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SURVEY DEVELOPMENT AND VALIDATION: STUDENT SELF EXPECTATIONS OF THE FIRST-YEAR COLLEGE EXPERIENCE SURVEY (THE SE-FYE SCALE)

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SURVEY DEVELOPMENT AND VALIDATION: STUDENT SELF EXPECTATIONS OF THE FIRST-YEAR COLLEGE EXPERIENCE SURVEY (THE SE-FYE SCALE)

DISSERTATION

A dissertation submitted in partial fulfillment of the
requirements for the degree of Doctor of Philosophy in the
College of Education
at the University of Kentucky

By

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ABSTRACT OF DISSERTATION

SURVEY DEVELOPMENT AND VALIDATION: STUDENT SELF EXPECTATIONS OF THE FIRST-YEAR COLLEGE EXPERIENCE SURVEY (THE SE-FYE SCALE)

First year at a university is often a transitional stage for students where they have opportunities to grow and develop in various areas and get familiar with a collegiate environment. It is crucial to have a good understanding of what first-year students expect to navigate and succeed in their first year at the university as their expectations not only reflect how well they prepared for university but also affect their behaviors and eventually influence their intentions to continue higher education Therefore, one of the primary purposes of this study was to design a survey to measure student self-expectations of first-year college experience (the SE-FYE scale) by applying a structured process and consulting various sources. Moreover, this study aimed to validate, reduce and improve the items of the original SE-FYE survey based on examined psychometric properties by applying Rasch measurement analysis. The target population of this study was first-year undergraduate students at a public four-year university in the United States. The sample consisted of 40 first-year students who responded as the pre-group at the beginning of Fall 2022 and 21 first-year students who responded close to the end of the semester as the post-group. Pre- and post-group respondents were from the same sample frame registered in the same first-year course. This study applied Rasch analysis to evaluate the extent of the SE-FYE items, measured the latent variables, and established validity and reliability evidence. The final SE-FYE scale was formed after several modifications, including 22 items to measure five primary variables: student self-expectations for their first year, self-expectations of academic readiness, self-expectations of academic engagement, self-expectations of personal development, and expectations about career preparation. Student persistence and characteristic items were included in the survey. The findings suggested that the items of the final scale established a reasonable unidimensionality, fit, separation, reliability, and category functionality. Interpretations and suggestions of the results were made from the perspectives of survey development and student success in higher education.

KEYWORDS: Student Self Expectations, First Year, College Experience, Survey Development, Survey Validation, Rasch Analysis

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CHAPTER 1. INTRODUCTION

1.1 Origin of Emphasis on the First-year Experience

Universities have started paying more attention to enhancing the first-year experience for undergraduate students, which known as the First-Year Experience Movement originated from the 1960s to the 1970s during the Civil Rights Movement (Freer, 2016; Upcraft & Gardner, 1989). The primary purpose of this movement was to improve the relationship between students and the university by creating first-year interventions. For instance, extended orientation was created and launched in 1972 as an innovative first-year program at a public four-year university to provide holistic support for first-year students, also known as University 101 (Freer, 2016). In addition to the extended orientation, a resource center and conference series were established at the university in the 1980s to foster further communication on first-year experience between practitioners and researchers (Freer, 2016; Upcraft & Gardner, 1989). Since then, universities have designed and implemented various first-year experience interventions to support students' growth in various aspects (Freer, 2016; Upcraft & Gardner, 1989). First-year experiences have also become the main emphases of undergraduate education for policymakers, researchers, and practitioners at institutional, state, and national (Hearn, 2006), as first-year experience forms a foundation to support students to succeed in their first and following years at the universities.

1.2 Current Issues in First Year

Ensuring students succeed in the first year is the foundation of learning and graduation, career goals, life, and social mobility in the following years for students

(Haveman & Smeeding, 2006). Generally, the first year at a university is a unique and challenging stage for students. Students are expected to take full responsibility for their own learning, living, working, and building interpersonal relationships in the first year (Smith &Wertlieb, 2005). Students also often experience being challenged to transition from high school (or other non-collegiate settings) into an unfamiliar collegiate environment where new "norms, traditions, rituals, language, and environment" are embedded (Hunter, 2006). Moreover, many students often find themselves academically and mentally underprepared for what they will face in their first college year (Barefoot, 2000).

Over the past three years, students have faced more uncertain and complicated challenges during their first year due to the impact of the COVID-19 pandemic. These challenges include enrollment disruption, negative mental health symptoms, and adjustment of learning environment change (remote learning in 2020 to the hybrid in 2021, and then back to in-person settings in 2022). Quantitatively, the proportion of high school graduates who enrolled in public 4-year universities immediately during the pandemic (2020 and 2021) was 30.4%, less than the pre-pandemic enrollment rate, 33.4% in 2018 and 32.9% in 2019. Similarly, the first-year retention and persistence rates dropped from 79.4% to 77.7% and 88.6% to 85.5% between 2017-2020, respectively (Howell et al., 2022). As a result, current enrollment, retention, and persistence rates have undoubtedly fallen behind previous years' first-year student outcomes. Therefore, it is critical to understand students' current perceptions of first-year learning at university and why they decide to continue undergraduate education.

1.3 Importance of Understanding Student Expectations in First Year

Student expectation has drawn increased attention, especially its influence on student decisions to continue university education (Robbins et al., 2004; Richardson et al., 2012; Schnettler et al., 2020; Bank et al., 1992). To further understand the importance of first-year expectations, researchers started declassifying student expectations as "realistic expectations" and investigating the relationship between expectations and the college experience (Rosenbaum et al., 2016; Crisp et al., 2009; Nadelson et al., 2013; Pancer et al., 2000; Jackson et al., 2000). For instance, Pancer and colleagues (2000) define realistic expectation as "integrative complexity of expectations," being often aware of the complexity of actual college events and issues, realizing connections and differences among different perspectives about the issues, and eventually taking the perspectives into account how to address the issues. Similarly, in Jackson and colleagues' (2000) study, researchers found that students who expressed positive expectations and accepted possible difficulties were more likely to successfully adjust to first-year university life. In addition, the extent of having realistic expectations has also been found to relate to the extent of first-year students' academic and social involvement, achievements, and mental health (Krieg, 2013; Pancer et al., 2000; Jackson et al., 2000).

Listening to student expectations is essential to understand student needs and identifying necessary improvements in institutional support upon entering the university. Unmet expectations may make first-year students feel their expectations about university have been disregarded, creating difficulty in adjusting to first-year learning (Stern, 1966; Pancer et al., 2000). The lack of alignment between initial student expectations and the reality of the university experience results in dissatisfaction, which creates obstacles for first-year students to transition into college successfully (Smith, & Wertlieb, 2005;

Pancer et al., 2000; Jackson et al., 2000; Jones, 2010), such as not achieving positive outcomes academically, socially, and mentally (Pancer et al., 2000; Jackson et al., 2000). Eventually, students are less likely to continue their undergraduate education, so universities are harder to promote retention and graduation rates and ensure accountability (Crisp et al., 2009; Nadelson et al., 2013).

1.4 Rationale of Developing a Scale

Student expectations of first-year experience as a non-traditional factor of first-year student outcomes are relatively newly new in higher education in the United States. Developing a scale to accurately measure student expectations is critical for building knowledge of the first-year experience and first year student success at universities. In educational research, surveys are widely used to collect attitudes, values, and beliefs (Nardi, 2018; Bandalos, 2018). In fact, existing studies on student expectations have used survey as a data collection tool. However, some limitations exist in existing studies. They may focus on student expectations of a singular aspect of first-year experience, such as academic or social involvement. Additionally, some studies adopt surveys without support of validity and reliability evidence, or the surveys are designed for a context different from American higher education.

To address the limitations in existing studies, this research focuses on measuring American student expectations of first-year experiences in various aspects at the public four-year university by following a comprehensive, structured survey development process. The primary purpose of this study is to develop and validate a survey to measure student expectations of university experiences towards their academic, social, personal and occupational development in first year. To achieve this primary purpose, the study

aims to fulfill three objectives. First, this study intends to define student expectations of first-year college experience conceptually based on theoretical and empirical literature. Second, this study is conducted to develop a survey designed to measure student expectations by applying a structured process and considering theory, targeted population's perceptions, and context. Lastly, the third objective is to validate the developed scale by applying Rasch measurement analysis. Subsequently, items in the scale will be modified or removed based on examined psychometric properties to form the final version of the scale.

1.5 Research Questions of Present Study

This study is guided by four research questions as follows:

Research Question 1: To what extent is each construct of student expectations of first-year college experience measured by items in the SE-FYE survey unidimensional?

Research Question 2: To what extent do the subscales of student expectations of first-year college experience in the SE-FYE survey demonstrate fit and functionality based on Rasch analysis results?

Research Question 3: To what extent can the subscales of student expectations of first-year college experience in the SE-FYE survey capture person ability differently across demographic groups?

Research Question 4: To what extent do the subscales of student expectations of first-year college experience in the SE-FYE survey have the capacity to capture change in person ability over time?

1.6 Significances of Present Study

The primary significance of this study is contributing an instrument with reliability and validity using Rasch measurement analysis to gather information regarding student expectations of first-year experience in higher education and student success. This study filling a gap in the literature by providing a conceptual definition of student expectations for first-year college experience based on the theoretical and empirical literature. Also, this study presents a practical example of developing a good scale by following a structured process and consideration of literature, pre-existing scales, targeted population perspectives, context, and measurement principles. Furthermore, this study highlights practical importance of applying Rasch measurement analysis on survey development and validation. As Boone suggested, Rasch analysis not only improves and monitors the quality of surveys but also detects respondent performance and changes (Boone, 2017).

Regarding information gathered through the survey, this study captures the latest student perspectives on how they expect to navigate university in first year for their growth in multiple areas. It sheds light on the role of student expectations of the college experience in first-year student persistence, which provide insights for researchers and professionals interested in student success. The last significance of this study extends to the students who participate in the study. Participation in this research may inspire students to be aware of and reflect on their initial expectations of college experience in the first year, which may contribute to their exploration of the meaning of going to the university.

1.7 Overview of Subsequent Dissertation Chapters

After describing the background to the present study in Chapter 1, Chapter 2 aims to establish a foundation from theoretical and empirical perspectives to gain a better understanding of first-year undergraduate students' expectations of the first-year experience, the role of expectations on student persistence, and the role of first-year interventions. Chapter 3 consists of a process of developing the SE-FYE survey, data collection procedure, and Rasch techniques for data analysis. Chapter 4 presents the results of Rasch measurement analysis on dimensionality, item fit, separation, reliability, category functionality, differential item functioning, and comparisons between pre and post scales. Finally, Chapter 5 focuses on interpretations of primary findings and suggestions for future use and improvement to the SE-FYE survey.

CHAPTER 2. REVIEW OF LITERATURE

Learning at the university is a crucial experience for educational and personal development. According to student development perspectives (Miller & Prince, 1977; Patton et al., 2016; Rodgers, 1990; Sanford, 1967), college student development is commonly defined as the process or path of positive, complex, holistic growth in various capabilities as students start with their higher education and get involved in postsecondary settings. The first college year as the beginning of undergraduate education, is a significant period for students to navigate possibilities to shape their educational, personal and future career trajectories. During the first year, students expect to make progress in various aspects, including academic and intellectual competence, interpersonal relationships, identity development, specific career goals and lifestyle, personal health and wellness, civic responsibility, spiritual development, and dealing with diversity (Upcraft & Gardner, 1989; Upcraft et al., 2005). Researchers started to pay more attention to understanding the impact of student expectations on student decisions to continue their education at the university during the critical first year (Bank et al., 1992; Robbins et al., 2004; Richardson et al., 2012; Schnettler et al., 2020).

However, the student expectations of first-year experience and their relationship with student persistence are relatively new in American higher education research. Also, lack of systematic definition for student expectations of first year college experience in the existing literature created difficulty for survey development. This chapter aims to fill the literature gap through building a solid theoretical foundation and conceptualize the construct of student expectations of first year experience based on the theoretical basis. Moreover, this chapter aims to operationalize the construct of student expectations of first

year experience for practical use based on empirical studies, status of first year students and first year interventions, and existing scales that measure the similar construct. To achieve the two aims, the chapter include the following:

1. theoretical perspectives regarding student persistence and student expectations,
2. empirical studies about the role of student expectations on first-year persistence,
3. existing first-year interventions to improve student persistence and form proper student expectations, and
4. existing scales that measure student expectations of navigating college experience in the first year.

At the end of this chapter, the conceptual and operational definitions of student expectations of first-year experience at a university are summarized based on literature.

2.1 Student Persistence Theories

During the earlier stage of student persistence theories, Spady (1970) developed an explanatory theoretical model of the dropout process through a comprehensive literature review based upon Durkheim's theory of (egoistic) suicide (1961), and the relationships presented in the model examined in Spady's (1971) longitudinal study. In the 1970s model of the dropout process, Spady described an interactive influence between student attributes and "expectations and demands" from university occurring since students enter into university. The interactive influence occurs in academic and social systems of the university in which students obtain "rewards" in both systems as the outcome of interactive influence. In particular, in the social system, "rewards" were referred to as social integration based on two conditions: close relationships and

compatibility of student attributes as entering university and impact of a university environment. In the academic system, "rewards" were referred to as grades or intellectual development. Whether students obtain sufficient "rewards" from the university is plausible to determine students' decisions on continuing or dropping out. Thus, the dropout process was defined as a complex social process in which students made a dropout decision or an institutional commitment directly influenced by the extent of satisfaction on gaining "rewards" from social and academic systems and pre-collegiate experiences such as family background and attributes such as academic potential.

Grounded on Spady's (1970, 1971) explanatory model of the dropout process, Vincent Tinto developed a Model of Dropout from Higher Education in 1975, which reorganized and further explained the interactive influence among factors. Similar to Spady's explanatory model of the dropout process, Tinto's theoretical model illustrated how interactions between students and institutions influence students to decide on continuing or dropping out from institutions. For further explanation, the dropout process from college is a longitudinal process where students have unique experiences through interacting with institutions' social and academic environments. Students and institutions continuously form and revise their education-related goals and commitments toward a stay or leave during this process. Students are academically and socially integrated into the collegiate environment during the interactions as to how students' characteristics and pre-college experience (family background, demographic characteristics, attributes/ability) influence personal and institutional development goals and commitments. These goals and commitments positively influence student satisfaction in college experience and dropout decisions. In other words, with higher personal and

institutional commitment "to the goal of college completion, students have higher satisfaction in their college experience and a lower possibility of dropping out of university. These arguments were supported by findings in studies by Terenzini and Pascarella in 1977 and 1983. Terenzini and Pascarella (1977) found that voluntary stayers had more positive perspectives on their university academic and non-academic lives than voluntary leavers. Pascarella and Terenzini (1983) further found a compensatory interaction between institutional and goal commitment in which higher levels of commitment to the goal of college completion compensate for lower levels of commitment to institutional commitment.

The student departure process models (proposed by Tinto and Spady) filled the gap in knowledge regarding the college dropout process (Pascarella, & Terenzini, 1980), especially Tinto's theory becoming one of the most influential theories regarding student decision on dropout or persistence. At the same time, researchers seek to improve departure theory and understand student retention/persistence through more precise interpretations of factors and relationships proposed in Tinto's model and examining the theory for different student populations in contexts. Bean (1985) proposed a conceptual model of student departure in response to the purposes above. Bean and colleagues redefined student dropout as dropout syndrome, a combination of intent to leave, openly discussing intention to leave, and actual action. Also, academic, social, psychological, and environmental factors in the model are assumed to influence three significant predictors of dropout syndrome, including college grades (academic), institutional fit (social), and institutional commitment (personal). With the concern of the difference in attrition process between traditional and non-traditional students, Bean and Metzner

(1985) proposed an additional conceptual model to explore non-traditional student attrition based on their previous dropout syndrome model and revisions on Tinto's model. Unlike Tinto's model, social integration primarily influences the attrition of traditional college students; Bean and Metzner indicated that the external environmental factor is the most critical influence on non-traditional students' attrition. In addition, the factors related to academic competency, performance, and psychology also directly affect non-traditional students' intention to leave and dropout actions.

During the same era, similar and comprehensive studies were conducted to provide a framework for college access and persistence (Astin, 1970, 1984). Astin's model on student development conceptualized three components in college: student outputs, student inputs, and the college environment detonated by IEO. Inputs influence outputs directly or indirectly through interaction with environmental variables. The key influences in Astin's model, the college environment's influence, and student-college interaction were similar and supportive to the theories of Tinto and Bean. Astin's framework components were more measurable to some extent than Tinto's model. For instance, student outputs are defined as results or outcomes influenced by the college on student development. In particular, outputs could be measures of students' "achievements, knowledge, skills, values, attitudes, aspirations, interests, and daily activities." Student inputs refer to student characteristics and pre-college experiences. The college environment is defined as institutional characteristics (i.e., size, institutional type) and actions, such as policy, curriculum, physical facilities, teaching practices, and student organizations. Together, Astin, Tinto, and Bean proposed theoretical models that complement one another and provide a comprehensive theoretical framework for

understanding the college student departure/persistence process (Cabrera et al., 1992, 1993; Metz, 2004; Milem & Berger, 1997).

These groundbreaking theoretical frameworks drew attention of higher education researchers interested in understanding student persistence. Thousands of studies focused on explaining the various factors that influence student persistence based on these theories, mainly focusing on investigating the influence of academic achievement/integration (DeBerard et al., 2004; Jeffreys, 1998; Ghaith, 2002; Gunuc, 2014; Pascarella, & Terenzini, 1980; Strayhorn, 2007), social engagement/integration (Endo, & Harpel, 1982; Deil-Amen, & Rosenbaum, 2003; Christie, & Dinham, 1991; Hu, 2011; Pike, & Kuh, 2005), psychological well-being (Ethington, 1990; Richardson et al., 2012; Mashburn, 2000; Jeffreys, 2001; Pike, 2006), and pre-college characteristics and experience (Pascarella, & Terenzini, 1983; Elkins et al., 2000; Terenzini et al., 1996; Hu, & Kuh, 2002; Renn, & Reason, 2021). However, one component being included across the theoretical models needs more attention: student expectations of college. In Tinto's model, student expectation was referred to as educational goal commitment. The level of expectation and its intensity influence students to obtain their psychological orientations based on their pre-experience and characteristics, which predict the level of academic and social integration and directly predict retention decisions. Similar to the theory of Reasoned Action, Fishbein and Ajzen (1975) indicated that intention to engage in a particular behavior is the best predictor of the outcome of engaging in the behavior; in turn, "attitudes lead to intentions, which in turn lead to behavior." The following sections focuses on expectation-related theories to better understand the definition and intensity of student expectations.

2.2 Expectation Theories

Some expectation-related studies were built upon the Expectancy Theory proposal by Victor Vroom in 1964 in the managerial science field (Geiger & Cooper, 1995; Breen & Lindsay, 2002; Friedman & Mandel, 2009, 2011). The main focus of the Expectancy Theory was to accurately define motivation and the relationship between motivation, perceptions, behavior, and performance. In particular, Vroom proposed that the perceived value of future outcomes determines motivation. The perceived probability of actions, behaviors, or efforts will lead individuals to reach the valued outcomes (Geiger & Cooper, 1995; Demetriou & Schmitz-Sciborski, 2011). Moreover, three beliefs, Valence, Expectancy, and Instrumentality, positively influence the intensity of motivation to act. Valence is the extent to which individuals perceive future outcomes or performance as valuable or attractive to individuals. Expectancy is the extent of individuals' beliefs on the probability that actions and efforts will lead to valued outcomes or performance. Finally, instrumentality is how individuals perceive the valued outcomes or performance that will lead to desired rewards.

Vroom's theory addresses motivation and performance in the workplace rather than specifically in the educational context. Geiger and Cooper (1995, 1996) applied Vroom's Expectancy Theory in the education setting to interpret student motivation on academic performance by considering Valence, Expectancy, and Instrumentality. They defined *expectancy* in the educational context as "motivating students to put forth academic effort depends on students' perceptions of the benefit of academic performance and their belief that exerting effort will lead to higher performance" (1995). The key finding was that a higher level of student perceptions of the benefit of academic

performance is associated with higher academic performance (GPA). Also, researchers suggested more discussion around relationships among different components (i.e., valence, expectancy, effort, ability, needs, performance) of the Expectancy Theory in the education context.

In response to the need for further discussion on relationships between student expectations and performance, built upon Atkinson's (1964) expectancy-value model, Eccles and colleagues proposed an expectancy-value model of performance and choice regarding mathematics achievement in 1983. Due to "expectancy and value components are more elaborate and are linked to a broader array of psychological and social/cultural determinants," these two components are assumed to be positively related to each other, rather than inversely related, as proposed by Atkinson" (Eccles & Wigfield, 2002). Furthermore, in 2000, Wigfield and Eccles further developed Eccles et al.'s expectancy-value model in education settings across disciplines, named the expectancy-value theory of academic motivation. After two years, Eccles and Wigfield provided a more precise interpretation of the expectancy-value theory of achievement through comparison to other theoretical perspectives on the impact of expectancy, task value, or both on student achievement. Researchers posited that expectation (for success) and task value directly influenced task choice, persistence, and performance (Eccles et al., 1983; Wigfield & Eccles, 2000; Eccles & Wigfield, 2002). In particular, the expectation of success and perceived value of the tasks are influenced by task-related beliefs or perceptions of tasks' characteristics and personal competence, for example, "ability beliefs, the perceived difficulty of different tasks, personal goals, self-schema, and affective memories" (Wigfield & Eccles, 2000; Eccles & Wigfield, 2002). Also, these task-related beliefs or

perceptions are impacted by individuals' previous experience and perceptions of efforts and achievement, and socialization influences such as others' expectations of the individuals.

One of the main factors in the expectancy-value model is expectations (for success), defined as students' beliefs on the extent to do well on upcoming tasks. Expectations (for success) are highly correlated with ability beliefs, defined as students' beliefs on how to do well on current tasks, similar to efficacy and outcome expectations that Bandura proposed (Wigfield & Eccles, 2000; Trautwein et al., 2012). Efficacy expectations emphasize that an individual believes they can do a task, whereas outcome expectations emphasize that they believe a particular action will lead to a specific outcome (Bandura, 1997). Another main factor of the theory is the perceived value of the tasks or achievement value, which is determined by attainment value (importance), intrinsic value (enjoyment), utility value (usefulness), and cost of a task (Eccles et al., 1983; Wigfield & Eccles, 2000). Attainment value is the perceived importance of gaining good performance on the task. Intrinsic value is enjoyment or interest that individual gains from working on a task, activity, or subject. Utility value is the perceived usefulness of getting involved in a task, activity, or subject, which is related to perceptions of the extent of a task that fits into an individual's future goals.
Finally, *cost* is defined as the perceived gain and loss of working on a task, such as estimated effort, energy, time, and possible negative results (Eccles & Wigfield, 2002; Trautwein et al., 2012). Attainment and intrinsic values are more likely influenced by intrinsic values, while utility value and cost are more related to extrinsic values (Trautwein et al., 2012). The two key factors, expectations (for success) and task value,

are strongly correlated. Researchers also found that the four components of task value strongly affect the extent of expectation for success, even though the degree of relationship between expectation and the four task value components is different in different contexts (Trautwein et al., 2012; Meyer et al., 2019).

2.3 First-Year Student Expectations and Its Influence on Student Persistence

Theories related to the student departure process and expectation value of achievement showed that student expectations play an essential role in explaining student departure/persistence decisions. The impact of student expectations has drawn some attention to researchers interested in college student success. For instance, when Terenzini and Pascarella (1977) examined student departure theory, they called for future research to explore further the relationship between initial student expectations of academic and non-academic experience and decision to stay or leave and between student initial expectations and characteristics. Since the 2000s, more empirical studies have sought to understand college student persistence and other first-year success-related outcomes, such as academic achievement, through applying the expectation-value of achievement theory (Demetriou & Schmitz-Sciborski, 2011). This section of the literature review focuses on the current status of first-year student expectations and existing empirical studies on first-year students' expectations of the university experience and its influence on student persistence.

2.3.1 First-year College Students and Their Expectations

The first-year college student population has significantly changed in enrollment numbers, characteristics, and college expectations over time. Since the 1970s, an

increasing number of individuals, especially the diverse student population, have enrolled in universities (Schnell & Doetkott, 2003). In 2018, a national report showed more than 18 million undergraduate enrollment at degree-granting postsecondary institutions compared to approximately 12 million enrollment during the late 1980s-early 1990s (IPEDS, 2018; Snyder, 1993). In addition, the proportions of diverse student populations, such as female, minority, part-time, and older students, have continuously increased. The estimated increase of minority and part-time students is increasing, although the increase of female students is slowing down.

In addition to changes in numbers and characteristics, expectations of first-year college students are different over time considering changed collegiate, society, and even global environments. For example, first-year students in the late 1980s-1990s believed colleges could help them approach stable jobs and life, resulting in intense anxiety about future jobs. Meanwhile, students perceived the importance of social issues such as women's rights but were not interested in participating in governance or other university political activities. Their expectation and value beliefs of college were influenced by their experience of a rough economic time with tensions in international relationships, terrorism, and the threat of nuclear war (Levine,1989). In contrast, today, students are deeply influenced by the "advancement of technology, issues of violence, a volatile economy, and social justice movements" (Seemiller & Grace, 2017). They generally perceive university learning as enjoyable, practical, and valuable and expect to gain hands-on learning and acquire skills for their future career and life. They also see the importance of engaging in group work or interacting with peers and instructors when they need help (Merriman & Valerio, 2016). Students today are interested in community

engagement focusing on complex topics (i.e., equal human rights). For career goals, they choose a major, program, and courses depending on whether they would learn sufficient skills suitable for their future careers. They are eager to run a business or work as self-employed. Generation Z are open-minded and passionate; they wish to become change-makers and problem-solvers (Mohr & Mohr, 2017).

Besides the overall changes in numbers, characteristics, and expectations of first-year college students over time, researchers discovered an issue related to misalignment between student expectations and the reality of a university as entering the university in the first year decades ago. The first college year, especially the first weeks and months of university, was usually much more stressful and challenging than anticipated (Salinitri, 2005; Barefoot, 2000; Tinto, 1999; Hunter, 2006). However, first-year students often held "naive, enthusiastic, and boundless idealism" beliefs about university life, named Freshmen Myth (Stern, 1966). This myth resulted in students needing more practical information about university life from family, friends, and others. Also, it resulted from high schools and universities with a lower understanding of the discrepancy between students' initial expectations of university life and the authentic experience of studying at the universities. Recent studies showed similar findings that supported the assertion regarding misalignment between student expectations and real university life (Smith & Werlieb, 2005; Crisp et al., 2009). More importantly, some researchers discovered a more detailed and comprehensive understanding of the definition and features of realistic expectations (Pancer et al., 2000; Jackson et al., 2000). For instance, two expectation-related studies using longitudinal data were conducted by Pancer and colleagues (2000) and Jackson and colleagues (2000). The study of Pancer and colleagues aimed to examine

student expectations about the university and subsequent actions, behaviors, or strategies to adjust in the first year. Notably, a realistic expectation is named "integrative complexity of expectations," which is defined as the extent to which a first-year college student is aware of the complexity of studying at a university, the extent to which the student realizes connections and differences among components of the perspectives such as different perspectives about studying at a university and eventually come up specific solutions based on the connections and differences. From a different angle, Jackson and colleagues focused on the features of student expectations of university experience and the relationship between expectations with some features and first-year adjustment. In particular, they found four types of expectations of studying at a university, optimistic, prepared, fearful, and complacent. In particular, some students held optimistic expectations of university (mainly social life), and others expressed prepared expectations of university life, which are positive expectations, accepted possible difficulties, and mentioned some strategies to deal with possible difficulties. These findings were supplemented by Shanahan and colleagues, in which optimism predicted expectations under uncontrollable situations (2020).

Other studies also investigated student expectations of university life and differences across personal characteristics. Nadelson and colleagues (2013) conducted survey research to understand first-year students' expectations of their college experience and awareness of university programs. Their analysis showed that older and higher ACT scores students held higher expectations of the importance of academic-related experience than social interactions. In comparison, out-of-state students had higher expectations of the importance of social-related experiences and activities, athletics-

related experiences, making new friends, and enjoyment of university life. Diniz and colleagues (2018) explored gender differences in academic expectations for first-year college students. In particular, they found that females had lower academic expectations, including the perceptions and desires of learning experiences in employment, personal and social development, student mobility, political engagement and citizenship, and social pressure perceptions, compared to males. Hicks (2003) conducted survey research to understand the differences in the perceptions and expectations of college between first-generation students and those who were continuing-generation, first-year, first-time students and participated in summer first-year experience programs. The researcher found that first-generation students tended to have had more unrealistic initial expectations of academic, personal, and social experience in the colleges, such as fewer of them realized the differences between university and high school, fewer of them were aware of the difficulty of learning and importance of seeking help and building relationships with instructors and classmates.

2.3.2 Influence of Student Expectations of Experience on Persistence

Understanding first-year students' expectations of the college experience is essential to evaluating students' initial perceptions and beliefs of the university. Student expectations of first-year experience influence persistence in various areas, including academic development, social life, personal development, and occupational development. As nontraditional predictors of first-year retention, expectations and perceptions of college experience recently drew more attention from researchers (Demetriou & Schmitz-Sciborski, 2011). Researchers found that students with more substantial, positive expectations of first-year college experience were more likely to continue to enroll in the

university. For instance, in Nadelson and colleagues' survey research (2013), researchers found students had positive expectations of several experiences, including social experience, research experience and (professional) career preparation. They also suggested the awareness of first year university's academic support is positively related to student persistence decisions. First-year student characteristics is also related to all the factors in their study, including student expectations, experience, decision to go to college, and awareness of university programs.

Regarding expectations of experience and gaining development at the university in different areas, studies showed some level of difference in findings in terms of the relationship between expectations and development in different areas (i.e., academic, social, personal) and the relationship between expectations of experience in developing different areas and student persistence. For instance, Friedman and Mandel (2009) investigated the prediction of expectancy and goal-setting on college academic performance and first-year retention and the extent to which expectancy and goal-setting improve the prediction of performance and retention after controlling for demographics, high school GPA, and SAT scores. They used an existing survey to measure student expectations, developed by Friedman and Lechner (2005), by measuring the level of effort to performance expectancies, performance to outcome expectancies, valence, goal specificity, challenge, clarity, participation, peer competition-grade attractiveness, the attractiveness of making friends, and effort to obtain good grades and to make friends. They found that higher student expectancies regarding academic performance are associated with higher cumulative GPA at the end of the first year (provide an additional prediction of the end of first-year cumulative

GPA). In particular, perceived grade attractiveness and effort to obtain good grades are positively associated with student persistence in university in the first year (added predictive value to retention beyond the first year in college). On the other hand, Friedman and Mandel (2009) did not find that expectation regarding social relationships in college significantly predicts first-year student persistence.

However, other studies showed different findings regarding relationships between expectation, value beliefs, experience in different areas, and first-year primary success outcomes-retention/persistence and academic achievement. For example, Lotkowski and colleagues (2004) investigated the impact of academic and non-academic factors on college first-year retention and GPA. Findings showed that most non-academic factors were moderately or strongly related to retention and GPA, including academic self-confidence, goals, skills, achievement motivation, social involvement, and support. In particular, academic-related self-confidence, skills, and goals are strong predictors of retention; academic self-confidence and achievement motivation (expectations for success) are strong predictors of first-year GPA. However, general self-concept is a weak predictor for both outcomes.

Similarly, Robbins and colleagues (2004) examined the impact of psychological and study skills factors (PSFs) on college outcomes (GPA and retention) through a meta-analysis. As a result, PSFs were categorized into nine different constructs: achievement motivation, academic goals, perceived social support, social involvement, academic self-efficacy, general self-concept, and academic-related skills. Notably, most PSFs were positively correlated with retention and GPA, even though the magnitudes of some PSFs were found to be different between two different college outcomes. For example,

academic-related goals, self-efficacy, and skills were the strongest predictors of college retention. In contrast, academic-related motivation and self-efficacy were the strongest predictors of college GPA. Overall, academic-related self-efficacy was the strongest predictor for both college outcomes. In addition, psychological and study skills factors substantially impact retention more than college GPA. However, two traditional predictors, high school GPAs and ACT/SAT scores, were still strong predictors of college GPAs. Finally, researchers suggested it is essential to integrate literature regarding educational persistence and motivational theories to enhance understanding of PSFs factors' effect on college outcomes.

Le and colleagues (2005) supported Robbins et al.'s findings, who developed the Student Readiness Inventory based on Robbins et al.(2004) to measure motivation, academic skills, and social engagement to predict college student success outcomes: academic performance and retention. In particular, Le et al. found ten primary factors of persistence and academic achievement: commitment to College, Goal Striving, Social Activity, Social Connection, and Academic Self-Confidence. Most of the factors were similar to those in Robbins et al.'s study (2004), while four were newly found, including Academic Discipline, General Determination, Communication Skills, and Emotional Control. After one year, Robbins and colleagues (2006) measured the predictive validity of the Student Readiness Inventory (Le et al., 2004). They found that stronger perspectives of Academic Discipline, Social Activity, and Emotional Control were predictive of better academic performance (GPA) and retention, and stronger perspectives of Commitment to College and Social Connection were predictive of better retention. More studies investigated similar findings regarding the impact of expectation,

motivation, and skills on academic performance and retention (Allen et al., 2008; Robbins et al., 2009; Beattie et al., 2018; Kahu & Nelson, 2018; van der Zanden et al., 2018). For instance, Allen and colleagues (2008) also found that students with a stronger perception of academic self-discipline were more likely to have better first-year academic performance.

Furthermore, perception of college commitment, social connectedness, pre-academic performance, and skills indirectly influenced retention. Robbins and colleagues (2009) developed and assessed theoretical models to further explore the relationship between college skills and psychosocial factors related to expectation and motivation. The finding showed that college skills were strongly associated with factors related to expectation and motivation, such as motivational control and academic performance. Moreover, skills or programs designed to improve practical, emotional, and self-regulation skills strongly influenced emotional control and first-year retention. Beattie and colleagues (2018) also indicated that first-year college students who gained better academic achievement held more substantial expectations of learning at the university in terms of perceiving "philanthropic goals," being "purpose-driven," and showing a higher willingness to put efforts into the study.

More recently, some researchers also emphasized the impact of expectation and task value on student persistence and academic achievement. For example, Davis and colleagues (2019) examined the influence of self-expectancy and task value on undergraduate HBCU students' class performance in STEM majors. As a result, students with higher self-expectancy were more likely to gain better class performance and return to the university the following year. In addition, students with higher self-expectancy also

have stronger beliefs in values. Like Eccles and Wigfield's study (2002), self-expectancy refers to the belief in having the necessary skills to succeed at the university and completing classwork regardless of difficulty. Meyer and colleagues (2019) further explored the relationship and interactive effect of expectation and task value beliefs on academic achievement. Findings showed that expectancy and value beliefs have a predicted effect on achievement. Specifically, a student with higher expectancy and value beliefs (except cost) was more likely to achieve higher. Besides discussing the relationship between expectation and value beliefs, Schnettler and colleagues (2020) investigated associations of difference in persistence and expectation and four components of task value beliefs (intrinsic value, attainment value, utility value, and cost) at the intraindividual level instead of interindividual level. Results showed a significant positive association between intrinsic value, attainment value, and persistence and a significantly negative association between cost and persistence.

2.4 First-Year Interventions

Universities design and implement first-year experience interventions to support students' growth in various aspects (Freer, 2016; Upcraft & Gardner, 1989). For instance, in The Freshman Year Experience. Helping Students Survive and Succeed in College, Upcraft and Gardner (1989) featured institutional first-year intervention programs and services. Orientation is designed to ease the transition for first-year students from high school to collegiate toward their success in academic achievement (p.82) and maximum personal development (p.83). Academic advising is designed to share institutions' academic expectations with students and identify first-year students' academic needs (pp.97-100). An academic support program, similar to an academic advising program, is

to identify students' academic needs but emphasizes learning skills (p.108). Living programs and on-campus activities intend to enhance student satisfaction with their college experience and increase the sense of belonging through interacting with peers and the environment (pp.148-150). Mentoring programs touch on multiple areas, such as sharing information, solving problems, and mapping the road for students (p.128). Counseling programs deal with students' personal, social, academic, and career development (pp.129-130). In short, the first-year programs mentioned above are complemental, even though each program mainly focuses on one or two types of the college experience.

First-year seminars serve different purposes; sometimes, the purposes may overlap with other first-year programs. For instance, extended orientations aim to share information regarding campus support and services; academic seminars aim to assist students in improving cognitive skills on an interdisciplinary based; basic study skills programs intend to help students become familiar with study skills and more (Greenfield et al., 2013). A combined format of extended orientation and academic seminar is designed to share campus resource information and improve student academic competence (Pittendrigh et al., 2016). Still, the first-year seminar is one of the most popular first-year interventions and critical, high-impact practices that positively influence first-year student persistence in the second year (Tinto, 2012; Greenfield et al., 2013). In addition, a practical, high-quality first-year seminar applies a holistic, student-centered approach (Cuseo, 2009), which is supposed to help students grow in academic and non-academic areas (Upcraft & Gardner, 1989), especially for historically underserved students (Greenfield et al., 2013). In a similar study conducted by Murray

and Summerlee (2007), the results showed that students who took a problem-based first-year seminar had higher levels of skill development and were more likely to apply skills and approaches in other learning environments, even in subsequent years.

"The highest-quality first-year experiences place a strong emphasis on critical inquiry, frequent writing, information literacy, collaborative learning, and other skills that develop students' intellectual and practical competencies. First-year seminars can also involve students with cutting-edge questions in scholarship and with faculty members' own research." -- AAC&U

A new format of first-year programs has been developed: interdisciplinary, credit-hour general education courses often designed for first-year college students at the institutional or departmental level. Bordelon and colleagues (2019) called this first-year program a "Robust Interdisciplinary First-Year Course," a three-credit-hour interdisciplinary course that applied three High-Impact Practices. The course was designed and taught by full-time faculty from different disciplines to help students understand general concepts in the discipline, such as what it means to be human. Researchers found that students benefited from the course in terms of perception and knowledge of college, relationship with faculty and other students, and positive influence on student performance and persistence. Koch and colleagues (2017) found that interdisciplinary study projects positively impacted student commitment in the early year of undergraduate education. Participating in the projects fulfilled students' basic psychological needs, including competence, relatedness, and autonomy, and improved student academic engagement, suggesting a positive influence on first-year persistence.

2.5 Existing scales

Student Self-Expectancies and Task Value scale were created by Eccles and colleagues (2005) and later applied in higher education settings by Davis and colleagues (2019). In particular, Davis and colleagues indented to employ the Student Self-Expectancies and Task Value scale to measure self-expectancies and perceived task value for undergraduate STEM students. The items were revised with consideration of the context. For instance, they changed the original question, "How have you been doing in math this year" to "How have you been doing in college courses this year." Another scale of First-Year Students' Experiences and Expectations was developed by Nadelson and colleagues (2013) to measure expectations and program/institution influence based on multiple pieces of literature and existing scales. Finally, Friedman and colleagues used an existing survey, Student Motivation Questionnaire (SMQ), developed by Friedman and Lechner (2005), to measure the level of effort to performance expectancies, performance to outcome expectancies, valence, goal specificity, challenge, clarity, participation, peer competition-grade attractiveness, the attractiveness of making friends, and effort to obtain good grades and to make friends. Three scales measured similar SE-FYE scale constructs and included clear-written items. Some items from the scales are adapted to the SE-FYE scale after modification. However, whole scales cannot be simply adopted into the SE-FYE scale due to insufficient reliability and validity evidence, mismatched context, and less comprehensive sources used to develop the scale.

In contrast, scales developed by Newton and colleagues (2008) and Casanova and colleagues (2019) followed the comprehensive survey development process and showed good evidence of psychometric properties. Newton and colleagues (2008) developed the

College Learning Effectiveness Inventory (CLEI), including six subscales with 50 survey questions to measure the impact of psychosocial factors on student learning in colleges. Casanova and colleagues (2019) developed and validated a scale to measure the characteristics of first-year college students' expectations of college experience and success. This scale focused on different expectations compared to other studies, such as training for employment, personal and social development, student mobility, political engagement and citizenship, social pressure, and social interaction. However, the shared limitation of these two studies for the SE-FYE scale is the difference in context and scope of college expectations. For instance, Newton and colleagues (2008) were not explicitly focused on first-year college students' perspectives, and Casanova and colleagues' study (2019) were not in the American higher education context.

2.6 Conceptual and Operational Definitions

Tinto's student departure theory (1975) plays a significant role in understanding why students leave or continue their education at universities and how universities support students to continue learning. Thousands of studies focused on understanding each component and relationship proposed in Tinto's student departure model. However, recently, student expectations of college experience as the nontraditional predictor of retention, have drawn more attention from researchers (Demetriou & Schmitz-Sciborski, 2011). Researchers found that students with more substantial, positive expectations of the first-year college experience were associated with higher first-year GPAs (Friedman & Mandel, 2009; Lotkowski et al., 2004; Robbins et al., 2004) and were more likely to continue to enroll in the university in the second year (Nadelson et al., 2013; Le et al., 2005; Davis et al., 2019). Overall, the literature shows the critical role of student

expectation of college experience on student retention and academic and non-academic achievement.

However, the literature has yet to find the definition of student expectations, specifically of the first-year college experience for their development in various aspects. First, the conceptual definition is the primary component of a survey, which aims to theoretically define the relevant concepts and identify the domain of the constructs of interest (Nardi, 2018; Bandalos, 2018). Operationalization is defining the constructs as measurable or observable indicators, which show the intended use of the scale and provide evidence of construct validity regarding content validity, criterion-related validity, and internal consistency (Hinkin, 1998).

Therefore, according to the theoretical and empirical literature, student expectations of the first-year college experience are conceptually defined as perceptions of one's capacities to navigate the upcoming university life in general during the first year. These expectations are also closely tied to their perceptions regarding academic, social, personal, and occupational development at the university and are influenced by students' prior experiences and characteristics. For operationalization, student expectations of first-year college experience are defined as the perceptions of the extent of their ability to navigate upcoming first-year university life. The operational definition of student persistence refers to the desire of whether or not to continue education at the university after the first year. The operational definition of expectations of first year development refers to the perceptions of the importance of academic, social, personal, and occupational growth in knowledge and skills during the first year at the university. Student characteristics are defined as family background, including demographic

information such as race, gender, first-generation status, and educational status, including first-time status and student classification. Student persistence is defined as student intentions to continue their higher education.

2.7 Chapter Summary

In summary, the literature emphasizes the importance of student expectations of first-year college experience in explaining its relationship with student persistence decisions. In particular, student perceptions of their capacities to navigate university life toward academic, social, personal, and occupational development during the first year positively influence student persistence and achievements and related to individuals' family and prior educational backgrounds of individuals. Universities also apply various interventions to improve student persistence and support students in growing comprehensively during the first year. Significantly, this chapter contributes the conceptual and operational definitions for student expectations of the first-year college experience, student persistence, and student characteristics. These contributions facilitate a better understanding of student expectations of first-year experience at university but also show the possibility of the intended use of these definitions.

CHAPTER 3. METHODOLOGY

3.1 Purposes of Present Study

The present study aimed to achieve three objectives. First, this study intended to define student expectations of first-year college experience conceptually based on theoretical and empirical literature. Second, this study intended to develop a survey designed to measure student expectations of first-year college experience (the SE-FYE survey) by applying a structured process. Third, this study was to validate the scales developed by applying Rasch measurement analysis. In turn, items in the survey were modified based on examined psychometric properties of the scale through Rasch analysis. First-year student expectations of the college experience were defined in the Literature Review Chapter. This chapter focused on the second research objective and describes an analysis plan for the third research purpose. Finally, all research questions were addressed in the Results Chapter.

3.2 Research Questions of Present Study

Research Question 1: To what extent is each construct of student expectations of first-year college experience measured by items in the SE-FYE survey unidimensional?

Research Question 2: To what extent do subscales of student expectations of first-year college experience in the SE-FYE survey establish fit and functionality through Rasch analysis?

Research Question 3: To what extent are subscales of student expectations of first-year college experience in the SE-FYE survey able to capture person ability varied across different demographic groups?

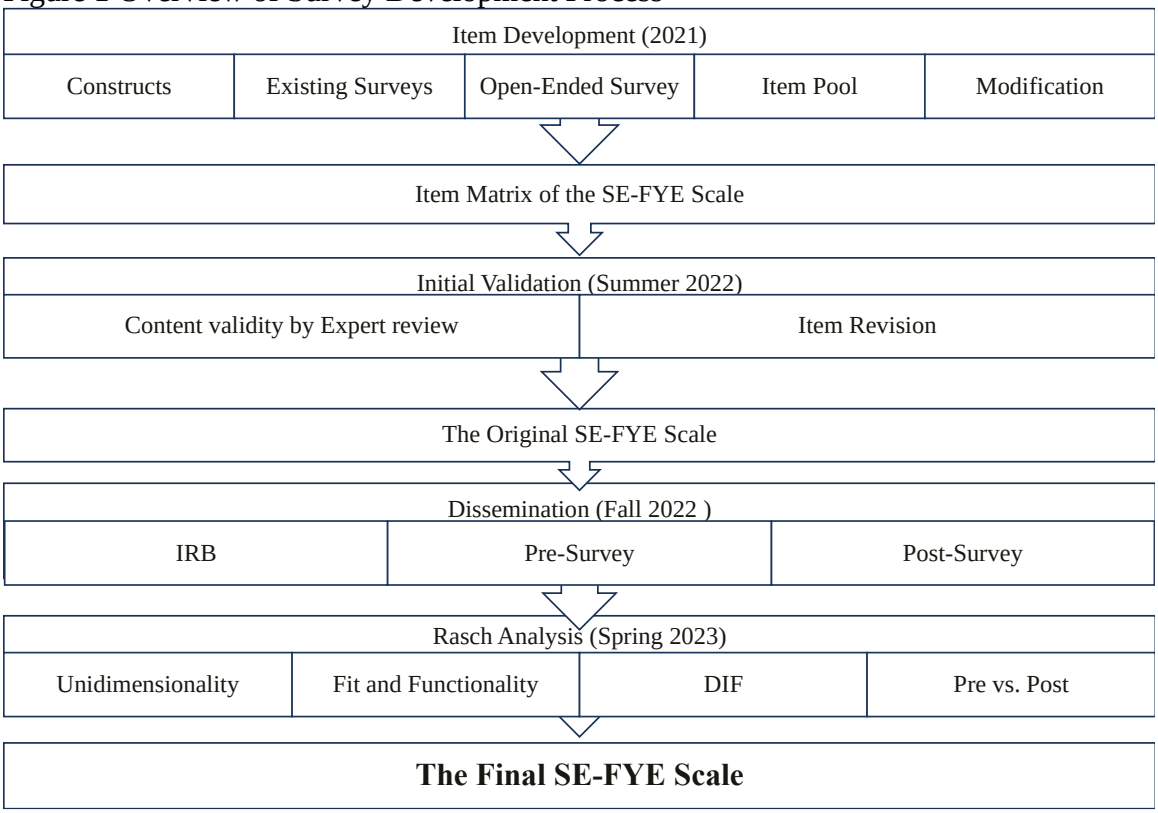
Research Question 4: To what extent do subscales of student expectation sof first-year college experience in the SE-FYE survey have the capacity to capture change in person ability over time?

3.3 Survey Development

In educational research, surveys are widely used to collect cognitive outcomes such as standardized tests and noncognitive results such as attitudes, values, and beliefs (Nardi, 2018; Bandalos, 2018). Three major connected aspects are incorporated during the development process of a rigorous, structured, and practical survey: conceptual definition, operational definition, and tailored instrument (Sampson et al., 2021). The steps of a survey development process vary in different studies. In general, the first step is item generation (Hinkin, 1998) and identification of domains of the constructs (Boateng et al., 2018), applying deductive (based on literature and existing scales), inductive (based on opinions from the targeted population of the study), or mixed methods to generate items (Morgado et al., 2017). The second step is theoretical analysis (Morgado et al., 2017) or content validity (Boateng et al., 2018) through gathering informative feedback from experts or the targeted population about the operational definition. The last step is psychometric analysis (Morgado et al., 2017) or scale evaluation (Boateng et al., 2018) to ensure construct validity and reliability. The overall process adds up the confidence in the measure's construct validity (Hinkin, 1998). Also, consideration of a survey's use, purpose, and context is essential to ensure validity and reliability and compensate for the lack of psychometric training (Sampson et al., 2021). Figure 1 shows the complete steps of survey development for this study based on the pre-

existing processes of survey development. More details for each step are described in the following sections.

Figure 1 Overview of Survey Development Process



3.3.1 Item Development

A clear conceptual definition identifies what is to be measured as the beginning step and foundation of the survey development. In Chapter 2, a fundamental understanding of student expectations has been built regarding theoretical perspectives of student expectations of the college experience and student expectations' role on student persistence. According to the conceptual and operational definitions and existing scales mentioned in literature review, the original Student Expectation of the First-Year College Experience (SE-FYE) survey was developed to measure student expectations and perceptions of their ability in learning and living at a university, specifically focusing on

their ability to navigating first year experience, and academic, social, occupational, and personal development experiences during their first academic year. Table 3.1 shows the latent variables, corresponding indicators, and definitions of the original SE-FYE scale identified after reviewing theoretical perspectives and recent studies.

Table 3.1 Variables, Corresponding Indicators, and Definitions of the Original SE-FYE Scale

Variables	**Indicators**	**Definitions**
Student Self Expectations for First Year	Perceptions of their ability to navigate upcoming first-year university life	The extent of perceived ability to do well on upcoming university life during the first year
Student Self Expectations of Academic Development	Perceptions of their academic growth	The extent of perceived ability to grow academically in knowledge and skills during the first year at the university
Student Self Expectations of Engagement	Perceptions of their college engagement	The extent of perceived ability to get involved in college life during the first year at the university.
Student Self Expectations of Personal Development	Perceptions of their Personal Development	The extent of perceived ability to grow personal-related knowledge and skills during the first year at the university
Student Expectations about Career Development	Perceptions of university prepared them for future career	The extent of perceived support offered by university to prepare their growth in occupational-related knowledge and skills during the first year at the university
First-year Persistence	Intention to continue	A desire to continue education at the same university after the first year.
Student Characteristics	Family Background	Demographic information including race, gender, first-generation status.
	Educational Background	Educational Information including first-time status, student classification.

3.3.2 Existing Surveys Review and Item Adaptation

After identifying a survey's purpose, latent variables, and constructs, reviewing existing surveys is necessary to determine whether a scale that measures the same constructs already exists (Bandalos, 2018) and is a helpful way to build an item pool of the scales. The item pool of the SE-FYE scale was adapted from five existing surveys designed to measure similar constructs of the SE-FYE scale. The existing surveys consist of Student Self-Expectancies and Task Value scale created by Eccles and colleagues (2005) and later applied in higher education settings by Davis and colleagues (2019), First-Year Students' Experiences and Expectations by Nadelson and colleagues (2013), Student Motivation Questionnaire (SMQ) by Friedman and Lechner (2005), College Learning Effectiveness Inventory (CLEI) by Newton and colleagues (2008), and Academic Expectations Questionnaire by Casanova and colleagues (2019). The first three scales, Student Self-Expectancies and Task Value, First-Year Students' Experiences and Expectations, and SMQ scales measured similar SE-FYE scale constructs and included clearly written items. Some items from the scales are adapted to the SE-FYE scale after modification. However, whole scales cannot be adopted into the SE-FYE scale due to insufficient reliability and validity evidence, mismatched context, and less comprehensive sources used to develop the scale. The latter two scales, CLEI and AEQ, also have a shared limitation for the SE-FYE scale: the difference in context and scope of college expectations. For instance, Newton and colleagues (2008) were not explicitly focused on first-year college students' perspectives, and Casanova and colleagues' study (2019) were outside the American higher education context. Further steps for revising and reducing items are described in the Modifications section.

3.3.3 Open-Ended Survey

Besides literature, perceptions of target participation help define the variables and constructs with contextual consideration (Sampson et al., 2021). Also, their perspectives help evaluate the face validity of the scale (Haynes et al., 1995). For these purposes, a survey with open-ended questions was designed and aimed to achieve multiple primary objectives of helping the SE-FYE scale's development:

1. Defining the latent variables of the SE-FYE scale
2. Generating items missed in the item pool
3. Reducing and revising items that are irrelevant to the context

Table 3.2 shows six items in the open-ended survey. Because the open-ended survey was designed to gather preliminary student perceptions on first-year expectations and college experience, the survey was distributed via Qualtrics by instructors to students who enrolled in a first-year interdisciplinary course in the Fall of 2021 before students were exposed to any main concepts regarding college experience. The participants also shared characteristics similar to the present study's target population, which was first-year undergraduate students, and the sampling frame was students who participated in first-year experience courses. They are more likely to be exposed to the holistic university experience and be aware of the experience.

The survey was distributed in five sections of the course. The class size for each section was about 20-25 students enrolled. Of the total 81 responses received, 42 students completed all survey questions. According to their responses, the primary goals, challenges, efforts, and skills they expected to have during the first college year fall into

the following themes: academic achievement, learning strategies, first-year transition, social relationship, and interest/major/career exploration. Information collected through the open-ended survey was used to define the latent variables of the SE-FYE scale, generate items missed in the initial item pool, and reduce or revise contextual irrelevant items.

Table 3.2 Items of Open-Ended Pilot Survey in 2021

Item	Questions
1	Do you think gaining undergraduate education is important to your life? Why or why not?
2	What will be the primary goal(s) you expect to achieve during your first year at UK?
3	What will be the main challenge(s) you may have during your first year at UK?
4	What efforts and skills do you think will be beneficial for your university experience in the first year at UK?
5	Do you believe EPE 174 will be helpful for you to set proper expectations that are aligned with the reality of studying at university? Why or why not?
6	Can you envision continuing your undergraduate education after completing your first year of learning at UK? Why or why not?

3.3.4 Modifications

Items in the item pool were excluded when misaligning with the theory, literature, and student voice. For instance, items from Casanova and colleagues' scale (2019) measuring "Student international mobility" were excluded, not a primary construct in this study. Items using similar statements from different scales were combined and modified as one item. For instance, one item in Nadelson and colleagues' scale (2013) is "I am constantly working at making new friends." One item in Casanova and colleagues' scale

(2019), "Live and socialize with a new group of friends," was combined and modified as "I think the first year of my undergraduate education at the university is an important opportunity to live and socialize with a new group of friends" in the present scale. Also, items were revised to maintain consistency throughout the survey and target respondents in the context. For instance, one original item in Davis and colleagues' scale (2019) was "Is the amount of effort it will take to do well in college courses worthwhile to you? (not very worthwhile, very worthwhile)." Because most items in the SE-FYE scale do not consist of questions to gather UK students' perceptions, to be consistent and specific, the original item has been revised as "The amount of effort it will take to succeed at UK is worthwhile to me."

Besides removing and revising items, items in the SE-FYE scale were newly created to gather additional information missed in existing surveys but mentioned in the literature or the pilot survey. For instance, one of the newly created items, "I believe that I can continue my education at UK" is based on theoretical and empirical literature that showed a statistically significant association between persistence and first-year expectations. Also, in the pilot open-ended survey, students mentioned they intend to learn how to locate campus resources that would be helpful for their learning in the first year. In this case, a new item was created to understand their perceptions of academic development: "I think the first year of my undergraduate education at the university is an important opportunity to learn how to seek help from university resources to deal with the academic challenges."

Moreover, existing surveys use different response scales. Another major modification of the SE-FYE scale is using a four-point Likert-type response scale

(including strongly disagree, disagree, agree, strongly agree) for most items except demographic questions. The original Likert-type scale was proposed by Rensis Likert in 1932, using strongly approve, approve, undecided, disapprove, and strongly disapprove assigned numeric values, from 1 to 5, as the scale points to reflect the degree of agreement on items. A More popular five-point Likert-type response scale format uses strongly disagree, disagree, undecided/neutral, agree, and strongly agree coded from 1 to 5 (Bandalos, 2018). Even though the Likert-type response scale is handy to show the extent of respondents' agreement increases or decreases in the order of the numerical values, the middle rating category (unsure, neutral, neither agree nor disagree) may lead to misinterpretation of participants' level of agreement. Respondents' intentions to choose the middle category might be various instead of moderate-level agreement (Kulas & Stachowski, 2013). Including a neutral middle category in the response scale is less likely to construct a meaningful measure (Bradley et al., 2015).

The initial SE-FYE scale or the item matrix for the SE-FYE scale consists of 49 items after consulting various sources, including theoretical and empirical literature, pre-existing surveys, and student voice: 11 items measure student expectations of the first-year college experience; 30 items measure student expectations of various development during the first year; one item measures first-year student persistence, and seven measure student demographic characteristics. Besides student demographic items and first-year college persistence, the rest of the SE-FYE scale items are attitudinal. APPENDIX 1 shows a survey item matrix to incorporate comprehensive information on each item, including item types, level of measure, answer choices, variables, construct, data sources, and scale citations.

3.3.5 Initial Validation: Expert Review

After item development, the content validity of the initial scale is often assessed (Morgado et al., 2017) through consulting experts and/or the target population (Mueller, 2004). Expert review is a more popular way to assess content validity for scale development than the target population (Boateng et al., 2018). Thus, in present study, an expert review was conducted in the Summer of 2022 by consulting professionals in higher education and measurement in education and in a different field. The experts were asked to review the items independently, identify the items that accurately and appropriately measure the constructs in the given context, and suggest items that needed to be modified. In particular, seven questions were used to guide experts in providing feedback as follows:

1. Do you think this item measures the intended construct? If the item does not measure the construct, please tell me why. Or any suggestions for improvement?
2. Is the wording of this item clear? If not, please indicate the issues related to the wording. Or any suggestions for improvement?
3. Do you think the content of this item is appropriate for first-year undergraduate students to answer? If not, please tell me why. Or any suggestions for improvement?
4. Does this item collect sensitive or biased information? If so, please indicate what sensitive or biased information might be collected.
5. Do you think the response options are appropriately used for this item? If not, please indicate what specific issues you identified.
6. Overall, do you think this item should be included? If this item should be removed, please indicate why.

7. Any additional comments or suggestions on problems identified from the survey item?

3.3.6 Survey Dissemination

Based on the expert feedback, items were kept, revised, or removed. The SE-FYE scale (see APPENDIX 2) was disseminated at the beginning of Fall 2022 and at the end of Fall 2022 after IRB approval on modifications. Data collected through pre- and post-surveys will be analyzed to see whether the scale is valid and reliable. The scale will be revised again based on psychometric evidence on validity and reliability as the final version of this study. More detail on psychometric analysis will be described in the Results Chapter.

3.4 Population and Sampling

The target population of this study was first-year undergraduate students at a public four-year university in the United States in 2022. In recent years, most undergraduate students must participate in at least one first-year intervention (i.e., first-year experience courses, summer program, first-year seminars) within their first academic year. In other words, students who participate in a first-year intervention are a reasonably accessible population for this study. In addition, first-year interventions aim to provide comprehensive support for students, such as helping first-year students better understand university life in academic and non-academic areas (Tinto, 2012; Upcraft &Gardner, 1989). As a result, students participating in a first-year intervention may have different perceptions of expectations of studying and living in the university before and after participation. The change in student perceptions of the items may provide informative

results to indicate the ability to capture changes in the instrument. Therefore, the sampling frame of this study will be undergraduate students who enrolled in a first-year course at the University of Kentucky.

3.4.1 Sampling Strategies

As mentioned previously, perspective changes provide rich information to address the primary purposes of this study. The first-year course is EPE 174: College Student, a programmatic first-year experience course designed to assist students in transitioning academic and social engagement in an interdisciplinary study of higher education. Students in EPE 174 have a better opportunity to learn about university life and set realistic expectations for development in various aspects. Therefore, they are supposed to have perspective changes after completing the course. Most students in this course are first-year students majoring in or interested in education. Although some second-year or returning students may also register for this course, the different perspectives compared to first-year students help answer the third research question instead of being not representative of the population. The corresponding sampling strategy applied in this study is nonprobability sampling, specifically purposive sampling. The sample was purposefully selected from undergraduate students enrolled in a first-year course, EPE174, at the University of Kentucky in 2022.

3.4.2 Data Collection Procedure

A SE-FYE scale was disseminated after expert review and revision in Fall 2022. The course instructors of EPE 174 were contacted to request permission to conduct the research study in their classes during the summer of 2022. After receiving the

permissions, the instructors distributed recruitment emails to EPE 174 students twice during the semester. The recruitment emails were distributed in August and December 2022, respectively, for pre and post-tests, applying the original SE-FYE scale to explore the changes in students' expectations and perspectives on their first-year experience and the course. All surveys were web-based and distributed via Qualtrics.

3.4.3 Ethical consideration/IRB confidential

Researchers should always consider and examine ethical issues during the research process. Reporting to ethical review boards is necessary to protect the study's participants. This study has been reported to Institutional Review Board (IRB) and certified as exempt. Therefore, the research activities of this study present no more than minimal risk to human subjects (Risk Level 1). After IRB approval, the first pilot survey study was conducted in the Fall of 2021. The survey development section includes detailed information regarding the first pilot survey. Because this study was ongoing with additional components (the second pilot survey and final version dissemination), modification requests were submitted for the additional components to the IRB in 2022. The additional data collection began when receiving the IRB approval.

All participants must be 18 years or older to participate in this study. To ensure the protection of subjects from direct interaction with the researcher, the course instructors of EPE 174 were asked to distribute the recruitment emails to their students. To eliminate academic risk for subjects, the instructors were not allowed to see the study data or know who did or did not participate. To obtain students' consent, a consent cover letter was included on the first page of surveys distributed via Qualtrics. Students were asked whether they had read and understood all information provided in the cover letter

and whether they were 18 years or older. If the students agree to participate in the study, click the "I agree" button and take the survey. After that, they can start entering their responses to survey questions. Students are free to close the survey and stop answering questions anytime. If the students do not agree to participate in the study, they are thanked for their time, and they could close the web browser and stop taking the survey. Any raw data will not be shared with other people who are not included in the study personnel to protect their confidentiality. The survey was anonymous, so no identifiable information was collected. Collected data was stored electronically (in Qualtrics/spreadsheet) on a local laptop secured with a passcode.

3.5 Rasch Analysis

The quality of self-designed surveys is often a concern for data users and psychometricians (Draugalis, 2008) due to a lack of essential knowledge and skills in developing surveys and a lack of a rigorous process of development. In addition, validity and reliability evidence are often required to demonstrate how well a set of items measures the intended constructs and how accurate and consistent a set of items measures the constructs across different participants, different times, and other conditions, respectively (Cook, & Beckman, 2006; Souza et al., 2017; Wasserman, & Bracken, 2013). Therefore, after data collection, the data analysis of the present study aims to test the dimensionality, validity, and reliability of subscales in the survey by applying Rasch analysis. WINSTEPS Rasch measurement software, version 4.4.1, will be applied to facilitate the analysis.

3.5.1 Overview of Rasch Model

Georg Rasch first developed the Rasch model in 1960, a mathematical model to express the probabilistic relation between item difficulty and person ability on one attribute (Bond & Fox, 2013, p.8, p.199). The basic principles capture the primary features of the Rasch model. First, the Rasch model is unidimensional, referred to as measuring one attribute at a time (Bond & Fox, 2013; Smith, 1996). The second principle is to construct validity in the Rasch models, defined as the extent to which the theoretical construct is measured accurately through a set of items that the researcher designed or developed and considering participant ability. Fit statistics, as one of the primary outputs of Rasch analysis, will help determine whether and how item and participant ability fit/measure the underlying unidimensional construct. Third, the Rasch model expresses the probabilistic relation between item difficulty and person ability on a unidimensional construct through logarithmic transformation of ordinal data into interval data. In particular, the intensity of the relationship includes persons with a higher level of ability are more likely to respond to all items correctly; items with a lower level of difficulty are more likely to be answered by all persons. Last, the Rasch model helps determine whether item difficulty and person ability spread enough along the continuum.

Overall, Rasch models are designed to ensure that the constructed scale is objective and raw data is transformed into equal intervals (Bond & Fox, 2013, pp.3-7; Boone, 2016). Objectivity and calibration with equal units are two primary features to ensure a scale with high quality (Wright & Stone, 1979). In other words, applying the Rasch model for survey development helps validate the construct a researcher intended to

measure through a set of survey items and helps operationalize the construct in a continuum.

3.5.2 Rating Scale Model

The rating scale model is one of the models in the Rasch family focusing on items with two or more response categories. The Andrich Rating Scale Model (RSM) is used to validate the extent to which the items hold together as a scale and assess the extent to which the persons endorse the items (Andrich, 1978). Items (except demographic items) in the SE-FYE survey are applied to the four-point Likert response scale, including strongly disagree, disagree, agree, and strongly agree, coded as 1,2,3,4, respectively. Each item is modeled as three thresholds with specific difficulty estimates. For each threshold, the probability of a person choosing a category over another is predicted as 50%. The general formula of the rating scale model is presented as follows (Wright & Masters, 1982; Bond & Fox, 2013):

$$P_{nik} = \frac{e^{(B_n - D_i - F_k)}}{1 + e^{(B_n - D_i - F_k)}}$$

If it is converted to log odds, the formula is presented as follows:

$$ln\left(\frac{P_{nik}}{1 - P_{nik}}\right) = B_n - D_i - F_k$$

Where P_{nik} is the probability of a person n choosing a category over another one on threshold k on any item i; B_n is estimated ability of person *n*; D_i is estimated difficulty of item *i*; and F_k is the threshold difficulty estimate or step difficulty of category k considering category k-1.

3.5.3 Unidimensionality

One or more items are often designed to measure a single construct following scale development steps. Unidimensionality refers to whether a set of items measures one latent attribute and does not measure other unintended attributes (Wright & Stone, 1999, cited in Aryadoust et al., 2021). In other words, unidimensionality is a prerequisite to evaluating whether the items measure the intended construct together and identifying the extent to which the items endorse the construct.

Thus, checking the dimensionality is the first step to evaluate the extent of the items subscale measured by the intended constructs when Rasch measurement analysis is applied. Principal component analysis of residuals (PCAR) is applied to examine the dimensionality, specifically to explore the evidence of added dimensions that items measured (Boone & Staver, 2020). The findings of unidimensionality are used to answer the present study's first research question: To what extent is each construct of student expectations of first-year college experience measured by items in the SE-FYE survey unidimensional?

In the present study, the eigenvalue of the first Contrast for each subscale is reviewed as this is the primary evidence of whether the unexplained variance is random or some items may measure other latent variables (Boone & Staver, 2020). If the eigenvalue is above 2.0, it indicates that some items should be considered to be removed due to multidimensional concerns. To further investigate, checking Pearson and Disattenuated correlation coefficients of person measures between each paired cluster in the first Contrast is necessary. Disattenuated correlation coefficients refer to Pearson correlation coefficients without error variances. The more disattenuated correlation

coefficients closer to 1, the more likely two clusters of items measured the same latent variable. If disattenuated correlation coefficients are between 0.3 and 0.7, it might be due to random. If the coefficients are less than 0.3 or even less than zero, two clusters might measure two different latent variables, so items in one of the clusters are considered to be removed.

3.5.4 Fit Diagnose

Fit statistics determine the extent of a construct well-measured by a set of items based on the difference between observed and expected responses, reported as infit mean square and outfit mean square statistics (Bond & Fox, 2013; Linacre & Wright, 2000). Infit is an information-weighted statistic based on the distance between item difficulty and a person ability, whereas outfit is an unweighted statistic based on the sum of squared standardized residuals (Bond & Fox, 2013; Green & Frantom, 2002). Suppose items or person ability fit the model. In that case, the construct is well measured by the items, infit, and outfit mean square statistics should be between 0.5 and 1.5, showing productive fit, or between 0.5 and 2.0, showing acceptable fit (Linacre & Wright, 2000). If item fit statistics exceed the ranges, they are considered to be removed as they may distort or degrade the measurement.

Thus, the findings are used to reduce misfitting items and to answer the present study's second research question: To what extent do subscales for student expectations of first-year college experience in the SE-FYE survey function in the Rasch Model as expected? Please note that the item reduction in the present study is mainly based on multiple Rasch analysis results, including PCAR analysis, Disattenuated correlation

coefficients, and fit statistics. These results are considered together to determine which items should be removed.

3.5.5 Item-Person Map

Item-person map, or Wright Map, visually shows the relations between item difficulty and respondent ability, separation of items and persons, along with the continuum in logit units. In the present study, the Wright Map displays the distribution of items on each subscale and respondents along a measurement continuum, representing the underlying construct. On the left side of the Map, persons are distributed in order of person ability: those with the strongest attitude toward the construct at the top and those with the weakest attitude toward the construct at the bottom. Items are distributed on the right side of the Map in order of item measures: the items the most difficult to agree on at the top of the Map and the least difficult to agree on at the bottom. The findings in the item-person Map are used to answer the present study's second research question.

3.5.6 Separation and Reliability

Person and item separation and reliability help determine whether items and person ability spread enough along the continuum and reproducibility of the items. Items and person ability spread enough along the continuum when separation is greater than 1.0 in standard error units (Green & Frantom, 2002). Specifically, suppose person separation is less than 2, and person reliability is less than 0.8. In that case, it indicates low person separation, suggesting the items are not sensitive enough to distinguish between high and low person ability. On the other hand, if item separation is lower than 3 and item reliability is lower than 0.9, it indicates low item separation, suggesting the need to

increase the sample size to confirm the item difficulty (Linacre & Wright, 2000). The findings in separation and reliability are used to answer the present study's second research question.

3.5.7 Category Functionality

The extent of response categories and thresholds that fit the model for the rating scale are needed to diagnose. The diagnostics often start with category frequencies, the number of responses in each response category, and the average measures of each category. A low category frequency is problematic. It is also problematic if average measures do not increase monotonically across categories. Importantly, thresholds and category fit statistics help show the extent of the distinction between categories. Thresholds should increase by at least 1.4 logits to show the distinction. Another visual tool to show thresholds is probability curves for rating scales. For category fit, if the outfit means greater than 2, it indicates noise.

3.5.8 Differential Item Functioning (DIF)

Differential item functioning (DIF) refers to whether "each item has the same difficulty for two groups" (Linacre & Wright, 2000), which is an important indicator to detect items with bias for people with different characteristics (Sireci & Rios, 2013). Evidence of DIF is used to answer the present study's third research question: To what extent do subscales of student expectations of first-year college experience in the SE-FYE survey able to capture person ability varied across different demographic groups?

In particular, DIF is used to test a null hypothesis: there is no difference in person ability to endorse an item between different demographic groups. Three parameters

indicate whether the null hypothesis should be rejected, including DIF Contrast, t-statistics, and p-value. DIF Contrast refers to how big the difference in item difficulty between the Reference group (treatment group) and Focal group (control group) is. If the DIF Contrast is positive, there is evidence that the Reference group has a more considerable difference than the Focal group and vice versa. If the DIF Contrast is higher than 0.5 logits, there is evidence that the difference between the two groups is noticeable. For t-statistics, if it is positive, the Reference group has a more considerable difference on an item than the Focal group and vice versa. Finally, if the p-value is lower than 0.05, the null hypothesis should be rejected; if it is greater than the alpha of 0.05, the null hypothesis should be failed to reject. The potential comparison groups include:

- students who plan to continue enroll next year and those who plan not to continue (including those who are not sure to continue)
- first-generation and continue generation students
- Students in different course sections
- female and male students
- students who self-identified as White and those who self-identified as non-White

3.5.9 Pre and Post Comparisons

A quality scale is expected to capture person ability changed over different times. As the present study gathers information from the same group of people at two different time points, each participant has two sets of observations. First, pre-post-person and item measures are plotted in the same item-person map to visualize the means, ranges, and distribution of item measures and pre and post-person measures along a measurement

continuum. Second, a pairwise DIF analysis examines the difference in item difficulty between pre- and post-respondents. Third, a t-test is also applied to see if there is any statistical significance between pre and post-person measures. Overall, the findings of pre-post comparisons are applied in the present study to answer the fourth research question: To what extent do subscales for student expectations of first-year college experience in the SE-FYE survey have the capacity to capture change in person ability over time?

3.6 Chapter Summary

The purposes and research questions of the present study were restated at the beginning of Chapter 3. This chapter primarily demonstrated a complete process of how the SE-FYE survey developed, from item development, initial validation, dissemination, and Rasch analysis to coming up with a final scale eventually. The first three development steps were presented at a regional conference. Lessons learned from the three development steps were shared in a regional conference, including the definitions of constructs, gaps in existing scales, application of an open-ended survey to gather student voices for helping form the items for the SE-FYE survey, use of item matrix to facilitate the visual presentation of information of each item and formation of the original SE-FYE survey based on expert review results. This chapter also covered rationales and descriptions of the target population, sampling strategies, data collection, and ethical considerations. The last part of this chapter included a detailed description of the Rasch analysis procedure, including the Rasch Model overview, introductions of Rasch measurement analysis techniques, and Rasch outputs.

CHAPTER 4. RESULTS

4.1 Overview of Chapter 4

This chapter mainly presents the results of Rasch measurement analysis for the SE-FYE scale. The original SE-FYE scale used in this study tailored existing surveys and added newly created survey items based on the context of the present study. As mentioned in the methodology section, a literature review, expert reviews, and an open-ended pilot survey for the target population were conducted to ensure the content validity of the SE-FYE scale. In addition, to evaluate the scale's construct validity and reliability, a set of examinations was conducted using Rasch analysis, including checking dimensionality, item fit, separation, reliability, category functionality, differential item functioning, and comparisons between pre and post scales.

4.2 Respondent Description

Table 4.1 presents data on a sample of students who responded to this survey and self-reported all demographic survey questions at the beginning of Fall 2022 and close to the end of the semester. The sample consists of 40 first-year students who responded as the pre-group at the beginning of Fall 2022 and 21 first-year students who responded close to the end of the semester as the post-group. Pre- and post-group respondents were from the same sample frame registered in the same first-year course. However, the respondents in the pre-group were not identical, matching those in the post-group, as no identifiers were collected.

Family and educational background variables measured the student characteristics. First, the educational background was measured by first-year

classification refers to respondents who enrolled in Fall 2022 as their first semester at the university, and first-time enrollment refers to respondents who were first-time enrolled in the university as first-year students in Fall 2022. The table shows that all respondents in pre and post-groups were first-year students. Also, the majority of the respondents were first-time enrolled in the university. In particular, 37 out of 40 respondents in the pre-group (92.50%) were first-time first-year students, while three respondents (7.50%) were transfer or return students. In contrast, 20 out of 21 respondents in the post group (95.24%) were first-time first-year students, and only 1 participant (4.76%) was a transfer or return student.

Second, the family background was measured by parent education level refers to the highest level of education either parent or guardian of respondents received until 2022; gender refers to respondents who self-identified as female, male, or other; and race refers to respondents who self-identified as White, Black, Latinx, Asian, and more than one race category. In terms of parental education, in the pre-group, 19 respondents (47.50%) were first-generation college students as neither their parent earned a bachelor's degree or higher, and 21 respondents (52.50%) were continuing-generation college students as one of their parents earned a bachelor's degree or higher. In the post-group, ten respondents (47.62%) were first-generation college students, and 11 (52.38%) were continuing-generation college students. For respondents' gender, 32 respondents in the pre-group (80.00%) were female, and eight (20.00%) were male. In the post-group, 15 respondents (71.43%) were female, and 6 (28.57%) were male. For respondents' race, 32 respondents in the pre-group (80.00%) were white (W), and eight respondents (20.00%)

were non-white (NW). In the post-group, 15 respondents (71.43%) were white, and six (28.57%) were non-white.

First-year persistence refers to a desire to continue education at the same university after the first year. As the table shows, 37 out of 40 pre-group respondents (92.50%) intended to continue, while three respondents (7.50%) were unsure. All 21 respondents in the post group (100.00%) intended to continue. For other variables, students were from five different sections of the course and instructed by graduate student instructor or non-student instructors. In the pre-group, most respondents were from the section taught by graduate student instructor, while in the post-group, more were from the sections taught by professor, lecturer, or staff. For participation in the pre, 12 respondents in the post-group (57.1%) had participated in the pre-survey, while eight respondents (38.10%) were unsure about the participation previously.

Table 4.1Descriptive Statistics of Respondents

		Pre (n =40)		Post (n=21)	
		N	%	N	%
First-year Persistence	Intention to Continue	37	92.50	21	100.00
	Unsure to Continue	3	7.50	0	0.00
Educational Background	First-year	40	100.00	21	100.00
	First Time	37	92.50	20	95.20
Family Background	First-Generation	19	47.50	10	47.60
	Continuing Generation	21	52.50	11	52.40
	Female	32	80.00	15	71.40
	Male	8	20.00	6	28.60
	White	32	80.00	15	71.40
	Non-white	8	20.00	6	28.60
Other	Student Teacher	25	62.50	8	38.10
	Non-Student Teacher	15	37.50	13	61.90
	Pre-Survey Participants	N/A	N/A	12	57.1

4.3 Item Removal for the Original SE-FYE Scale

After the SE-FYE scale was designed, the items in the initial scale were revised and removed, considering experts' feedback. The original SE-FYE scale was disseminated to the selected first-year students in Fall 2022. The results of unidimensionality and fit indices were used to find the items that measured the intended constructs and fitted the Rasch model well. The following shows the process and psychometrical evidence of the item removal process to form the final version of the SE-FYE scale.

Items removed from the original Self-Expectations for First Year and Self-Expectations of College Engagement subscales were mainly based on multidimensional evidence. In particular, the eigenvalues of the first contrast were 2.22 for the Self-Expectations for First Year subscale and 2.56 for the original Self-Expectations of College Engagement subscale; both were greater than 2.00; the disattenuated correlations between clusters in the first Contrast also supported multidimensional concern. The disattenuated correlations of Self-Expectations for First Year between clusters 1 and 2 was 0.35, between clusters 1 and 3 was 0.52, and between clusters 2 and 3 was 1. As the disattenuated correlation coefficient of approximately 1 (or 0.82) suggests items in two clusters measured the same variable (Linacre, 2014), the disattenuated correlations indicate the Self-Expectations for First Year items in cluster 1 may not measure the same variable as items in clusters 2 and 3. Similarly, the disattenuated correlation of Self-Expectations of College Engagement between clusters 1 and 3 was -0.08, between clusters 1 and 2 was 1.00, and between 2 and 3 was 0.61, indicating items in cluster 3 may measure different variables than items in the other two clusters. Also, some items

were removed from the original Self-Expectations of Academic Development, Self-Expectations of Personal Development, and Expectations about Career Preparation based on item fit statistics. Most removed items from those three subscales had low outfit mean squares (<0.5), showing that the item fit may be due to unexpected responses. As a result, the name of the subscales in the final SE-FYE scale were tweaked based on the statements of the retained items, that is, Self-Expectations for the First Year (SE-FY), Self-Expectations of Academic Readiness (SE-AR), Academic Engagement (SE-AE), Personal Development (SE-PD), and Expectations about Career Preparation (E-CP). In particular, the SE-FY subscale consisted of six items. The final versions of SE-AR, SE-AE, SE-PD and E-CP subscales consisted of four items respectively. The removed items were listed in APPENDIX 3. The differences in subscales, constructs, and items between the original and the final scale are discussed in Chapter 5. The following sections illustrate the Rasch analysis results of the final version of SE-FYE scale.

4.4 Unidimensionality

This section revealed the results of unidimensionality to answer the first research question of this study: *Research Question 1: To what extent is each construct of student expectations of first-year college experience measured by items in the SE-FYE survey unidimensional?*

Table 4.2 illustrates the results of principal component analysis of residuals for the final version of the SE-FYE scale. First, Student Self-Expectations for First Year (SE-FY) subscale was designed to measure student perspectives of their perceived ability in successfully handling upcoming tasks and experiences during the first year at the

university. The results supported a reasonable extent of unidimensionality in the SE-FY subscale. In particular, the unexplained variance in the first contrast was in 1.78 eigenvalues, which is less than 2 and approximately the same amount of variance between the observed and expected variances in observations, even though the variance explained by the first dimension was only 34.10%, less than 50%, and more variance was explained by person measures than item measures.

Second, Student Self Expectations of First-Year Academic Readiness (SE-AR) subscale was designed to measure student perspectives of their academic readiness during the first year at the university. No multidimensionality problems were detected for the SE-AR subscale. Overall, there was approximately the same amount of variance between the observed and expected variances in observations. In particular, more than half of the variance was explained by the first dimension, while person measures explained more variance than item measures. For the unexplained variance in the first contrast, it was in 1.53 eigenvalues, which is less than 2.

Third, Student Self Expectations of First-Year Academic Engagement (SE-AE) subscale was designed to measure student perspectives of their abelites to get involved in learning during the first year at the university. Similarly, no multidimensionality problems were detected for the SE-AE subscale. There is a small difference between the observed and expected variances in observations, but they are still close to each other. In particular, the first dimension explained 57% of the variance, while person measures explained slightly more variance than item measures. The unexplained variance in the first contrast has an eigenvalue of 1.75, less than 2.

Fourth, Student Self Expectations of First-Year Personal Development (SE-PD) subscale was designed to measure student perspectives of their growth in personal development knowledge and skills during the first year at the university. Again, no multidimensionality problems were detected for the SE-PD subscale. The amount of observed variance is close to the expected variance in observations. In particular, the first dimension explained 52.7% of the variance, and person measures explained more than item measures. For the unexplained variance in the first contrast, it was in 1.70 eigenvalues, which is less than 2.

Last, Student Expectations about First-Year Occupational Experience (E-CP) subscale was designed to measure student perspectives of what occupational-related support the university would provide to them during the first year at the university. A possibility of multidimensionality was detected for the E-CP subscale. There is a difference in the amount of variance between the observed and expected variances in observations, but they are acceptably close to each other. Approximately 58% of the variance was explained by the first dimension, while person measures explained most of the variances and more than item measures. The unexplained variance in the first contrast was in 1.70 eigenvalues, less than 2.00.

Table 4.2 Standardized Residual Explained and Unexplained Variance for the Final SE-FYE Scale

		Eigenvalue	Observed	Expected
SE-FY	Total Raw Variance	9.11	100.00%	100.00%
	Explained by Measures	3.11	34.10%	32.80%
	Explained by Persons	2.32	25.40%	24.50%
	Explained by Items	0.79	8.70%	8.40%
	Total Unexplained Variance	6.00	65.90%	67.20%
	In The First Contrast	1.78	19.50%	N/A
SE-AR	Total Raw Variance	10.34	100.00%	100.00%
	Explained by Measures	6.34	61.30%	59.00%
	Explained by Persons	3.97	38.40%	37.00%
	Explained by Items	2.36	22.90%	22.00%
	Total Unexplained Variance	4.00	38.70%	41.00%
	In The First Contrast	1.53	14.80%	N/A
SE-AE	Total Raw Variance	9.40	100.00%	100.00%
	Explained by Measures	5.40	57.50%	52.70%
	Explained by Persons	2.79	29.70%	27.30%
	Explained by Items	2.61	27.70%	25.50%
	Total Unexplained Variance	4.00	42.50%	47.30%
	In The First Contrast	1.75	18.70%	N/A
SE-PD	Total Raw Variance	8.46	100.00%	100.00%
	Explained by Measures	4.46	52.70%	51.20%
	Explained by Persons	2.74	32.40%	31.50%
	Explained by Items	1.71	20.30%	19.70%
	Total Unexplained Variance	4.00	47.30%	48.80%
	In The First Contrast	1.70	20.10%	N/A
E-CP	Total Raw Variance	9.51	100.00%	100.00%
	Explained by Measures	5.51	57.90%	54.30%
	Explained by Persons	3.81	40.10%	37.60%
	Explained by Items	1.70	17.80%	16.70%
	Total Unexplained Variance	4.00	42.10%	45.70%
	In The First Contrast	1.70	17.80%	N/A

For further exploration of evidence of unidimensionality, Table 4.3 shows Pearson and disattenuated correlation coefficients of person measures between each paired cluster in 1st Contrast of SE-FYE scale. Items of SE-FY, SE-AR, SE-AE and SE-PD in Clusters measured the same latent variable as the disattenuated correlation coefficient is 1. For E-CP subscale, two pairs of item clusters (clusters 1 and 3, clusters 2 and 3) measured the same latent variable as the disattenuated correlation coefficients

were 1. However, the disattenuated correlation coefficient between clusters 1 and 2 was -1, which showed items measured very different constructs or the same construct in the opposite direction.

Table 4.3 Pearson and Disattenuated Correlations between Clusters in The First Contrast of the SE-FYE Scale

	Item Clusters	Pearson Correlation	Disattenuated Correlation
SE-FY	1-3	0.29	1.00
	1-2	0.05	1.00
	2-3	0.05	1.00
SE-AR	1-3	0.42	1.00
	1-2	0.24	1.00
	2-3	0.01	1.00
SE-AE	1-3	0.30	1.00
	1-2	N/A	N/A
	2-3	N/A	N/A
SE-PD	1-3	0.04	1.00
	1-2	0.24	1.00
	2-3	0.56	1.00
E-CP	1-3	0.07	1.00
	1-2	-0.05	-1.00
	2-3	0.59	1.00

4.5 Fit and Functionality

This section illustrates the results of fit and functionality for the scale to answer the second research question of this study: *Research Question 2: To what extent do subscales of student expectations of first-year college experience in the SE-FYE survey establish fit and functionality through Rasch analysis?*

4.5.1 Item Fit

Table 4.4 shows item fit statistics of the final SE-FYE scale, ordering by outfit mean square indices from greater to smaller values. As shown, all items in the Self-Expectations for First Year (SE-FY) and Self-Expectations of Academic Engagement (SE-AE) subscales showed a productive fit because infit and outfit MNSQ of all six items falls in the recommended range from 0.5 to 1.5. In the Self-Expectations of Academic Readiness (SE-AR) subscale, items SE-AR 1 and SE-AR 2 showed a productive fit because infit and outfit MNSQs fall in the recommended range from 0.50 to 1.50. Items SE-AR 7 and SE-AR 6 showed an acceptable fit because infit MNSQs fall from 0.50 to 1.50, and outfit MNSQs fall between 0.50 and 2.00. In the Self-Expectations of Personal Development (SE-PD) subscale, items SE-PD 1, SE-PD 2, and SE-PD 6 showed a productive fit because infit and outfit MNSQ fall in the recommended range from 0.50 to 1.50. Items SE-PD 3 showed an acceptable fit because infit MNSQs fall from 0.50 to 1.50 and outfit MNSQs are 0.43, falling slightly below 0.50. In the Expectations about Career Preparation (E-CP) subscale, items E-CP 2, E-CP 3, and E-CP 4 showed a productive fit because of infit and outfit MNSQs in the recommended range from 0.50 to 1.50. Items E-CP 1 showed an acceptable fit because of infit MNSQs in the range from 0.50 to 1.50 and outfit MNSQ is 1.59, falling in between 0.50 and 2.00.

Table 4.4 Item Fit Indices of the final SE-FYE Items

Items	Item Measure (S.E.)	Infit MNSQ	Outfit MNSQ
SE-FY7: During my first year, I will have a sense of the level of difficulty in attaining my goals.	0.73 (0.34)	1.42	1.38
SE-FY1: I will do well at UK during my first year.	-0.39 (0.36)	0.98	1.10

Table 4.4 (continued).

SE-FY4: I have a clear picture of what first-year university life is about.	1.47 (0.31)	1.08	1.07
SE-FY10: I will enjoy my first-year university life at UK as a whole.	-0.77 (0.36)	0.87	0.86
SE-FY9: The amount of effort it will take to succeed at UK is worthwhile to me.	-0.65 (0.36)	0.72	0.67
SE-FY6: During my first year, I will have a sense of priority on my goals.	-0.39 (0.36)	0.71	0.64
SE-AR 7: to get involved in academic research.	3.38 (0.44)	1.27	1.64
SE-AR 6: to improve my study skills.	-1.24 (0.41)	1.21	1.62
SE-AR 1: to become aware of the importance of positive academic outcomes.	-1.07 (0.41)	0.65	0.67
SE-AR 2: to become aware of obstacles to my academic success.	-1.07 (0.41)	0.67	0.51
SE-AE 6: to discuss course-related content with instructors or professors during office hours.	1.24 (0.52)	0.99	1.23
SE-AE 5: to discuss academic plans and learning progress with my academic advisor.	0.43 (0.52)	0.88	1.06
SE-AE 8: to respect others with different viewpoints.	-2.63 (0.52)	0.80	0.99
SE-AE 4: to work with other students in-class to improve my learning.	0.96 (0.52)	0.92	0.85
SE-PD 1: to explore my identity.	1.56 (0.41)	1.10	1.17
SE-PD 2: to develop my personality.	-0.46 (0.47)	1.06	1.05
SE-PD 6: to take a critical view of the world and think about how to transform it.	0.53 (0.43)	0.97	1.02
SE-PD 3: to gain confidence in my potential.	-1.64 (0.50)	0.63	0.43
E-CP 1: to have better opportunities to find a job.	1.99 (0.46)	1.35	1.59
E-CP 2: to get training on professional skills that are helpful for future careers.	-0.42 (0.47)	0.89	0.64
E-CP 4: to ensure a satisfactory professional career after my studies.	-0.42 (0.47)	0.75	0.56
E-CP 3: to empower me to succeed professionally in the future.	-1.14 (0.51)	0.60	0.65

Note. S.E. refers to standard error. MNSQ refers to mean square.

4.5.2 Wright Map

Figure 2 presents an Item-Person Map (also known as the Wright Map) of the distribution of six items in the SE-FY subscale and respondents along a measurement continuum, representing the underlying construct of student self-expectations for the first year. Overall, item measures are distributed around the center of the continuum with a mean of 0.00 logits, which is lower than the mean of person measure of 1.90 logits. Additionally, the range of item measures is narrower than the range of person measures. In particular, item measures range from -0.77 to 1.47 logits, where SE-FY10 is expected to be the easiest-to-agree item in the subscale, and SE-FY4 is the most difficult-to-agree item. Person measures ranged from -5.54 to 6.79 logits, where more than half of the respondents were more likely to agree or strongly agree with all six items. Moreover, the map shows an observable gap between items SE-FY 4, 7, 1, and 6 and a large gap between most respondents and one respondent at the bottom of the map. Additionally, items SE-FY 1 and 6 are distributed at the same line, showing less separation.

Figure 2 Item-Person Maps of SE-FY Items

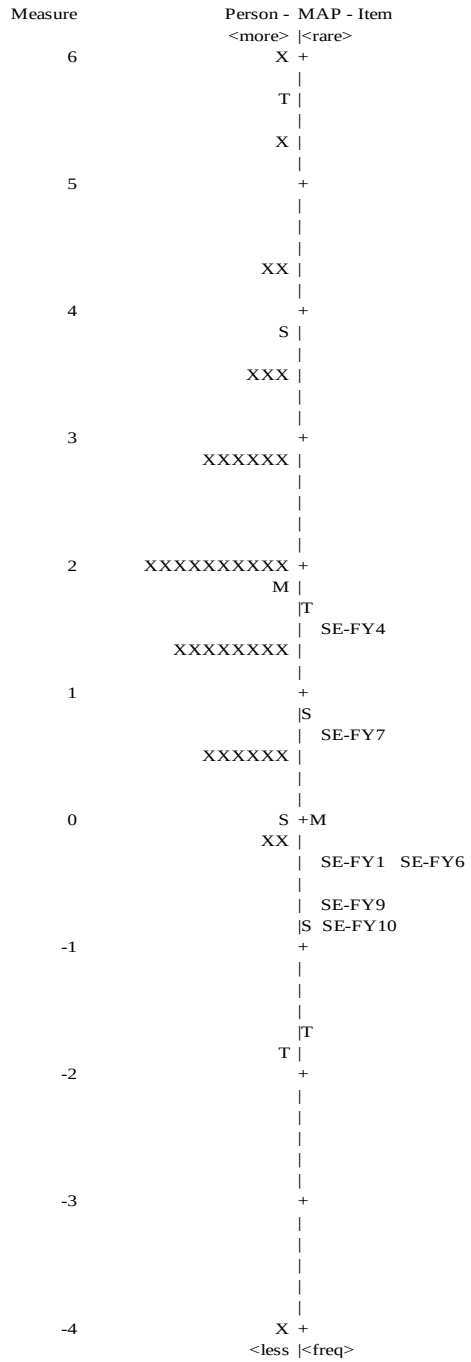


Figure 3 presents an Item-Person Map of the distribution of four items in the SE-AR subscale and respondents along a measurement continuum, representing the underlying construct of self-expectations of academic readiness in the upcoming first year. Overall, item measures are distributed around the center of the continuum, with a mean of 0.00 logits, which is lower than the person-measure mean of 2.22 logits. The range of item measures is narrower than the range of person measures. In particular, item measures range from -1.24 to 3.38 logits, where SE-AR 6 is expected to be the easiest-to-agree item in the subscale, and SE-AR 7 is the most difficult-to-agree item. Person measures ranged from -5.03 to 7.49 logits, where most of the respondents are more likely to agree or strongly agree with items SE-AR 1, 2, and 6. The map also shows a gap between SE-AR 7 and the remaining items. The measures of a person ability are relatively normally distributed. Items SE-AR 1 and 2 are overlapped, showing no separation.

Figure 3 Item-Person Maps of SE-AR Items

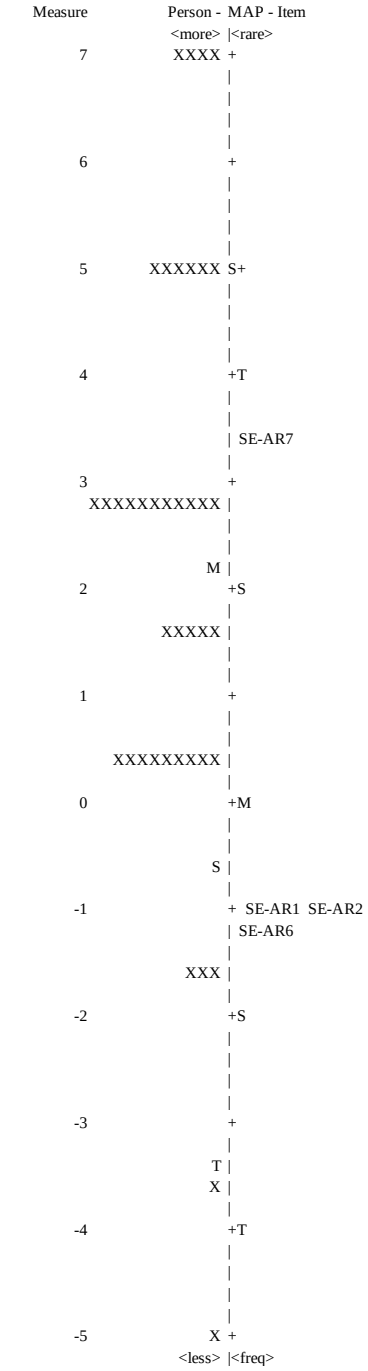


Figure 4 presents an Item-Person Map of the distribution of four items in the SE-AE subscale and respondents along a measurement continuum, representing the underlying construct of perspectives of student self-expectations of academic engagement at the university during the upcoming first year. Overall, item measures are distributed around the center of the continuum, with a mean of 0.00 logits, which is lower than the mean of person measure, 3.15 logits. The range of item measures is narrower than the range of person measures. In particular, item measures range from -2.63 to 1.24 logits, where SE-AE 8 is expected to be the easiest-to-agree item in the subscale, and SE-AE 6 is the most difficult-to-agree item. Person measures ranged from -3.72 to 7.08 logits. Most respondents are likely to agree or strongly agree with items SE-AE4, SE-AE5, and SE-AE 6, and almost all respondents are likely to agree or strongly agree with all items. Moreover, the map shows a gap between SE-AE 8 and the rest of the items. The measures of personal ability are normally distributed except for one respondent's person ability measure located at the bottom of the map.

Figure 4 Item-Person Maps of SE-AE Items

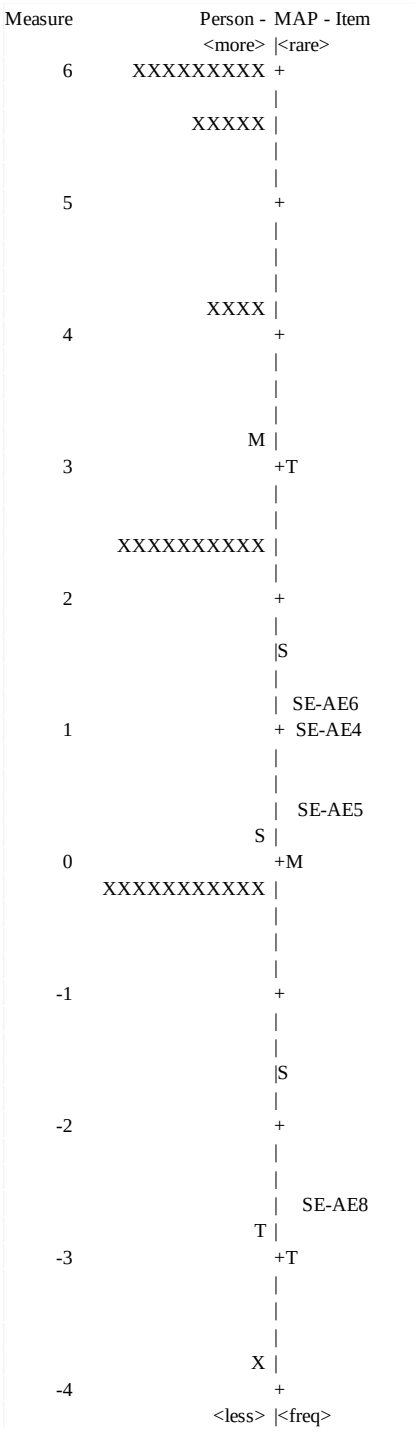


Figure 5 presents an Item-Person Map of the distribution of four items in the SE-PD subscale and respondents along a measurement continuum, representing the underlying construct of student self-expectations of personal development in the upcoming first year. Overall, item measures are distributed around the center of the continuum, with a mean of 0.00 logits, which is lower than the person measure's mean of 2.88 logits. The range of item measures is narrower than the range of person measures. In particular, item measures range from -1.64 to 1.56 logits, where SE-PD 3 is expected to be the easiest-to-agree item in the subscale, and SE-PD 1 is the most difficult-to-agree item. Person measures ranged from -2.79 to 5.80 logits. Almost all respondents were likely to agree with items SE-PD 3 and SE-PD 2 except for one respondent at the bottom of the map, and more than half of the respondents were likely to agree with all SE-PD items. Moreover, the map shows an equal gap between items, and the measures of person ability are slightly skewed to the left.

Figure 5 Item-Person Maps of SE-PD Items

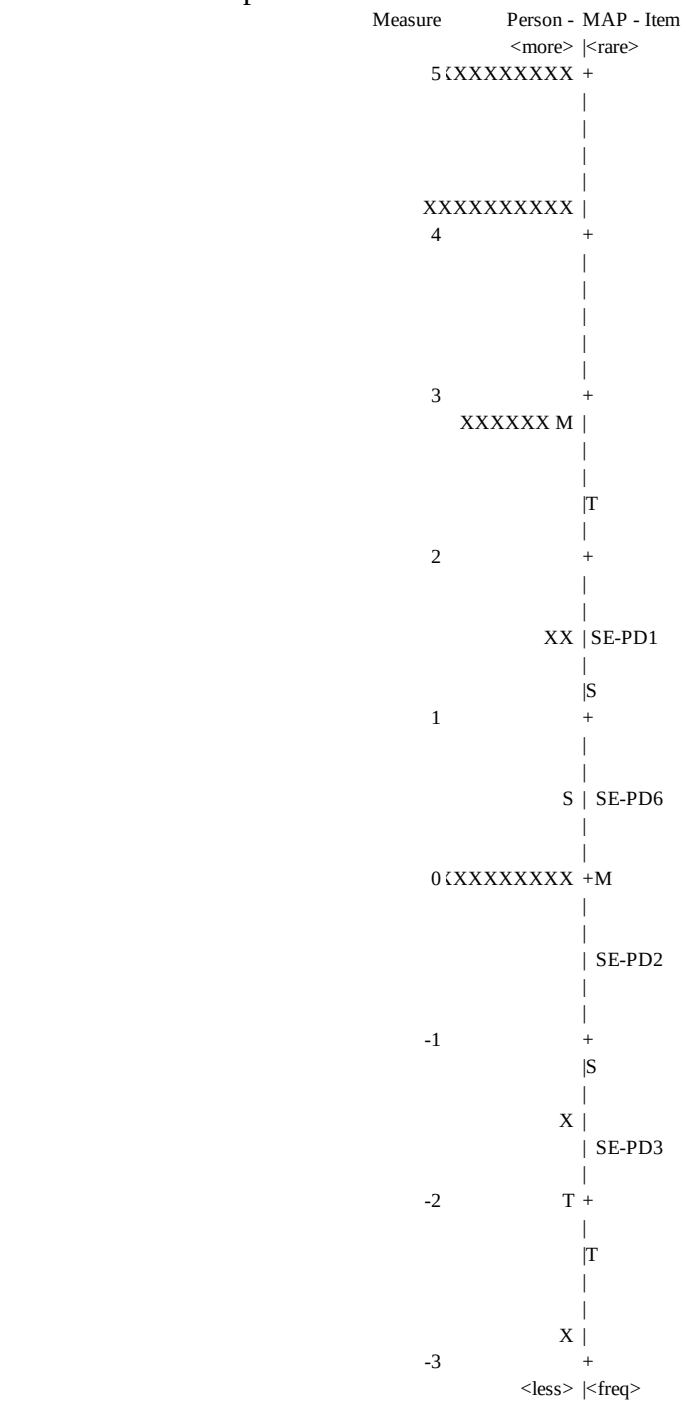
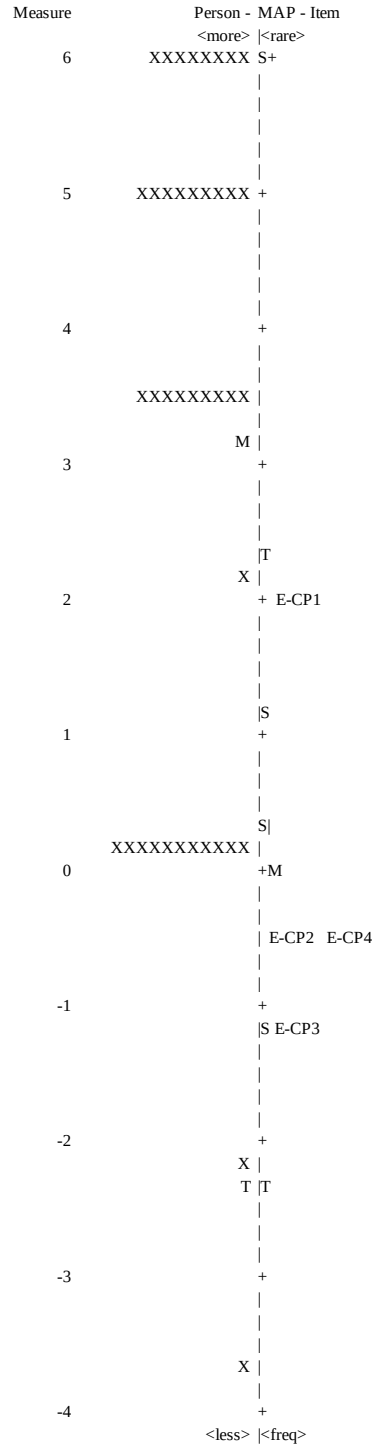


Figure 6 presents an Item-Person Map of the distribution of four items in the E-CP subscale and respondents along a measurement continuum, representing the underlying construct of student expectations about career preparation supported by the university in the upcoming first year. Overall, item measures are distributed around the center of the continuum, with a mean of 0.00 logits, lower than the person measures' mean of 3.21 logits. The range of item measures is narrower than the range of person measures. In particular, item measures range from -1.14 to 1.99 logits, where E-CP 3 is expected to be the easiest-to-agree item in the subscale, and E-CP 1 is the most difficult-to-agree item. Person measures ranged from -3.71 to 6.77 logits. Expect two respondents at the bottom of the map; almost all respondents are likely to agree with items E-CP 3, E-CP 4, and E-CP 3, and more than half of the respondents are more likely to agree or strongly agree with all items in E-CP. The map also shows a large gap between E-CP 1 and the rest of the items, and items E-CP 2 and 4 are overlapped, showing no separation. The measures of persona ability are almost uniform in shape, excluding the two respondents' measures at the bottom.

Figure 6 Item-Person Maps of E-CP Items



4.5.3 Separation and Reliability

Table 4.5 shows item separation, item reliability, person separation, and person reliability of the SE-FYE scale. All items in the subscales show a meaningful item hierarchy supported by the item separation greater than 2 and the item reliability greater than 0.8. However, all items may be less sensitive to distinguish different responses due to relatively low person separation (less than 2) and person reliability (less than 0.8).

Table 4.5 Item/Person Separation and Reliability

Subscales	Item Separation	Item Reliability	Person Separation	Person Reliability
SE-FY	2.13	0.82	1.69	0.74
SE-AR	4.55	0.95	1.70	0.74
SE-AE	2.80	0.89	1.55	0.71
SE-PD	2.42	0.85	1.37	0.65
E-CP	2.27	0.84	1.48	0.69

4.5.4 Categorical Functionality

Table 4.6 shows the results of the functionality of rating scale categories. As shown, all categories in SE-FY subscale were used by respondents. In particular, most observed responses were on step category 3 (“agree”), while less than ten responses were on category 1 (“strongly disagree”). Three categories in the other four subscales were used by respondents. Most observed responses were on step category 3 (“agree”) in the SE-AR and SE-AE subscales and on step category 4 (“strongly agree”) in the SE-PD and

E-CP subscales. However, less than ten responses were on category 2 ("disagree") in the SE-AE, SE-PD and E-CP subscales.

Notably, all items in the five subscales did not exhibit category disordering except the SE-AR subscale exhibited slight category disordering. Also, all infit and outfit averaged mean squares of all categories were less than 1.5 except outfit MNSQ of category 2 in SE-AR subscale. The Andrich threshold shows an increase in step thresholds for all subscales, However, the distances between the adjacent categories of SE-FY subscale falls in the recommended range between 1.2 and 5 logits.

Table 4.6 Summary of Category Structure of the SE-FYE scale

	Response Levels	Observed Responses Count (and %)	Infit MNSQ	Outfit MNSQ	Andrich Threshold	Category Measure
SE-FY	1	8 (3.00)	0.68	0.43	None	-3.61
	2	17 (7.00)	1.16	1.08	-2.32	-1.77
	3	154 (64.00)	0.93	0.99	-1.2	1.19
	4	61 (25.00)	0.97	0.95	3.52	4.63
SE-AR	2	14 (9.00)	1.37	2.07	None	-4.31
	3	79 (49.00)	0.89	0.92	-3.21	0
	4	67 (42.00)	0.8	0.82	3.21	4.31
SE-AE	2	4 (3)	1.06	1.21	None	-5.07
	3	85 (53)	0.89	1.06	-3.97	0
	4	71 (44)	0.86	0.92	3.97	5.07
SE-PD	2	7 (4)	1.31	1.36	None	-3.88
	3	65 (41)	0.96	0.91	-2.77	0
	4	88 (55)	0.81	0.68	2.77	3.88
E-CP	2	5 (3)	1.43	1.44	None	-4.71
	3	75 (75)	0.86	0.85	-3.61	0
	4	80 (50)	0.81	0.65	3.61	4.71

4.6 Differential Item Functioning

This section shows the results of differential item functioning to answer the third research question of this study: *Research Question 3: To what extent are subscales of student expectations of first-year college experience in the SE-FYE survey be able to capture person ability varied across different demographic groups?*

A Differential Item Functioning (DIF) analysis was performed to explore if the items defined each construct in a different manner for different student groups in race, gender, parent education, intention to continue, and student-instructor section. First, of items defined the construct of the student self-expectations for first year, SE-FY 4 exhibited not only substantive DIF between females and males (|DIF Contrast| = 1.81 > 0.64 logits, Joint S.E. = 0.69) but also a statistically significant DIF (Rasch-Welch t = -2.61, d.f. = 12, Prob. =0. 0228 < 0.05). Of four SE-AR items defined the construct of the student self-expectations of academic readiness in the academic-focused college experience, SE-AR 7 exhibited not only substantive DIF between student instructor and non-student instructor (|DIF Contrast| = 2.34 > 0.64 logits, Joint S.E. = 0.92) but also a statistically significant DIF (Rasch-Welch t = 2.54, d.f. = 25, Prob. = 0.02 < 0.05). Of four E-CP items defined the construct of the student expectations about career preparation in the first year, item E-CP 2 exhibited substantive DIF between student instructor and non-student instructor (|DIF Contrast| = 2.53 > 0.64 logits, Joint S.E. = 1.05) and also a statistically significant DIF (Rasch-Welch t = 2.40, d.f. = 11, Prob. = 0. 04 < 0.05). However, no SE-AE or SE-PD items exhibited a statistically significant DIF. Thus, it shows that the construct of the student self-expectations in the academic engagement and personal development during the first year was defined similarly for

different student groups in race, gender, parent education, intention to continue, and student-instructor section.

4.7 Pre and Post Comparisons

This section displays the results of pre and post comparisons to address the fourth research question of this study: *Research Question 4: To what extent do subscales of student expectations of first-year college experience in the SE-FYE survey have the capacity to capture change in person ability over time?*

Figure 7 visualizes the distribution of SE-FY items measures and pre and post-person measures along a measurement continuum. Overall, item measures are still distributed around the center of the continuum and lower than the mean of person measure. Even though the range of person measures is wide, most of the person measures ranged from -0.78 to 6.10 logits. The person measures higher than 6.10 or lower than -0.78 were considered as extreme responses. SE-FY4 is the most difficult-to-agree item for students in pre and post, whereas SE-FY10 and SE-FY 1 are the easiest-to-agree items. Even though substantive DIF evidence was detected for SE-FY 1 ((|DIF Contrast| = 1.19 > 0.64 logits, Joint S.E. = 0.72) and SE-FY 10 ((|DIF Contrast| = 0.73 > 0.64 logits, Joint S.E. = 0.70), no DIF showed statistical significance. Last, items in the SE-FY subscale captured the perspective change in perceived ability in navigating the university during the first year. On average, the post-person measure was 1.20 logits higher than the pre-person measure at a 10% significance level ($t = 1.9010$, $df = 59$, $SE = 0.633$, $p = 0.06 < 0.1$).

Figure 7 Item-Person Maps of Pre and Post SE-FY Items

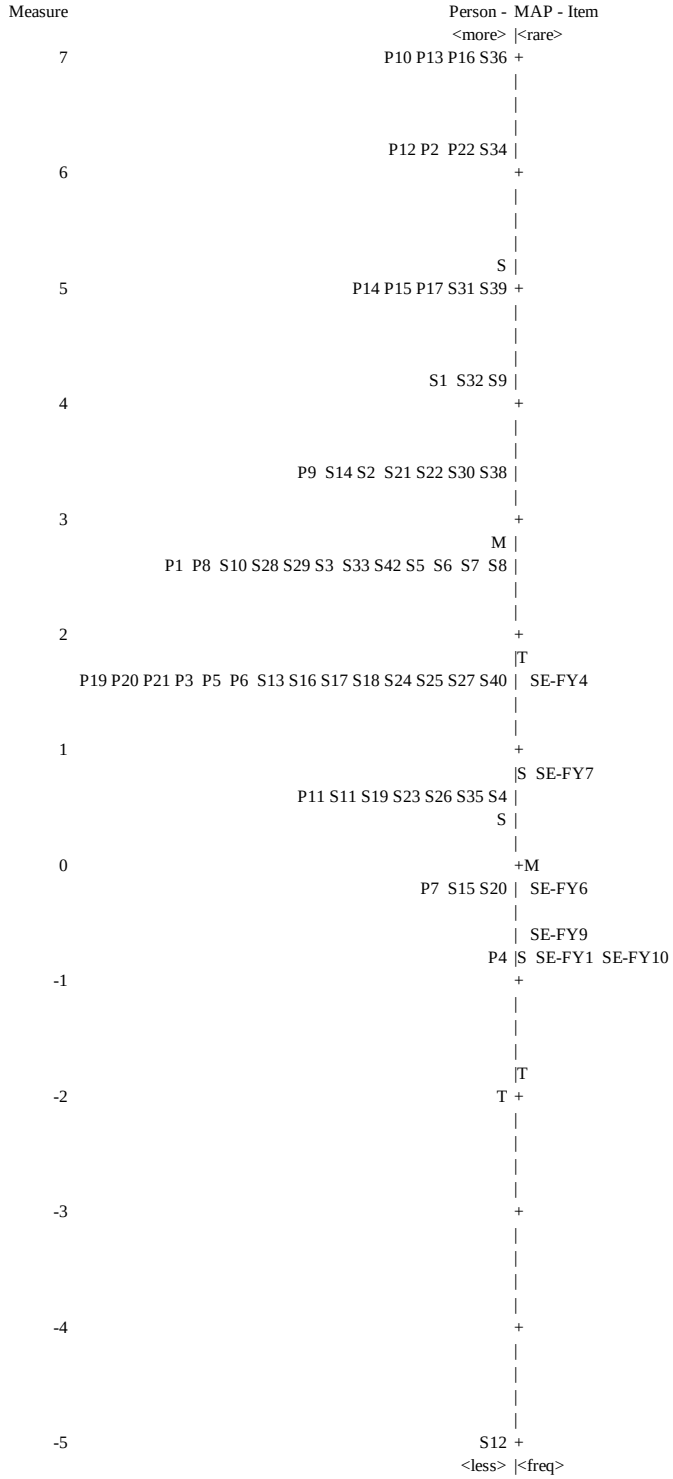


Figure 8 visualizes the distribution of SE-AR items measures and pre and post-person measures along a measurement continuum. Item measures are still distributed around the center of the continuum and lower than the mean of person measure. The range of person measures ranges from -1.87 to 10.15, while the measures higher than 7.77 logits may be considered extreme responses. SE-AR 7 is the most difficult-to-agree item for students in pre and post. However, Items SE-AR 1, 2, and 6 are overlapped, showing no separation. Item SE-AR 7 showed substantive DIF between pre and post (|DIF Contrast| = 0.71 > 0.64 logits, Joint S.E. = 0.72). Items in the SE-AR subscale captured that the post-person measure was 0.2682 logits higher than pre person measure. However, there is no statistical significance.

Figure 8 Item-Person Maps of Pre and Post SE-AR Items

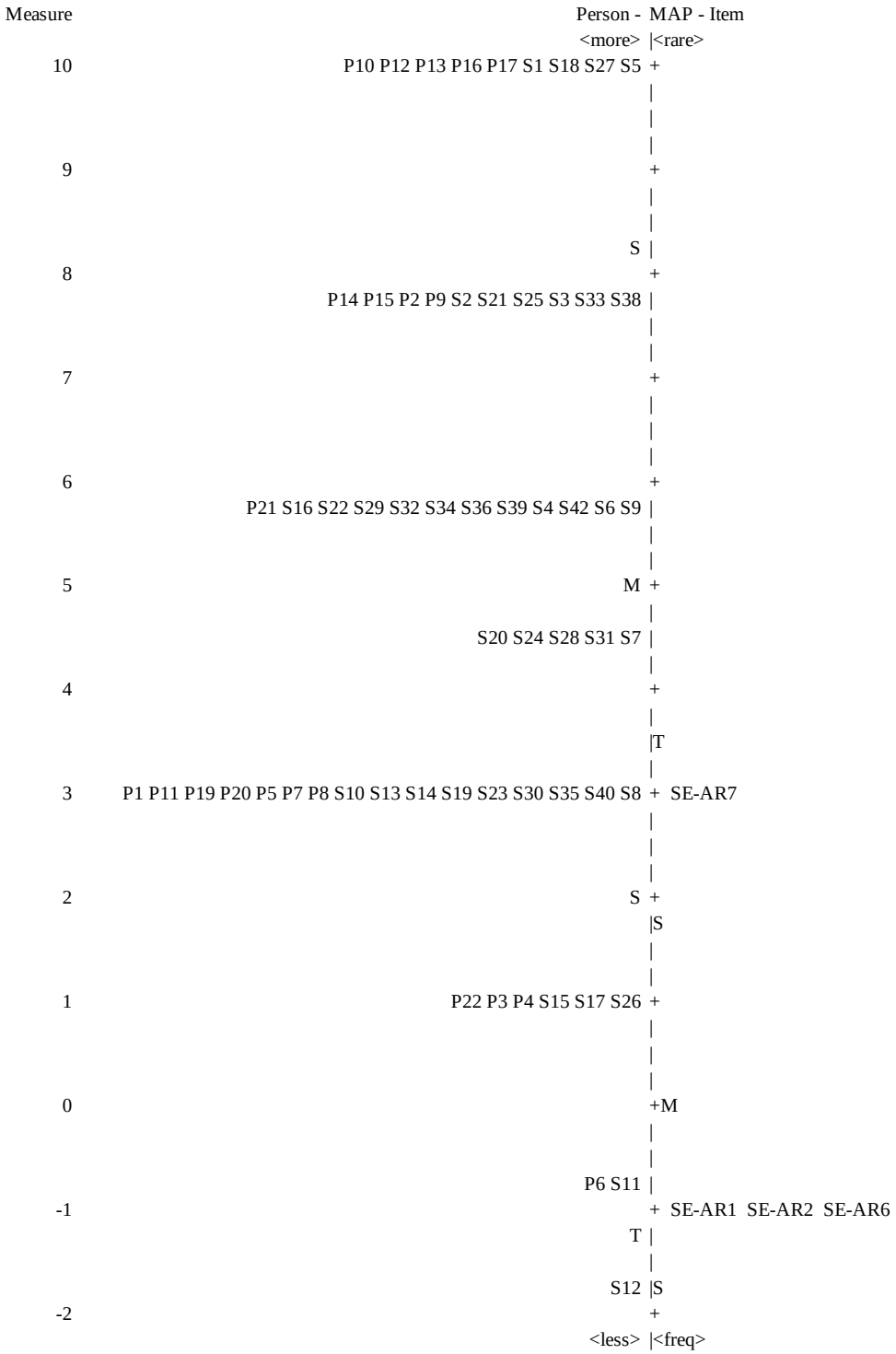


Figure 9 visualizes the distribution of SE-AE item measures and pre and post person measures along a measurement continuum. Overall, item measures are still distributed around the center of the continuum and lower than the mean of person measure. The range of person measures is wide from -3.81 to 7.15, while the measures higher than 5.61 logits are considered the extreme response. SE-AE 6 is the most difficult-to-agree item and SE-AE 8 is the easiest-to-agree item for both pre and post. Still, a larger gap exists between item SE-AE 8 and the other SE-AE items. Substantive DIF evidence was detected for SE-AE 5 ((|DIF Contrast| = 1.00 > 0.64 logits, Joint S.E. = 0.98). Last, items in the SE-AE subscale showed that, on average, post-person measures were 0.6163 logits lower than pre-person measures. However, the difference is not statistically significant.

Figure 9 Item-Person Maps of Pre and Post SE-AE Items

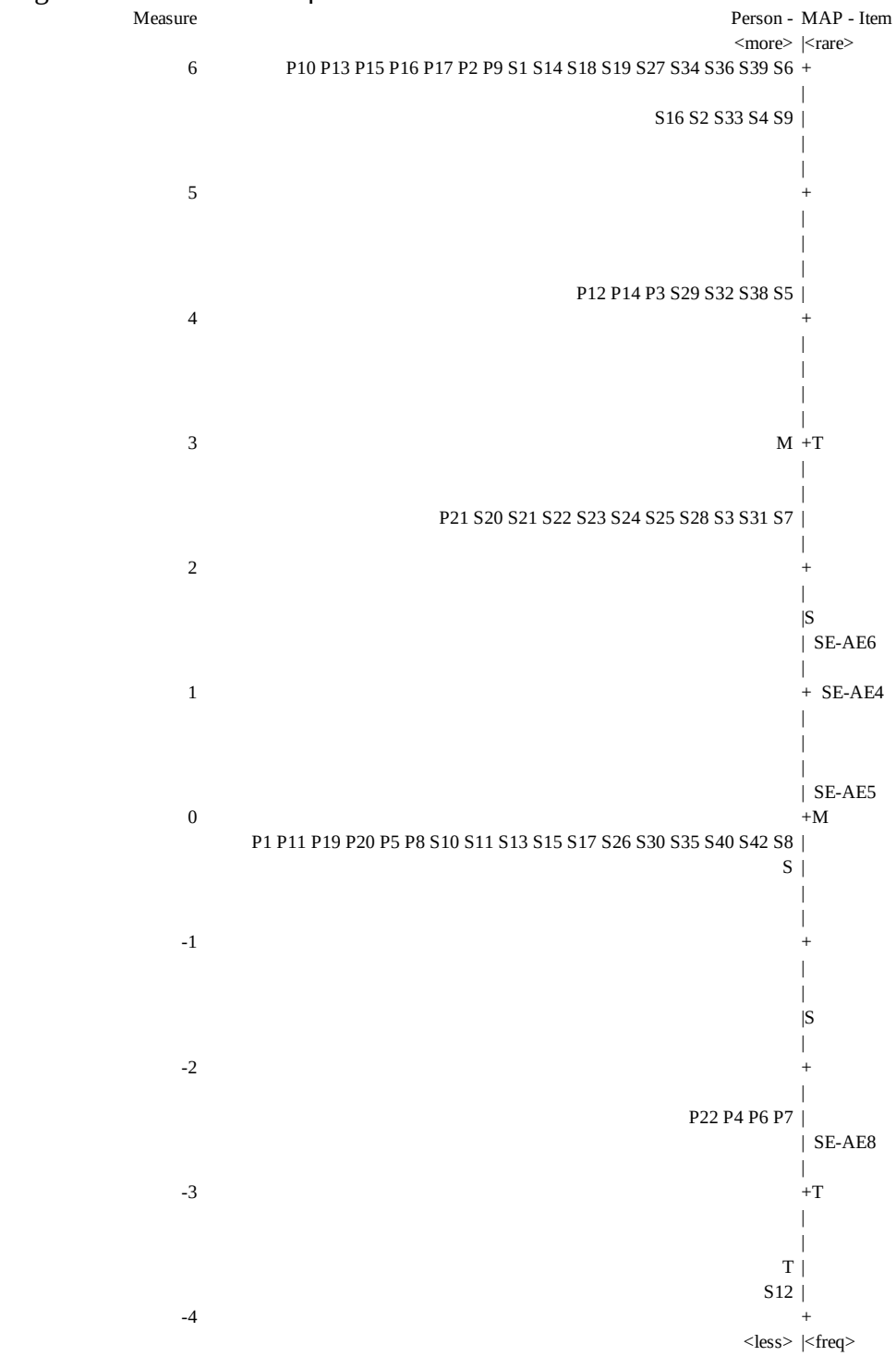


Figure 10 visualizes the distribution of SE-PD items measures and pre and post person measures along a measurement continuum. Item measures are centered and lower than the mean of person measure. The range of person measures ranges from -3.47 to 6.50, while measures higher than 4.89 logits are considered extreme responses. SE-PD1 is still the most difficult-to-agree item for students in pre and post and SE-PD 3 is still the easiest-to-agree item. There is a larger gap between items SE-PD 1 and SE-PD 6. All items in the SE-PD subscale showed substantive DIF as |DIF Contrast| for all four items were greater than 0.64 logits. Items in the SE-PD subscale captured that post average person measure was 0.0778 logits lower than the average person measure. However, there is no statistical significance.

Figure 10 Item-Person Maps of Pre and Post SE-PD Items

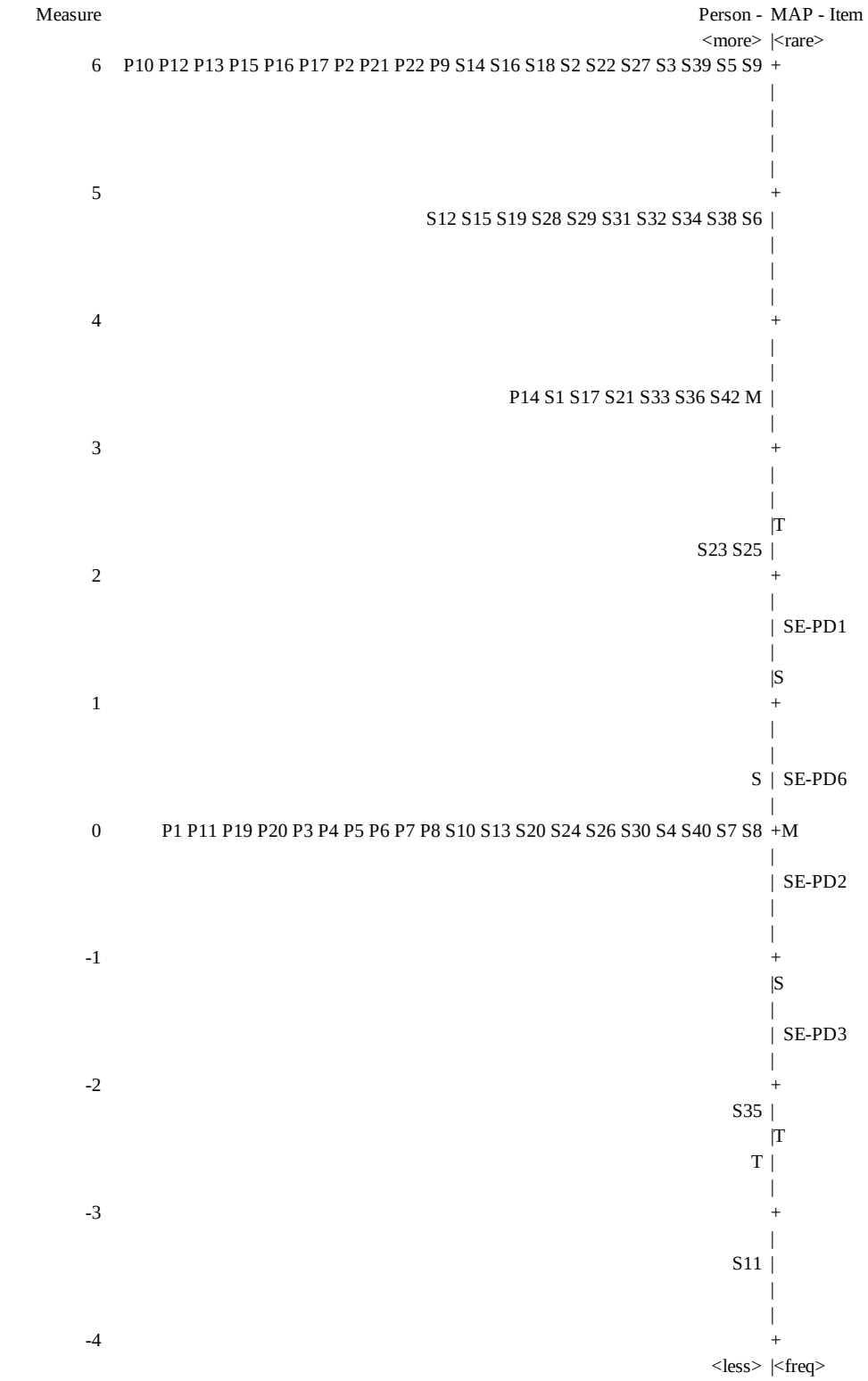
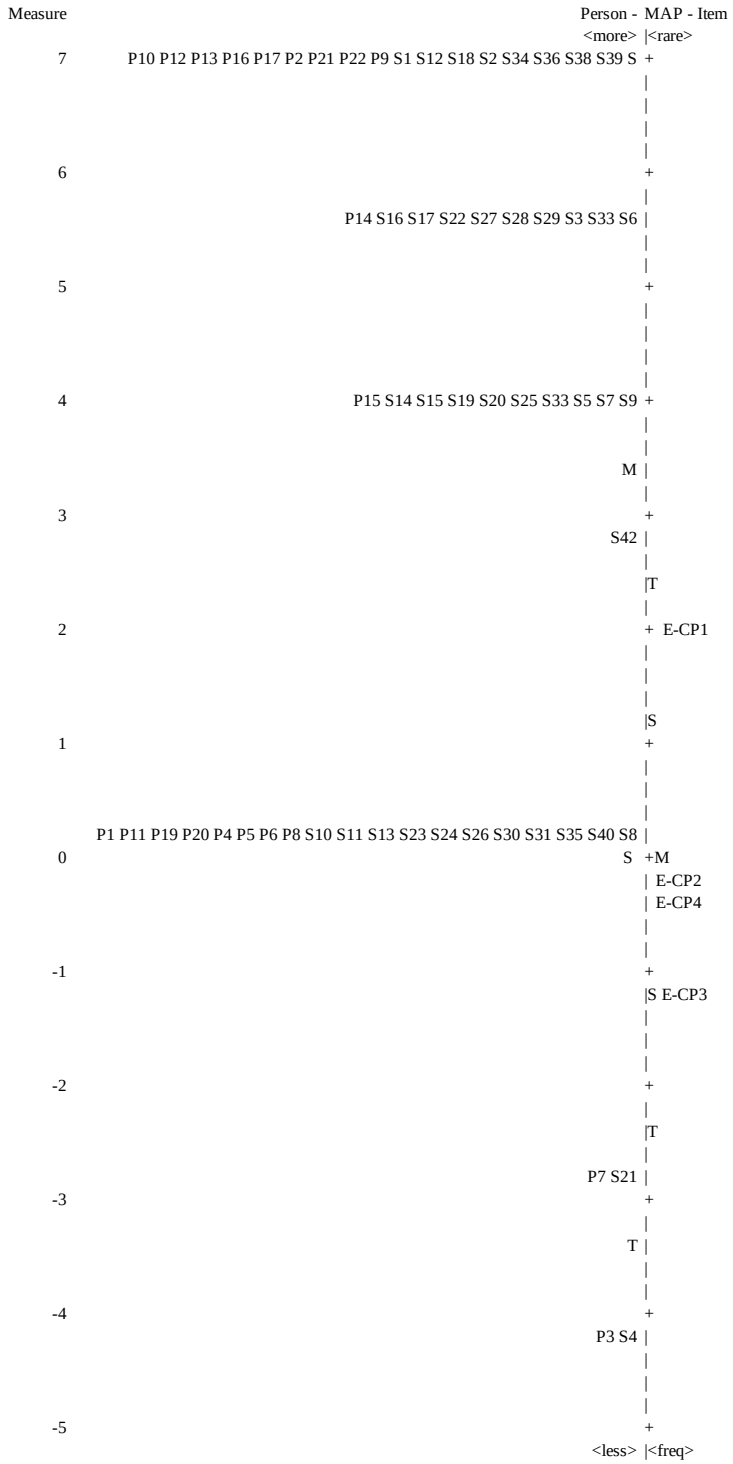


Figure 11 visualizes the distribution of E-CP items measures and pre and post person measures along a measurement continuum. Item measures are distributed around the center and lower than the mean of person measure. Person measures have a wider range from -4.29 to 7.37, while measures higher than 5.59 logits are considered extreme responses. E-CP 1 is the most difficult-to-agree item and E-CP 3 is still the easiest-to-agree item. A larger gap exists between item E-CP 1 and the rest of the items. Items E-CP 1 and E-CP 2 subscale showed substantive DIF as the |DIF Contrast| were greater than 0.64 logits. Items in E-CP subscale captured that post average person measure was 0.2468 logits lower than pre average person measure. However, no statistical significance evidence was detected.

Figure 11 Item-Person Maps of Pre and Post E-CP Items



4.8 Chapter Summary

Chapter 4 begins with the sample's demographic statistics and follows with the item removal process of the original SE-FYE scale based on the dimensionality check results and item fit diagnosis. After removing misfitting items, the primary validation results for the final version of the SE-FYE scale were presented and organized into subscales sections. In particular, results of unidimensionality are presented to answer the first research question. Next, the results of the item-person map, item fit statistics, category function, and separation and reliability are used to answer the second research question. Next, the results of differential item functioning across different demographic groups are presented to answer the third research question. Finally, differences in item-person map, differential item functioning, and person ability are compared between pre and post-surveys to respond to the fourth research question. Overall, items in the final scale established a reasonable unidimensionality, fit, separation, reliability, and category functionality. One SE-AR item and one E-CP item showed DIF between different course sections. One SE-FY item showed DIF between different gender groups and between pre and post-respondents. Also, person measures for the SE-FY items of post-survey are higher than pre-survey. In Chapter 5, the interpretations of results are discussed.

CHAPTER 5. DISCUSSION AND CONCLUSION

This study aims to design a survey measuring students' self-expectations regarding first-year college experience, named the SE-FYE scale. The primary objective of present study is to validate and improve the scale based on psychometric properties through applying Rasch measurement analysis. This chapter includes discussions of the formation of the final SE-FYE scale based on psychometric evidence, primary findings on unidimensionality, fit and functionality, differential item functioning, and pre and post-scale functionality comparisons. The discussions emphasize on interpretations of Rasch results and considerations of Rasch analysis and literature to refine the scale. At the end of this chapter, contributions of present study, possible practical use of the scale, limitations, and suggestions for future research are highlighted.

5.1 Interpretations of the Major Findings

After removing the items with multidimensionality and misfitting issues, the SE-FYE scale was finalize, comprising 22 items measuring student self-expectations of first year college experience. The items of the final SE-FYE scale established a reasonable unidimensionality, fit, separation, reliability, and category functionality. The majority items did not exhibit differential item functioning between different demographic groups. For comparison between pre-and post-surveys, post-survey respondents had a higher level of self-expectations for first year compared to post-survey respondents. This section focuses on discussions on forming the final scale based on Rasch measurement analysis and interpretations of the primary results of the present study.

5.1.1 The Final Scale

The results showed potential multidimensionality and item misfit for certain items of the original SE-FYE scale. To ensure the validity and reliability of the scale, the items with multidimensionality and misfit were removed. Specifically, the items were removed from the original subscales measuring self-expectations for the first year and self-expectations of engagement based on multidimensional evidence. The eigenvalues of the first contrast were greater than 2.00 for both subscales, indicating that some items in these two subscales may measure an additional latent variable. Examining the disattenuated correlations between item clusters in the first contrast showed similar results. The items were removed from the original subscales measuring self-expectations of academic, personal, and occupational development due to the outfit mean square statistics being lower than 0.5, indicating the item fit may be overly predicted due to unexpected responses. In other words, these removed items are too sensitive to unexpected responses, such as guessing, extreme responses, and response errors, which may gather inaccurate data and lead to problematic results.

According to the evidence from the evaluation of dimensionality and item fit, 16 items in total were removed from the original SE-FYE scale. It turned out that 22 items were retained and formed as the final SE-FYE scale. The psychometric evidence supports that items in the final SE-FYE scale have established a reasonable extent of validity and reliability. Items in each subscale fit the model and hold together measured the intended latent variables. More importantly, it is crucial to review the removed and retained items in the final SE-FYE scale and to understand the latent variables measured by the final subscales based on considerations of literature and context. Returning to the literature and

context of the study is essential to ensure the consistency between conceptual definition, statistical evidence, and empirical findings (Sampson et al., 2021).

Therefore, after assessing the validity and reliability of the final SE-FYE scale, the following section focuses on reviewing removed and retained items, discussing and refining the subscales, which aims to ensure the scale accurately measures the intended variables, refine the definitions of variables, and eventually provide trustworthy results. The final version of the SE-FYE scale included five subscales to measure student self-expectations for the first year, self-expectations of academic readiness, academic engagement, personal development, and expectations about career preparation. Table 5.1 shows the statement of items removed from the original scale and items retained in the final scale.

For the first subscale, the items retained in the final SE-FY subscale measured student self-expectations for the first year, defined as perceptions of their ability to navigate their upcoming university life in the first year, which aligned with the conceptual definition of student expectations of first-year college experience in literature review chapter. The removed items emphasized how students perceived the difference in effort between high school and college, and goal commitment. Even though perceived efforts and goal commitment were the factors relating to expectations and affecting first-year persistence and academic performance (Friedman & Mandel, 2009; Le et al., 2004; Robbins et al., 2004), the decision to exclude these items was based on psychometric evidence and alignment with the intended construct of student self-expectations for the first year.

The items in the final SE-AR subscale were tailored to measure self-s of academic readiness, which refers to student perceptions of their preparedness for learning at the university during the upcoming first year. The removed items in the original subscale seem more related to students' perspectives of their own capacity for self-directed learning. Self-directed learning affects student academic achievement and fosters lifelong learning capacity, which is particularly significant for first-year medical or nursing students (Abraham et al., 2011; Hill et al., 2020). Overall, academic readiness is more specific than the original variable, s of academic development, which is not only supported by statistical evidence but also essential for first-year students in general.

Items in the final SE-AE subscale measured self-s (SE) of academic engagement, defined as student perceptions of the importance of their interaction with others in academic settings for learning purposes. In contrast, the removed items were more about perceptions of the importance of their interaction with others for socialization purposes. According to the literature, academic and social engagement are related to student s for the first year (Krieg, 2013; Pancer et al., 2000; Jackson et al., 2000). The final subscale only consisted of items measuring the SE of academic engagement based on Rasch analysis results. However, the removed items measuring SE of social engagement are worth considering for future scale development.

In the final SE-PD subscale, the items measured student self-s of personal development, referring to student perceptions of the importance of their identity and personality development at the university in the first year. In contrast, the removed items were more related to self-s of civic engagement, defined as student perceptions of the importance of their proactive actions to interact with society and their sense of

responsibility and potential contribution to society. Similar to the SE-AE subscale, the items were removed from the original SE-Personal Development subscale mainly based on Rasch evidence. As personal identity development and civic engagement are essential for students' progress in the first year (Upcraft & Gardner, 1989; Upcraft et al., 2005), it is worth considering incorporating the item measuring SE of civic engagement in the future in the different study contexts.

The retained items in the final E-CP subscale measured student s about career preparation, defining student perceptions about how the university can help them be equipped for future career opportunities. The one removed item was more related to student perceptions about the connection between academic programs and future career paths. Career preparation is a development for first-year students (Upcraft & Gardner, 1989; Upcraft et al., 2005), which is also one of the reasons that motivated them to go to college (Nadelson et al., 2013). It is notable that all items in the E-CP subscale intended to measure student s of what the university could provide for their career preparation, which is different from other subscales that were intended to measure student s of their capacity to navigate the first year and achieve development in various aspects.

Table 5.1 Removed Items and Final Scale

The Removed Items	The Retained Items as the Final Scale
Stem Question for the Self-s for First Year (SE-FY) subscale: Please rate the level of agreement on the following statements about your s of your ability and effort on upcoming first-year experience:	
2: To do well for my first year at UK, I will have to work harder than in high school.	1: I will do well at UK during my first year.
3: To do well for my first year at UK, I will have to work harder than other students.	4: I have a clear picture of what first-year university life is about.
5: During my first year, I will have clear and specific goals that I want to achieve by being at UK.	6: During my first year, I will have a sense of priority on my goals.
8: I am determined to do what it will take in order to succeed at UK with my goals.	7: During my first year, I will have a sense of the level of difficulty in attaining my goals.
	9: The amount of effort it will take to succeed at UK is worthwhile to me.
	10: I will enjoy my first-year university life at UK as a whole.
Stem Question for the Self-s of Academic Readiness (SE-AR) subscale: During my first year at UK, I think it will be important….	
3: to become aware of the amount of effort that I need to exert in order to learn.	1: to become aware of the importance of positive academic outcomes.
4: to take primary responsibility for learning coursework.	2: to become aware of obstacles to my academic success.
5: to learn how to seek help from university resources to deal with academic challenges.	6: to improve my study skills.
	7: to get involved in academic research.
Stem Question for the Self-s of Academic Engagement (SE-AE) subscale: During my first year at UK, I think it will be important….	
1: to socialize and have fun.	4: to work with other students in-class to improve my learning.

Table 5.1 (continued).

2: to attend parties with peers.	5: to discuss academic plans and learning progress with my academic advisor.
3: to have a group of new friends with whom I can relax and socialize outside of class.	6: to discuss course-related content with instructors or professors during office hours.
7: to discuss course-related content with instructors or professors outside of the classroom setting.	8: to respect others with different viewpoints.
Stem Question for the Self-s of Personal Development (SE-PD) subscale: During my first year at UK, I think it will be important….	
4: to acquire skills to be a more responsible person.	1: to explore my identity.
5: to understand how I can contribute to improving society.	2: to develop my personality.
7: to become a committed citizen toward the problems of contemporary society.	3: to gain confidence in my potential.
8: to contribute to the improvement of the human condition or the well-being of people.	6: to take a critical view of the world and think about how to transform it.
Stem Question for the s about Career Preparation (S-CP) subscale: During my first year at UK, I think it will be important….	
5: to find connections between my program and potential future career.	1: to have better opportunities to find a job.
	2: to get training on professional skills that are helpful for future careers.
	3: to empower me to succeed professionally in the future.
	4: to ensure a satisfactory professional career after my studies.

5.1.2 Unidimensionality

Checking the dimensionality is the first step to evaluate the extent of items in the SE-FYE survey measured the intended variables when Rasch measurement analysis was

applied. This section discusses the findings related to the first research question of this study: *Research Question 1: To what extent is each construct of student expectations of first-year college experience measured by items in the SE-FYE survey unidimensional?*

Overall, the findings suggest that no multidimensionality evidence was detected in five subscales of the final SE-FYE scale, so items in each subscale measured the intended variables. The results showed almost the same amount or minimal differences (less than 5%) between observed and expected variances, indicating that the data from each subscale fit the Rasch model reasonably. More importantly, one of the critical pieces of evidence showed that the eigenvalues of the first contrast for all subscales were less than 2.00, which suggests the unexplained variances are due to random noise and no evidence that the other added latent variables were measured by items in each SE-FYE subscale.

However, disattenuated correlations between clusters in the first contrast of E-CP showed that items in clusters 1 and 2 measured either two or the same variable in the opposite direction. Two items may measure different perceived occupational outcomes after college experience. Item E-CP 1 to have better job opportunities may measure perspectives that they expected a better job opportunity after college experience. Item E-CP 4, which ensures a satisfactory professional career after my studies, may measure students' perspectives on what they expect to have a satisfying career after college experience. Even though this finding potentially raises a concern about the multidimensionality of E-CP, the latent trait that the two items intended to measure was still aligned with student expectations about how the university facilitates their career readiness. Additionally, the other Rasch results did not exhibit issues such as the

eigenvalues of the first contrast and fit statistics. Thus, there is no need to remove the items.

While examining dimensionality, some additional findings help draw a complete picture of measures of scales. First, the variances explained by person and item measures of all subscales were greater than 50% of the total variance except the SE-FY subscale. Measures of the SE-FY subscale explained 34.10% of the total variance, which indicates that most of the variance was unexplained due to random noise instead of the other latent variable. Second, in all subscales, more variance was explained by person measures than item measures. This indicates that the standard deviation of person ability measures is larger than the item difficulty measures" standard deviation. In other words, the person ability to agree on the items is more varied compared to the item difficulty. Overall, findings from the dimensionality examination suggest that no multidimensionality was detected in five subscales of the SE-FYE survey. However, there is a need to consider other results to see whether issues are observed in the fit and functionality of the subscales.

5.1.3 Fit and Functionality

After checking the dimensionality, item fit diagnosis is the next primary step to evaluating the extent to which each item in the subscale fits the Rasch model. The distributions of item and person measures are also discussed to understand how items measure each aspect of the trait. Separation and reliability indexes for each subscale are interpreted and compared. Last, the functionality of response categories is discussed, primarily focusing on the usage of categories and any existing disordering. This section discusses the findings related to the second research question of this study: *Research*

Question 2: To what extent do subscales of student expectations of first-year college experience in the SE-FYE survey establish fit and functionality through Rasch analysis?

Item Fit

The findings for the final SE-FYE scale suggest that all items in SE-FY, SE-AE, and some items in SE-AR, SE-PD, and E-CP subscales show a productive fit, indicating the items can differentiate different respondent abilities on the underlying trait that subscale intended to measure. Meanwhile, the findings suggest items SE-AR 7 *to get involved in academic research*, SE-AR 6 *to improve my study skills*, SE-PD 3 *to gain confidence in my potential*, and E-CP 1 *to have better opportunities to find a job* have an acceptable fit on the model, which suggest these items would be able to somehow differentiate different respondent ability on the underlying trait measured. In other words, items in each subscale measured what they intended to measure.

Item-Person Map

The findings of item-person maps show rich information about the relationship between personal measures and item measures. The first finding is that all subscales' person measures have a wider range than item measures, indicating a small number of items were included in each subscale. Item-person maps also show that student attitudes are higher than the item measures: most items for respondents are easy to agree on, indicating most students hold higher expectations and stronger perspectives on their ability to navigate the first-year college experience. This is consistent with previous literature findings (Crisp et al., 2009; Smith &Wertlieb, 2005). From a measurement perspective, adding more items targeting students with stronger attitudes is necessary.

Besides adding items targeting stronger attitudes, the findings suggest adding items to fill the gaps between items in the SE-FY, SE-AR, SE-AE, and E-CP subscales to ensure the items measure student perspectives at different aspects along the same variable more comprehensively. For instance, in order to measure students' stronger attitudes, more items related to these aspects can be considered in the future: 1) perceived college readiness of first-year university life for SE-FY; 2) academic research for SE-AR; 3) interaction with the professor for SE-AE; 4) identity exploration for SE-PD; and 5) connection between higher education and job opportunity for E-CP. Even though the overlapped items were found in the SE-FY, SE-AR, and E-CP subscales, further revision and removal of the reductant items may be considered in the future study after more items are incorporated.

Separation and Reliability

The findings show that item separation indexes of subscales are greater than 2 and item reliability indexes are greater than 0.8, indicating a meaningful item difficulty hierarchy, especially the SE-AR subscale. The finding also shows that the person separation indexes of SE-FY, SE-AR, and SE-AE are greater than 1.5, indicating an acceptable separation. In contrast, the person separation reliabilities of SE-PD and E-CP were not ideal. Person reliability indexes range from 0.65 to 0.74, indicating that the items may not be sensitive enough to discriminate all levels of responses. Overall, the items are located along with the latent variable reasonably. It is worth considering that adding items can distinguish different levels of responses. For example, adding the items to measure stronger attitude is coordinated with the discussion in the finding of the item-person map.

Categorical Functionality

This study examined how well the rating scale functions to explore the usage of each category and whether any disordering exists. First, the finding of observed count and percentage of the four-point rating categories show that categories "3" and "4", agree and strongly agree, are most frequently used by respondents. This suggests that, on average, respondents hold a high level of agreement for items of all five subscales, or in other words, respondents show high expectations and strong attitudes toward the importance of various first-year experiences at university. Additionally, the infit and outfit mean square statistics of most used categories for each subscale fall in the recommended range, indicating the responses agree and strongly agree that the Rasch model can reasonably predict options and provide meaningful information on the variable. On the other hand, because no observed responses or less than ten were in category "1" for all subscales and less than ten observed responses were in the categories "2" for SE-AE, SE-PD, and E-CP, the finding suggests that respondents were not using the disagreement options. Most infit and outfit mean square statists of categories 1 and 2 were between 1.00 and 1.5, indicating a relatively large amount of randomness in the data. However, it is not a big issue, as categories 1 and 2 had low usage. Overall, a consideration of dealing with the low usage of categories can be combining categories, such as using "disagree," "agree," and "strongly agree."

Moreover, the finding shows that the Rasch-Andrich threshold and category measures increase as the category number increases, indicating that each category is sequentially measured more of the latent variable (no disordering). In other words, the

options from "disagree" to "strongly agree" show student expectations and perspectives of first-year experience from weak to strong.

5.1.4 Differential Item Functioning

This section discusses the findings related to the third research question of this study: *Research Question 3: To what extent are subscales of student expectations of first-year college experience in the SE-FYE survey be able to capture person ability varied across different demographic groups?*

As students' educational and family background often shape their expectations for the first-year university experience, checking differential item functioning (DIF) is necessary to understand further how items define the construct to different people. The findings of DIF suggest most items do not show DIF, indicating that most items defined the constructs similarly to different respondents. Three items show significant DIF between different groups and meaningful effect size as the DIF contrast is greater than 0.64. Specifically, SE-FY 4: *I have a clear picture of first-year university life*, which define the student self-expectations for overall college experience in the first year differently for females and males. SE-AR 7 *to get involved in academic research* and E-CP 2 *to get training on professional skills that are helpful for future careers* defined differently to the students taught by graduate student instructors and those taught by professors and staff. However, it is unnecessary to remove the three DIF items. This is because only one item from the SE-FY, SE-AR, and E-CP subscales shows DIF does not show sufficient evidence that the subscales measure the latent trait biased toward one group.

5.1.5 Pre and Post Comparisons

This section discusses the findings related to the fourth research question of this study: *Research Question 4: To what extent do subscales of student expectations of first-year college experience in the SE-FYE survey have the capacity to capture change in person ability over time?*

Pre- and post-responses were placed with pre and post-person ability measures together along a measurement continuum of the construct. The finding suggests SE-FY 1 *I will do well at UK during my first year* is a potential DIF item between pre and post-survey. In contrast, items defined similarly between pre-and post-surveys on the constructs of student self-expectations of academic readiness, academic engagement, personal development, and expectations about career preparation. The finding also suggests a significant difference in personal ability measures, which indicates that respondents in the post-survey hold stronger expectations of their capacity to navigate first-year university life successfully than respondents in the pre-survey. No significant difference was found in student expectations of other aspects in the first year between pre and post-surveys. Possible reasons include the small number of items in subscales, unpaired pre and post-comparison, small post-participant sample size, and data collection timing. These possible reasons are considered limitations of the present study discussed in the limitation sections, and corresponding recommendations to deal with the limitations are proposed in the future works section.

5.2 Contributions

This study has contributed to a solid foundation for developing a survey designed to understand student expectations of their ability to navigate first-year experience and their expectations about what the postsecondary institutions support them to achieve their career goal. In particular, first, this study provides a conceptual definition of student expectations of the first-year college experience: perceptions of one's capacities to navigate the upcoming university life in general during the first year. These expectations are also closely tied to their academic, social, personal, and occupational development expectations at the university and are influenced by students' prior experiences and characteristics. Operational definitions were provided to blueprint how to design the SE-FYE scale. These definitions fill the gap in the literature on theoretical understanding of student expectations of first-year college experience and build a foundation for designing the survey.

Second, this study illustrates a comprehensive and structured survey design process based on measurement theory and adapts the processes recommended by survey development literature (Boateng et al., 2018; Morgado et al., 2017; Artino et al., 2014; Sampson et al., 2021). The study presents practical evidence on developing scales with consideration of literature, pre-existing scales, targeted population perspectives, context, and measurement principles. As this study shows, developing a sound, structured survey requires much effort, but a comprehensive process ensures the intended measures to establish promising psychometrical evidence (Hinkin, 1998). More importantly, as Sampson and colleagues suggested (2021), a structured sound instrument is successfully

developed when items are held together as a scale, measure the intended constructs, and can be practically used.

Moreover, this study contributes empirical evidence that applying Rasch measurement analysis facilitates survey development and validation in higher education. As researchers suggested, Rasch analysis provides a guide for improving and monitoring the quality of scales (Boone, 2017; Green & Frantom, 2002). In this study, after the survey design stage, the original SE-FYE survey was created and provided a good starting point to develop the scale further. This study shows the steps of removing items after examining the extent of unidimensionality and item fit in the Rasch model to measure the underlying variables. After reducing the number of items with multidimensional evidence or misfit, the final version of the scale consists of 22 items measuring student self-expectations of development in the first year and expectations about the university. With the small number of items, the final version of the scale is easy to manage and can reduce survey fatigue.

More importantly, in addition to the contribution to survey development, this study contributes a survey to the higher education field to help better understand student expectations of the first-year college experience. The final scale establishes a great extent of validity and reliability, likely producing trustworthy and consistent data. The final version of the SE-FYE scale precisely measured student self-expectations for the first year, academic readiness, academic engagement, personal development, and expectations about career preparation. Additionally, the items removed from the original scale are considered a foundation of the item bank for future scale development.

Furthermore, the results and suggestions discussed above align with the previous studies' student expectations and shed light on first-year student success. For instance, the results of the item-person map indicate that most students hold higher expectations for their first-year experience, which is aligned with the literature (Araújo et al., 2019; Nadelson et al., 2011; Smith & Wertlieb, 2005). Additionally, the finding of differential item functionality suggested that students in graduate teaching assistant sections held different expectations compared to students in other sections on the item intended to measure their perceptions of the importance of research engagement during the first year and expecting the university to support them to prepare their future professional career in the first year. The results show that graduate teaching assistants play an essential role in undergraduate education, especially in the first year, and engage in research related to the activity (Goodwin et al., 2021; Gonzalez, 2001; Campanile, 2013). Forming a mentor-mentee relationship is often seen between graduate and undergraduate students, influencing first-year students' future major selection and enhancing their research and occupational awareness (Goodwin et al., 2021; Flaherty, 2016). Another finding of differential item functionality suggested that females were more likely to perceive a clearer idea about the first-year experience. This finding adds more information about gender differences in student first-year expectations. However, the literature suggested that comparing the gender gap alone may not provide enough valuable information to inform further improvement in research. Instead, investigating expectation gaps across multiple subgroups would help better understand expectations (Wells et al., 2013).

5.3 Practical Implications

As discussed above, the development of the SE-FYE scale contributes to the theory and research related to student expectations, first-year student experience and development, and the application of scale development in higher education. In practice, the SE-FYE scale can be a valuable instrument and utilized by first-year intervention instructors, student affairs professionals, and university administrators to enhance first-year student success. The potential implications of the present study for various stakeholders are discussed as follows.

Instructors of first-year interventions play important roles in first-year student success as they are one of the first groups to communicate with students about university expectations. Instructors can use the SE-FYE scale to gather student expectations, which helps them be aware of the difference between their expectations and student expectations. This awareness can help identify the course content that mismatches with or overlooks student expectations so instructors can provide more relevant content and support to bridge the gap in expectations of first-year experience. An existing study conducted by Hassel and Ridout (2018) showed overlap and differences in expectations of instructors and students, and the researchers found that instructors modified their expectations and teaching styles to provide better support for first-year students after recognizing differences. For instance, if the responses to the SE-FYE items show extremely high or low expectations, instructors may consider applying the handholding method to reduce stress due to the unexpected complexity of first-year transition at the beginning of the first semester and gradually transform to the hands-on method to help

students recognize the differences or complex in the first year and encourage them to explore possible solutions while experiencing various aspects of university life.

The scale can help student affairs professionals recognize student expectations to create the possibility of narrowing the gap in expectations between student affairs professionals and first-year students. The study by Tevis and Britton (2020) revealed the potential positive influence on student success when student affairs professionals recognize student expectations, form active connections, clearly communicate with students about their expectations, and improve existing services based on student needs. Therefore, for faculty and staff who work in or related to student affairs (i.e., academic advisor, career advisor), the SE-FYE scale can help them gain a better understanding of student expectations of their ability to navigate various college experiences. As a result, the professionals can provide better guidance that matches student expectations while aligning with institutional expectations. For instance, academic advisors can use the scale to understand how students perceive their capacity for academic readiness and engagement. For students with high expectations, the academic advisor can help students set up reachable goals and detailed plans or skills for coursework and further education. For students with low expectations, the academic advisor can help them recognize reasons for attending the university and the potential benefits they could gain from higher education.

University administrators can benefit from using the SE-FYE to ensure accountability. Using the scale is a way to "listen to" student voices about their perceptions of their abilities and their expectations of what the university would provide. After knowing student expectations, the administrators can have more precise ideas of

which expectations (mis)align with institutional expectations. As a result, they can determine the first-year interventions that are appropriate and effective in supporting students to succeed in the first year and allocate more funding and other resources, eventually to inform first-year initiatives or policy revisions. Meanwhile, it is a chance for administrators to form a better community in the university through communicating with leadership and staff and partnerships outside of the university, such as high school districts (Hacifazlioglu & Özdemir, 2010).

5.4 Limitations

Despite the promising findings and contributions discussed above, this study has limitations. First, as described in the methodology chapter, an open-ended survey was conducted at the very beginning of the survey development in the present study. It aimed to gather student perspectives on the first year and benefits of attending university, expectations of their ability to manage first year and university life, and what they could benefit from the university experience. In fact, the open-ended survey results were important to ensure the definition of the constructs, generate items for the initial scale, and provide contextual information for item modifications with literature and expert feedback together. However, due to the timeline of this study, respondents' perceptions of the original or final SE-FYE scale were not revisited. This limitation may add some uncertainty about how respondents would interpret the items, which increases the possibility of errors in their responses.

Second, it is important to note the potential influence of the data collection timing on the responses. The pre-survey data was collected at the beginning of the

semester, specifically during the first two weeks after the first day of class. During the time, students have already attended some types of first year interventions, such as orientation, which can affect their initial expectations of the first year at university. Also, post-data was collected during the last two weeks of the semester when students focused on preparing for the final examinations and projects. It might not be a good time to ask students to reflect on what they expect themselves to make progress in the rest of the first year. This timing issue may explain the low response rate in the post-survey.

Third, the study had a relatively low response rate as mentioned above. Survey invitations were sent to students across five course sections during the pre-survey data collection; about 120 students were contacted. Even though approximately 80 students started the survey, only 42 students completed the pre-survey. The post-survey received even fewer responses. Besides timing might be an issue, this limitation can be because of the slightly long length of the original survey and no incentives for students willing to complete the survey. Also, the smaller sample size and the homogeneous sample limit this study's generalizability. The results of this study apply to first-year students interested in choosing education as their major and enrolling in a first-year experience course at a four-year public university.

Last, the data was collected at two different time points of the semester to address the fourth research question. Even though respondents in the pre- and post-surveys were selected from the same first-year course (same sampling frame) and shared highly similar characteristics, it is important to note that respondents were not paired because their identifier information was unavailable. Therefore, the results of the

fourth research question explained the group difference between pre- and post-respondents instead of capturing individual changes in perceptions.

5.5 Future Research Recommendations

To respond to the potential limitations discussed above, cognitive interviews will be considered as this study goes further to understand how targeted participants interpret the items and any areas and perspectives missed in the present scale. A technique called "thinking-aloud" interviewing will be applied to encourage participants to interpret and share their thinking process of answering the survey items. This technique will gather feedback from participants with less bias and help explore unanticipated issues to adjust, eventually enhancing the validity and reliability of the items (Willis, 2004, p.4).

Second, as the data collection timing can affect the accuracy of responses, the survey will be distributed to students who attended college orientation or the very first intervention intended to introduce university life to students. The data will be collected before the start of the intervention. Also, to incorporate more detail about students' initial knowledge of the university, the items intended to measure the status of first year and first time will still be included in the survey. Moreover, other items measuring a similar variable will be included as well. For example, the items measure the number of college credits they have already had, the type of interventions they have participated in, and the sources that help them learn how to navigate university life.

Additionally, the timing of collecting pre and post-data will be modified. The baseline survey will be disseminated before the beginning of the first semester, and the

follow-up survey can be considered during the first week of the second semester. However, only the first subscale, student expectations for the first year, will be used to compare the changes in student responses before more evidence supports the other subscales and shows the capacity to capture changes. Importantly, the difference refers to group differences instead of individual growth.

Furthermore, as discussed in the final scale section, many removed items did not establish reasonable validity and reliability. However, they measure important factors for first-year student development, such as student perceptions of their social and civic engagement. An item bank will be built to contain those removed items and items considered included in the scale, such as student self-expectations of research engagement, college readiness, personal identity, and connection between future careers and majors. This item bank will help create a new scale to measure student expectations of aspects that do not explore in the present study based on the final SE-FYE scale, such as mental health and financial awareness.

Lastly, additional validation studies will be conducted after the new items are included in the item bank. The bank will also create a chance to accurately measure each expectation variable and outcome to investigate the relationship between factors, such as self-expectations for the first year, academic engagement, social engagement, civic engagement, personal development, characteristics, and student persistence. The future data will be collected from a larger sample size and include students from different disciplines to ensure external validity and that the information collected through the scale ensures external validity and enhances generalizability.

5.6 Conclusions

This study reveals promising preliminary findings for developing and validating the SE-FYE scale. Still, some limitations exist, and future works have been discussed above for further improvement on this scale. The present study documented how the SE-FYE survey was developed based on structured survey design, modifications, validation, and future improvements. This study eventually explored 22 items holding together as the final SE-FYE scale with a reasonable unidimensionality, fit, separation, reliability, category functionality, no significant bias between demographic groups, and one subscale with the capacity to capture changes in attitudes. Findings suggested that the SE-FYE scale accurately measured student self-expectations for the first year, academic readiness, academic engagement, personal development, and expectations about career preparation. Overall, this study is critical to building knowledge of student expectations of themselves, their capacity, and their expectations about university support during the first year. The findings also suggest the potential use of the scale for professionals and researchers to facilitate a better understanding of current student expectations and share meaningful feedback to multiple stakeholders at the university to better prepare students for university life before, during, and after the first year.

APPENDICES

APPENDIX 1. Survey Item Matrix of The Initial SE-FYE Scale

Items	Level of Measure	Answer Choice	Variables	Constructs	Sources	Scale Citations
I plan to continue my education at the university.	Nominal	Yes. No. I am not sure.	First-Year College Persistence	Intention to Continue	Literature/Theory	Student departure theory
I enjoy university life at the university as a whole.	Ordinal	SD D A SA	Student Expectation of First-Year College Experience	Perceptions of Efforts on Upcoming First-Year Experience	Existing scale; Literature/Theory	Expectancy-Value Model; Nadelson et al., 2013
To do well at the university, I have to work harder than in high school.	Ordinal	SD D A SA	Student Expectation of First-Year College Experience	Perceptions of Efforts on Upcoming First-Year Experience	Existing scale; Literature/Theory; First Pilot Survey	Expectancy-Value Model; Davis et al., 2019; Survey in Fall 2021
To do well at the university, I have to work harder than other students.	Ordinal	SD D A SA	Student Expectation of First-Year College Experience	Perceptions of Efforts on Upcoming First-Year Experience	Existing scale; Literature/Theory	Expectancy-Value Model; Davis et al., 2019
I have clear and specific goals that I want to achieve by being at the university.	Ordinal	SD D A SA	Student Expectation of First-Year College Experience	Perceptions of Efforts on Upcoming First-Year Experience	Existing scale; Literature/Theory	Expectancy-Value Model; Friedman & Lechner, 2005; Friedman & Mandel, 2009.
I have a clear sense of priorities on these goals.	Ordinal	SD D A SA	Student Expectation of First-Year College Experience	Perceived Value of University Tasks in First Year	Existing scale; Literature/Theory	Expectancy-Value Model; Friedman & Lechner, 2005; Friedman & Mandel, 2009.
I have a sense of the level of difficulty in attaining my goals.	Ordinal	SD D A SA	Student Expectation of First-Year College Experience	Perceived Value of University Tasks in First Year	Existing scale; Literature/Theory	Expectancy-Value Model; Friedman & Lechner, 2005; Friedman & Mandel, 2009.
I am determined to do what it will take in order to succeed at the university with my goals.	Ordinal	SD D A SA	Student Expectation of First-Year College Experience	Perceived Value of University Tasks in First Year	Existing scale; Literature/Theory	Expectancy-Value Model; Friedman & Lechner, 2005; Friedman & Mandel, 2009.
The amount of effort it will take to succeed at the university is worthwhile to me.	Ordinal	SD D A SA	Student Expectation of First-Year College Experience	Perceived Value of University Tasks in First Year	Existing scale; Literature/Theory	Expectancy-Value Model; Davis et al., 2019
I have a clear picture of what university life is about.	Ordinal	SD D A SA	Student Expectation of First-Year College Experience	Perceptions of Doing Well on Upcoming University Tasks in First Year	Existing scale; Literature/Theory	Nadelson et al., 2013; Expectancy-Value Model
I will be/have been doing well at the university during my first semester.	Ordinal	SD D A SA	Student Expectation of First-Year College Experience	Perceptions of Doing Well on Upcoming University Tasks in First Year	Existing scale; Literature/Theory; First Pilot Survey	Expectancy-Value Model; Davis et al., 2019; Survey in Fall 2021
I believe I will do well in the following semesters.	Ordinal	SD D A SA	Student Expectation of First-Year College Experience	Perceptions of Doing Well on Upcoming University Tasks in First Year	Existing scale; Literature/Theory; First Pilot Survey	Expectancy-Value Model; Davis et al., 2019; Survey in Fall 2021

I think the first year of my undergraduate education at the university is an important opportunity....						
1. to be aware of the importance of positive academic outcomes (i.e. good grades, good learning habits, etc.)	Ordinal	SD D A SA	Student Knowledge on First-Year Experience	Awareness on Value of Academic Experience	Existing scale; Literature/Theory; First Pilot Survey	Expectancy-Value Model; Davis et al., 2019; Survey in Fall 2021
2. to be aware of the challenges that obstacle my academic success (i.e. good grades, the level of engagement in study)	Ordinal	SD D A SA	Student Knowledge on First-Year Experience	Awareness on Value of Academic Experience	Existing scale; Literature/Theory; First Pilot Survey	Expectancy-Value Model; Davis et al., 2019; Survey in Fall 2021
3. to be aware of the amount of effort that I need to engage in learning	Ordinal	SD D A SA	Student Knowledge on First-Year Experience	Awareness on Value of Academic Experience	Existing scale; Literature/Theory	Expectancy-Value Model; Davis et al., 2019
4. to take primary responsibility for learning knowledge/coursework	Ordinal	SD D A SA	Student Knowledge on First-Year Experience	Awareness on Value of Academic Experience	Existing scale; Literature/Theory	Expectancy-Value Model; Davis et al., 2019
5. to learn how to seek help from university resources to deal with the academic challenges	Ordinal	SD D A SA	Student Knowledge on First-Year Experience	Awareness on Value of Academic Experience	Literature/Theory; First Pilot Survey	Student First-year success; Student departure theory; Survey in Fall 2021
6. to evaluate my study skills	Ordinal	SD D A SA	Student Knowledge on First-Year Experience	Awareness on Value of Academic Experience	Existing scale	Newton et al., 2008
7. to improve my study skills	Ordinal	SD D A SA	Student Knowledge on First-Year Experience	Awareness on Value of Academic Experience	Existing scale; First Pilot Survey	Newton et al., 2008; Survey in Fall 2021
8. to get involved in academic research	Ordinal	SD D A SA	Student Knowledge on First-Year Experience	Awareness on Value of Academic Experience	Existing scale; Literature/Theory	Nadelson et al., 2013; High-impact practices
1. to have moments of socialization and fun.	Ordinal	SD D A SA	Student Knowledge on First-Year Experience	Awareness on Value of Social Experience	Existing scale; Literature/Theory; First Pilot Survey	Casanova et al., 2019; Newton et al., 2008; Student First-year success; Student departure theory; Survey in Fall 2021
2. to participate regularly in parties with peers.	Ordinal	SD D A SA	Student Knowledge on First-Year Experience	Awareness on Value of Social Experience	Existing scale; Literature/Theory; First Pilot Survey	Casanova et al., 2019; Newton et al., 2008; Student First-year success; Student departure theory; Survey in Fall 2021
3. to have a group of friends with whom I can relax and socialize outside of class.	Ordinal	SD D A SA	Student Knowledge on First-Year Experience	Awareness on Value of Social Experience	Existing scale; Literature/Theory; First Pilot Survey	Casanova et al., 2019; Newton et al., 2008; Student First-year success; Student departure theory; Survey in Fall 2021
4. to live and socialize with a new group of friends.	Ordinal	SD D A SA	Student Knowledge on First-Year Experience	Awareness on Value of Social Experience	Existing scale; Literature/Theory; First Pilot Survey	Casanova et al., 2019; Newton et al., 2008; Student First-year success; Student departure theory; Survey in Fall 2021

5. to understand the importance of working with other students in-class to my learning.	**Ordinal**	**SD D A SA**	**Student Knowledge on First-Year Experience**	**Awareness on Value of Social Experience**	**Existing scale; Literature/Theory**	**Nadelson et al., 2013; Student First-year success; Student departure theory;**
6. to establish a professional relationship with my academic advisor through discussing academic plans and learning progress.	Ordinal	SD D A SA	Student Knowledge on First-Year Experience	Awareness on Value of Social Experience	Literature/Theory	Student First-year success; Student departure theory
7. to establish a professional relationship with instructors or professors by using office hours to discuss course-related content or assignments.	Ordinal	SD D A SA	Student Knowledge on First-Year Experience	Awareness on Value of Social Experience	Literature/Theory	Student First-year success; Student departure theory
8. to establish a professional relationship with instructors or professors by engaging in learning knowledge in the classroom setting.	Ordinal	SD D A SA	Student Knowledge on First-Year Experience	Awareness on Value of Social Experience	Literature/Theory	Student First-year success; Student departure theory
9. to acquire social skills, cultural norms, and societal customs	Ordinal	SD D A SA	Student Knowledge on First-Year Experience	Awareness on Value of Social Experience	Literature/Theory; First Pilot Survey	Survey in Fall 2021
1. to improve my identity.	Ordinal	SD D A SA	Student Knowledge on First-Year Experience		Existing scale; Literature/Theory	Casanova et al., 2019; Newton et al., 2008; Student First-year success; Student departure theory
2. to develop my personality	Ordinal	SD D A SA	Student Knowledge on First-Year Experience	Awareness on Value of Personal Development Experience	Existing scale; Literature/Theory; First Pilot Survey	Casanova et al., 2019; Student First-year success; Student departure theory; Survey in Fall 2021
3. to gain confidence in my potential.	Ordinal	SD D A SA	Student Knowledge on First-Year Experience	Awareness on Value of Personal Development Experience	Existing scale; Literature/Theory; First Pilot Survey	Casanova et al., 2019; Student First-year success; Student departure theory; Survey in Fall 2021
4. to acquire skills to be a more responsible and autonomous person.	Ordinal	SD D A SA	Student Knowledge on First-Year Experience	Awareness on Value of Personal Development Experience	Existing scale; Literature/Theory; First Pilot Survey	Casanova et al., 2019; Student First-year success; Student departure theory; Survey in Fall 2021
5. to understand how I can contribute to improving the world and society.	Ordinal	SD D A SA	Student Knowledge on First-Year Experience	Awareness on Value of Personal Development Experience	Existing scale; Literature/Theory	Casanova et al., 2019; Student First-year success; Student departure theory
6. to take a critical view of the world and think about how to transform it.	Ordinal	SD D A SA	Student Knowledge on First-Year Experience	Awareness on Value of Personal Development Experience	Existing scale; Literature/Theory	Casanova et al., 2019; Student First-year success; Student departure theory

7. to become a committed citizen toward the problems of contemporary society.	**Ordinal**	**SD D A SA**	**Student Knowledge on First-Year Experience**	**Awareness on Value of Personal Development Experience**	**Existing scale; Literature/Theory**	**Casanova et al., 2019; Student First-year success; Student departure theory**
8. to contribute to the improvement of the human condition or the well-being of people.	Ordinal	SD D A SA	Student Knowledge on First-Year Experience	Awareness on Value of Personal Development Experience	Existing scale; Literature/Theory	Casanova et al., 2019; Student First-year success; Student departure theory
1. to find connections between my program and potential future career.	Ordinal	SD D A SA	Student Knowledge on First-Year Experience	Awareness on Value of Occupational Knowledge	Literature/Theory First Pilot Survey	Survey in Fall 2021
2. to have better opportunities to find a job.	Ordinal	SD D A SA	Student Knowledge on First-Year Experience	Awareness on Value of Occupational Knowledge	Existing scale; Literature/Theory; First Pilot Survey	Casanova et al., 2019; Student First-year success; Student departure theory; Survey in Fall 2021
2. to get training on professional skills that are helpful for future careers.	Ordinal	SD D A SA	Student Knowledge on First-Year Experience	Awareness on Value of Occupational Knowledge	Existing scale; Literature/Theory; First Pilot Survey	Casanova et al., 2019; Student First-year success; Student departure theory; Survey in Fall 2021
3. to empower me to succeed professionally in the future.	Ordinal	SD D A SA	Student Knowledge on First-Year Experience	Awareness on Value of Occupational Knowledge	Existing scale; Literature/Theory; First Pilot Survey	Casanova et al., 2019; Student First-year success; Student departure theory; Survey in Fall 2021
4. to ensure a satisfactory professional career after my studies.	Ordinal	SD D A SA	Student Knowledge on First-Year Experience	Awareness on Value of Occupational Knowledge	Existing scale; Literature/Theory	Casanova et al., 2019; Student First-year success; Student departure theory

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Is this your first-time enrolled in a public four year university?	**Nominal**	**Yes No**	**Student Characteristics**	**Educational Background**
Are you a returning student?	Nominal	Yes No	Student Characteristics	Educational Background
Are you a transfer student?	Nominal	Yes No	Student Characteristics	Educational Background
What is you student classification?	Nominal	First-year Sophomore Junior Senior Non-degree seeking Seeking second degree	Student Characteristics	Educational Background
Has either of your parents (or guardians) earned a four-year college/university degree?	Nominal	Yes No	Student Characteristics	Family Background
What is your gender identity?	Nominal	Male Female Not listed (please specify if you want to)	Student Characteristics	Family Background
How would you describe your racial identity? Please click all that apply.	Nominal	Black or African American White Asian or Asian American Hispanic, Latinx, or Spanish Origin Native American or Alaskan Native Hawaiian Native	Student Characteristics	Family Background

APPENDIX 2. The Original SE-FYE Scale

Items	Statement
SE-FY 1	I will do well at UK during my first year.
SE-FY 2	To do well for my first year at UK, I will have to work harder than in high school.
SE-FY 3	To do well for my first year at UK, I will have to work harder than other students.
SE-FY 4	I have a clear picture of what first-year university life is about.
SE-FY 5	During my first year, I will have clear and specific goals that I want to achieve by being at UK.
SE-FY 6	During my first year, I will have a sense of priority on my goals.
SE-FY 7	During my first year, I will have a sense of the level of difficulty in attaining my goals.
SE-FY 8	I am determined to do what it will take in order to succeed at UK with my goals.
SE-FY 9	The amount of effort it will take to succeed at UK is worthwhile to me.
SE-FY 10	I will enjoy my first-year university life at UK as a whole.
SE-AR1	to become aware of the importance of positive academic outcomes.
SE-AR2	to become aware of obstacles to my academic success.
SE-AR3	to become aware of the amount of effort that I need to exert in order to learn.
SE-AR4	to take primary responsibility for learning coursework.
SE-AR5	to learn how to seek help from university resources to deal with academic challenges.
SE-AR6	to improve my study skills
SE-AR7	to get involved in academic research
SE-AE 1	to socialize and have fun.
SE-AE 2	to attend parties with peers.
SE-AE 3	to have a group of new friends with whom I can relax and socialize outside of class.
SE-AE 4	to work with other students in-class to improve my learning.
SE-AE 5	to discuss academic plans and learning progress with my academic advisor.
SE-AE 6	to discuss course-related content with instructors or professors during office hours.
SE-AE 7	to discuss course-related content with instructors or professors outside of the classroom setting.
SE-AE 8	to respect others with different viewpoints.
SE-PD 1	to explore my identity.
SE-PD 2	to develop my personality.
SE-PD 3	to gain confidence in my potential.
SE-PD 4	to acquire skills to be a more responsible person.

SE-PD 5	to understand how I can contribute to improving society.
SE-PD 6	to take a critical view of the world and think about how to transform it.
SE-PD 7	to become a committed citizen toward the problems of contemporary society.
SE-PD 8	to contribute to the improvement of the human condition or the well-being of people.
E-CP 1	to have better opportunities to find a job.
E-CP 2	to get training on professional skills that are helpful for future careers.
E-CP 3	to empower me to succeed professionally in the future.
E-CP 4	to ensure a satisfactory professional career after my studies.
E-CP 5	to find connections between my program and potential future career.

APPENDIX 3. Item Removed from the Original SE-FYE Scale

Item removed	**Reason of Removal**
SE-FY 2: To do well for my first year at UK, I will have to work harder than in high school.	Potential Multidimensionality
SE-FY 3: To do well for my first year at UK, I will have to work harder than other students.	Potential Multidimensionality
SE-FY 5: During my first year, I will have clear and specific goals that I want to achieve by being at UK.	Potential Multidimensionality
SE-FY 8: I am determined to do what it will take in order to succeed at UK with my goals.	Potential Multidimensionality
SE-AR 3 to become aware of the amount of effort that I need to exert in order to learn.	Low Outfit MNSQ
SE-AR 4 to take primary responsibility for learning coursework.	Low Outfit MNSQ
SE-AR 5 to learn how to seek help from university resources to deal with academic challenges.	Low Outfit MNSQ
SE-AE 1: to socialize and have fun.	Potential Multidimensionality
SE-AE 2: to attend parties with peers.	Potential Multidimensionality
SE-AE 3: to have a group of new friends with whom I can relax and socialize outside of class.	Potential Multidimensionality

SE-AE 7: to discuss course-related content with instructors or professors outside of the classroom setting.	Potential Multidimensionality
SE-PD 4: to acquire skills to be a more responsible person.	Low Outfit MNSQ
SE-PD 5: to understand how I can contribute to improving society.	Low Infit and Outfit MNSQs
SE-PD 7: to become a committed citizen toward the problems of contemporary society.	Low Outfit MNSQ
SE-PD 8: to contribute to the improvement of the human condition or the well-being of people.	Low Outfit MNSQ
E-CP 5: to find connections between my program and potential future career.	Low Outfit MNSQ

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PUBLICATIONS

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- **Xiao, M.,** Bradley, K. D., & Lee, J. (2020). Exploring the Relationship between Student Involvement and First-to-second Year Retention at Four-year Postsecondary Institutions. *Mid-Western Educational Researcher, 32*(3). **[Distinguished Paper in 2019]**
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