latest group-based motivation research (Fong et al., 2021; Perez et al., 2018). For example, Perez and colleagues found that URM students are overrepresented in a high-cost profile associated with lower average STEM GPA and STEM course completion compared to other profiles. One possible reason suggested by researchers is the existence of structural barriers in their earlier life experiences (Dawson, 2014; Fong et al., 2021; Saw et al., 2018). For instance, limited access to out-of-school STEM activities, advanced STEM courses before college, and STEM role models may prevent URM students from developing interests in STEM-related subjects.

Implications

Implications for Research

One major novelty of this research is that it added motivational beliefs to perfectionism profiles to capture how multiple perfectionistic and motivational facets work together. By including motivation in the profile, we gained insight into the motivational nature of each perfectionism profile. This information highlights the necessity to move beyond person-centered perfectionism research, which solely depends on grouping different dimensions of perfectionism, and consider how other constructs (e.g., personality traits) cohere with perfectionism. Such an approach has been used in some recent personality (e.g., Ferguson & Hull, 2018; Rzeszutek & Gruszczyńska, 2020) and motivation (Conley, 20212; Linnenbrink-Garcia et al., 2018) research.

Via the person-centered approach to perfectionism and motivation, this study showed that more than half of the sample (57.62% from *High/High* and *Low/Low* profiles) exhibited patterns of perfectionism and motivation that are not commonly seen in variable-centered studies. This result indicates that the interplay between multiple facets of perfectionism and motivation is less straightforward and more complex than previously believed. Also, it demonstrates that a person-centered approach can capture a wider range of students' actual learning experiences in learning college-level math.

Moreover, the formation of the four profiles again demonstrates the close association between perfectionism and motivation (Damian et al., 2016; Nguyen & Deci, 2016). For instance, in the three profiles that displayed perfectionistic tendencies (*Adaptive*, *Maladaptive* and *High/High*), at least one motivational belief (achievement value or cost) was high. In particular, in the *High/High* profile, the achievement value and cost displayed a contractionary pattern consistent with the mixed perfectionistic

tendencies of this group. On the other hand, in the *Low/Low* profile, wherein individuals did not exhibit a perfectionistic disposition, motivation appeared to be correspondingly diminished. Connecting this to McAdam's (2013) analogy that was addressed in Study 1, the "actor" personality is almost always accompanied by the "agent" motivation. But if there is no "actor," the "agent" will not be present either. This also supports Flett and Hewitt's (2020) claim that the complex nature of perfectionism will be particularly salient when it is viewed from a motivational perspective.

Implications for Practice

When examining the academic outcomes associated with each group, I only identified one profile (*Adaptive*; 37.11%) that had both adaptive behavioral and emotional outcomes, leaving the rest of the sample in need of more attention. By adding achievement value and cost (from EVT) to the perfectionism profile, this study delivers a critical message for how to choose and integrate motivation interventions in perfectionism research. For example, for students in the *Maladaptive* profile who experienced high cost, a cost reduction intervention, which aims to help students perceive the challenges of their math course as less psychologically costly, may be helpful (e.g., Rosenzweig et al., 2020). However, for the students in the *Low/Low* profile who did not see the importance of math but experienced low cost, a utility value intervention would be more efficient, because it would help students view the course material as personally useful and relevant to their lives (e.g., Harackiewicz et al., 2012; Harackiewicz et al., 2016).

In addition to considering the structure of the profiles, researchers should also examine a wide range of outcomes in making intervention evaluations. In the case of the *High/High* group in this study, if researchers only examine its associated behaviors, they

may conclude that this group has a relatively positive academic tendency. However, a closer inspection of this profile's emotional well-being would reveal that conclusion as erroneous, because students in this group also suffered from negative affect despite exhibiting high engagement. Accordingly, an intervention for students in this group, who simultaneously experience high perfectionism and motivation, should focus on emotional cost. Perhaps a social and emotional learning intervention would be an effective option (Weissberg et al., 2015). Additionally, this finding has important implications for instructors. Given that students with overwhelmingly high perfectionism and motivation are engaged in class and may exhibit high achievement, instructors might neglect their emotional well-being, which could contribute to the students' lower involvement and achievement in the long term.

Limitations and Future Directions

Several limitations of this study should be noted. First, its reliance on self-reported behaviors may be problematic. Prior research indicates that there may be a discrepancy between self-reported behaviors and actual behaviors and recall bias may be a contributor (Samuelstuen & Bråten, 2007). For future studies, it would be beneficial to involve teachers' or peers' evaluations for more objective behavioral scores.

Second, I aggregated different aspects of achievement values (i.e., interest, attainment, and utility) and cost (opportunity cost, effort cost, and emotional cost) in this study, given that it is the first step in exploring the *Perfectionism-Motivation* profile. However, some nuances of the EVT constructs may have been lost due to this approach. For example, in the profile with high perceived cost, it is unclear which dimension of cost is more salient. Future research should examine the profiles with expanded achievement values and cost. Furthermore, I had little information to explain why URM students

differed in certain profiles. Therefore, I suggest that future researchers consider including race-reimagined (DeCuir-Gunby & Schutz, 2014; Matthews & López, 2020) constructs in EVT to further investigate the role of culture-specific motivation in perfectionism profiles. In addition, researchers can add other theoretical frameworks to the perfectionism profile. For example, there is a line of variable-centered work that examines the relationship between perfectionism and goal orientations (e.g., Bong et al., 2014; Eum & Rice, 2011), but no research has employed a person-centered approach yet.

Next, because perfectionism and motivational constructs from the EVT are domain-specific in the academic setting (Dissertation Study 1; Wigfield et al., 2017), this study selected math as its domain. However, given that each academic domain may have its own unique characteristics (Alexander et al., 1991; Buehl & Alexander, 2001), future studies should explore whether the four profiles identified in this study can be replicated in other domains, such as in domains “far” from math (e.g., history or language). In addition, researchers should replicate this study with a different sample, like middle school or high school students, given that developmental stage is an important factor in the EVT framework (Eccles, 2005).

Last, this research depends on a cross-sectional design, which leaves the stability of the profiles unknown. Prior studies investigating shifts in motivation profiles found that many students go from one profile to another, indicating that profile membership may be unstable. However, there is no similar research focusing on changes in perfectionism profiles. Therefore, it would be valuable to adopt a longitudinal design to observe potential shifts in profile membership. In addition, using such a design would assist researchers in documenting how demographic and contextual variables (e.g., teachers and peers) play a role in these changes.

Appendix - Measures

Notes: All survey items, except for the demographic background, were assessed using a self-reported 7-point Likert scale, ranging from 1 (*strongly disagree*) to 7 (*strongly agree*).

Measures in Study One

Short Almost Perfect Scale-Revised (Blasbert et al., 2016; Rice et al., 2014)

Perfectionistic Standards:

1. I have expectations of perfection for myself in my major/non-major courses.
2. I set perfectionistic standards for myself in my major/non-major courses.
3. I expect perfection from myself in my major/non-major courses.
4. I have a strong need to strive for perfectionism in my major/non-major courses.

Perfectionistic Discrepancy:

1. Doing my best never seems to be enough in my major/non-major courses.
2. My performance rarely measures up to my standards in my major/non-major courses.
3. I am hardly ever satisfied with my performance in my major/non-major courses.
4. I often feel disappointment after completing a task in my major/non-major courses, because I know I could have done better.

Perceived Competence (Midgley et al., 2000)

1. I'm certain I can master the skills taught in my major/non-major courses.
2. I can do even the hardest work in my major/non-major course if I try.
3. I'm certain I can figure out how to do the most difficult class work in my major/non-major courses.
4. Even if the work in my major/non-major courses is hard, I can learn it.
5. I can do almost all the work in my major/non-major courses if I don't give up.

Achievement Value (Conley 2012)

1. I enjoy the courses in my major/non-major courses.
2. I like the courses in my major/non-major courses.
3. The courses in my major/non-major courses is exciting to me.
4. Being someone who is good at my major/non-major courses is important to me.
5. It is important for me to learn my major/non-major courses.
6. Being good in my major/non-major courses is an important part of who I am.
7. My major/non-major courses are useful for me to learn.
8. My major/non-major courses are valuable, because they will help me in the future.
9. Being good in my major/non-major courses will be important for my future (like when I get a job or go to graduate school).

Perceived Cost (Jiang et al., 2018)

1. Doing well in my major/non-major courses requires more effort than I want to put into it.
2. It requires too much effort for me to get good grades in my major/non-major courses.
3. It takes too much of effort for me to do well in my major/non-major courses.
4. I have to give up other activities that I like in order to do well in my major/non-major courses.
5. I have to sacrifice a lot of free time to be good in my major/non-major courses.
6. To do well in my major/non-major courses requires that I give up other things I enjoy.
7. Studying my major/non-major courses scare me.
8. Studying my major/non-major courses make me feel stress.
9. My major/non-major courses make me annoyed.

Measures in Study Two

Almost Perfect Scale-Revised (Blasbert et al., 2016; Slaney et al., 2001)

Perfectionistic Standards:

1. I have expectations of perfection for myself in math.
2. I expect perfection from myself in math.
3. I have perfectionistic standards for my performance in math.
4. I try to be perfect at everything I do in math.
5. I set perfectionistic standards for myself in math.
6. I have a strong need to strive for perfectionism in math.
7. If you do not expect much out of yourself in math, you will never succeed.

Perfectionistic Discrepancy:

1. My performance rarely measures up to my standards in math.
2. I often feel disappointment after completing a math task because I know I could have done better.
3. My best just never seems to be good enough for me in math.
4. I am never satisfied with my accomplishments in math.
5. I am not satisfied even when I know I have done my best in math.
6. I hardly ever feel that what I've done is good enough in math.
7. Doing my best never seems to be enough in math.
8. I am hardly ever satisfied with my performance in math.
9. I often feel frustrated because I can't meet my goals in math.
10. I rarely live up to my high standards in math.
11. I often worry about not measuring up to my own expectations in math.
12. I am seldom able to meet my own high standards for performance in math.

Achievement Value (Conley 2012): Same as in Study One

Perceived Cost (Jiang et al., 2018): Same as in Study One

Engagement (Linnenbrink, 2005; Linnenbrink-Garcia et al., 2018)

Behavioral Engagement:

1. Even when my coursework in this class is dull and uninteresting, I keep working until I finish.
2. Even when I don't want to do my class readings and assignments, I force myself to do the work.
3. Even if I don't see the importance of a particular class reading or assignment, I still complete it.
4. I force myself to finish my coursework even when there are other things I'd rather be doing.

Cognitive Engagement:

1. When reading for this course, I make up questions to help focus my reading.
2. When I become confused about something I'm reading for this class, I go back and try to figure it out.
3. Before I study new course materials thoroughly, I often skim through to see how they are organized.
4. I try to change the way I study in order to fit the course requirements and instructor's teaching style.

Procrastination (Wolters, 2003; Zusho & Barnett, 2011)

1. I generally postpone working on assignments in this course.
2. I am too lazy to work on assignments ahead of the deadlines in this course.
3. I have problems prioritizing tasks in this course.
4. I promise myself I will do something for this course, then put it off anyway.

Classroom Affect (Jiang et al., 2018)

Positive Classroom Affect:

1. Most of the time, being in this class puts me in a good mood.
2. I like being in this class.
3. I am happier when I am in this class than when I am in other classes.

Negative Classroom Affect:

1. This class often makes me feel bad.
2. I am often angry when I'm in this class.
3. I often feel frustrated when I am doing the work for this class.
4. I often feel bored in this class.

Emotional Exhaustion (Schaufeli et al., 1996)

1. I feel emotionally drained by this class.
2. I feel used up at the end of this class.
3. I feel tired when I get up in the morning and I have to face another day in this class.
4. Studying in or attending this class is really a strain for me.
5. I feel burned out from my studies in this class.

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