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Reconceptualizing Future Time Perspective Extension through Episodic Future Thinking

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Future time perspective extension is an individual's perception of the psychological distance between future goals. The concept of extension can be expanded to include how far into the future an individual habitual time space extends and the diffusion of goals within that time space. This alignment and distance may be related to the individual episodic future thinking, the pre-experiencing of future events. Research in FTP and EFT are typically siloed; considering both approaches to future thinking provides not only greater insight into the two constructs but may also provide avenues for developing interventions. Participants in this study (n = 13) were recruited from a scholarship program designed to provide them with financial support as they progress from community college to high-wage careers in science and engineering. Students were transitioning from two-year programs at local community colleges to science degree programs at a large four-year research university. Students' narratives of their future lives were collected using an interview format, participants also completed a digital survey to quantitatively measure their future time perspective. Qualitative data were analyzed using a deductive thematic analytic approach and a content analytic approach. Students' profiles differed in extension (how far into the future students' project) and diffusion (how many potential future careers are considered). Findings suggest that students with more extended, vivid, and specific career narratives. have higher career commitment and self-efficacy. The study concludes that understanding the intersection of FTPE and EFT can inform educational interventions to support students in visualizing and planning for their careers, particularly in science and engineering fields.

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Reconceptualizar la ampliación de la perspectiva temporal futura mediante el pensamiento futuro episódico

La extensión de la perspectiva temporal futura es la percepción individual de la distancia psicológica entre los objetivos futuros. El concepto de extensión puede ampliarse para incluir hasta qué punto el espacio temporal habitual de un individuo se extiende hacia el futuro y la difusión de objetivos dentro de ese espacio temporal. Esta alineación y distancia pueden estar relacionadas con el pensamiento episódico sobre el futuro, es decir, la pre-experimentación de eventos futuros. La investigación sobre FTP y EFT suele realizarse de forma separada; considerar ambos enfoques del pensamiento futuro no solo proporciona una mayor comprensión de los dos conceptos, sino que también puede abrir vías para el desarrollo de intervenciones. Los participantes de este estudio (n = 13) fueron reclutados de un programa de becas diseñado para brindarles apoyo financiero a medida que avanzan desde la educación técnica hacia carreras bien remuneradas en ciencia e ingeniería. Los estudiantes estaban en transición desde programas de dos años en colegios comunitarios locales hacia programas de grado en ciencias en una gran universidad de investigación de cuatro años. Las narrativas de los estudiantes sobre sus vidas futuras se recopilaron mediante entrevistas, y los participantes también completaron una encuesta digital para medir cuantitativamente su perspectiva temporal futura. Los datos cualitativos se analizaron utilizando un enfoque analítico temático deductivo y un enfoque de análisis de contenido. Los perfiles de los estudiantes variaron en extensión (hasta qué punto proyectan su futuro) y difusión (cuántas posibles carreras futuras consideran). Los hallazgos sugieren que los estudiantes con narrativas de carrera más extensas, vívidas y específicas muestran un mayor compromiso con su carrera y una mayor autoeficacia. El estudio concluye que comprender la intersección entre FTPE y EFT puede ayudar a diseñar intervenciones educativas que apoyen a los estudiantes en la visualización y planificación de sus carreras, especialmente en los campos de la ciencia y la ingeniería.

Palabras clave: perspectiva de tiempo futuro, pensamiento futuro episódico, descuento temporal.

Reconceitualização da extensão da perspectiva de tempo futuro por meio do pensamento episódico do futuro

A extensão da perspectiva de tempo futuro é a percepção individual da distância psicológica entre os objetivos futuros. O conceito de extensão pode ser expandido para incluir até que ponto o espaço de tempo habitual de um indivíduo se estende no futuro e a difusão dos objetivos dentro desse espaço de tempo. Esse alinhamento e distância podem estar relacionados ao pensamento episódico sobre o futuro, ou seja, a pré-experiência de eventos futuros. Pesquisas sobre FTP e EFT geralmente são conduzidas separadamente; considerar ambas as abordagens do pensamento futuro não apenas proporciona uma compreensão mais profunda dos dois conceitos, mas também pode abrir caminhos para o desenvolvimento de intervenções. Os participantes deste estudo (n = 13) foram recrutados de um programa de bolsas projetado para oferecer suporte financeiro enquanto avançam do ensino técnico para carreiras de alto salário nas áreas de ciência e engenharia. Os estudantes estavam em transição de programas de dois anos em faculdades comunitárias locais para programas de graduação em ciências em uma grande universidade de pesquisa de quatro anos. As narrativas dos estu-

dantes sobre suas vidas futuras foram coletadas por meio de entrevistas, e os participantes também responderam a uma pesquisa digital para medir quantitativamente sua perspectiva de tempo futuro. Os dados qualitativos foram analisados usando uma abordagem analítica temática dedutiva e uma abordagem de análise de conteúdo. Os perfis dos estudantes diferiram em extensão (até que ponto projetam seu futuro) e difusão (quantas carreiras futuras potenciais são consideradas). Os resultados sugerem que estudantes com narrativas de carreira mais extensas, vívidas e específicas apresentam maior comprometimento com a carreira e maior autoeficácia. O estudo conclui que compreender a interseção entre FTPE e EFT pode informar intervenções educacionais para apoiar os estudantes na visualização e no planejamento de suas carreiras, especialmente nas áreas de ciência e engenharia.
Palavras-chave: perspectiva para o futuro, pensamiento episódico do futuro, desconto temporário.

The effect of our thinking about the future has been the focus of psychological research for more than a century (James, 1886). Much of the research on future thinking has focused on the Future Time Perspective (Lewin, 1942; Nuttin, 1965; Keough et al., 1999; Lens et al., 2002; Kooij et al., 2018). Future time perspective (FTP) has been defined as an individual's perception and orientation toward the future (Husman & Lens, 1999). Research has demonstrated that Future time perspective relates to students' motivation and emotions (Kooij et al., 2018) and predicts their career decision-making (Walker & Tracey, 2012). Future time perspective also predicts delay of gratification (Göllner et al., 2018). In this paper, we will focus on one aspect of future time perspective: extension (FTPE) or the psychological temporal distance between the present and a future goal or event (Husman & Lens, 1999; Lens et al., 2012; Paixão et al., 2011).

The effect of temporal distance on human behavior, cognition, and emotion has been extensively examined in many different disciplines, including economics (Rösch et al., 2022), education (Lens et al., 2012), health and behavioral psychology (Epstein et al., 2022 Rung et al., 2018), stress and well-being (Fynes-Clinton & Addis, 2023). Research has demonstrated that individuals prefer smaller immediate rewards over larger, delayed rewards. The preference for immediate rewards has been labeled temporal discounting (Seaman et al., 2022). However, research has also demonstrated that individuals differ in the effect of distance on their valuing of future goals; this individual difference is Future Time Perspective Extension. This individual difference factor influences how students prioritize future outcomes, the perceived immediacy of future events, and planning for the future (Bembenutty & Karabenick, 2004; Diaconu-Gherasim et al., 2022). Individual differences in delay discounting are related to other measures of impulsivity and self-control.

Although Future Time Perspective is seen as a relatively stable construct, research on future thinking and FTP has found that it is possible to activate future thinking in a way that reduces temporal discounting (Göllner et al., 2018). Recent research has found that it is possible to alter the negative effects of temporal discounting on goal-striving and self-regulation through the induction of Episodic Future Thinking, imagining a specific and vivid future event (Carr et al., 2021; Schacter et al., 2017). Utilizing experimental methods, researchers have explored the effects of future thinking on temporal discounting and impulsivity and found that imagining a vivid, specific future event can reduce temporal discounting and impulsivity (Rösch et al., 2022).

Episodic Future Thinking and Future Time Perspective Extension both remediate the negative effects of temporal distance. A few researchers have examined the intersection of EFT and FTP, and they have demonstrated that these aspects of future thinking are interrelated and both impact the self-regulation of the participant's behaviors (Liu & Feng, 2019; Göllner et al., 2018). Despite their overlapping focus on humans' tendency to value near-term outcomes more than long-term outcomes, few studies have examined their intersection. Prior studies have focused on quantitative and experimental methods. In this study, we will apply a multidimensional topographical framework developed to understand students' Future Time Perspective (Spence et al., 2022) and a coding framework that has been previously utilized to assess features of episodic future thinking. Our study is novel in that it utilizes qualitative methods to examine the intersection of EFT and FTP. This study expands our understanding of FTPE and the intersection between EFT and FTPE.

Future Time Perspective

Imagining the future is important for university students' learning and motivation. The examination of thinking about the future within educational contexts has focused on the individual differences in future time perspective: "the degree to which and how the chronological future is integrated into the present life-space of an individual through

motivational goal-setting processes" (Husman & Lens, 1999, p. 14). Meta-analytic studies have consistently found that FTP is related to better health and academic outcomes (e.g., Kooij et al., 2018). Researchers have found that all things are equal; the further a goal is in the future, the less value it will have (Peters & Büchel, 2011); future time perspective is the individual difference in the slope of that decline. Future time perspective is negatively related to reducing the value of future goals and thus related to a willingness to delay gratification in the present to achieve a valued long-term goal (Dreves & Blackhart, 2019). In this research study, we examine the concept of FTP through career and academic contexts, emphasizing extension. Extension is the psychological distance of future goals, which is relatively stable within an individual and specific life domains and influences students' motivation and learning (Lens et al., 2012; Paixão et al., 2011).

The classic model of temporal extension within future time perspective has focused on goal setting. One way to operationalize this is for participants to identify the average distance of self-generated future goals or to ask participants about their psychological experience at particular lengths of time (Hilpert et al., 2012; Husman & Lens, 2008). This research has demonstrated that the psychological distance of future goals is related to the value we place on future goals and is related to deep learning and motivation (Hilpert et al., 2012). Research has also explored FTP extension through qualitative interviews. For example, Spence and colleagues (2022) asked students to discuss their long-term and short-term goals; using a phenomenography-informed approach, they mapped how students perceived their future possible careers. They examined students' extension through identification of life course markers such as graduation, first job, or anticipated career transitions.

Exploring the Shape of Future Time Perspective

Using qualitative and quantitative measures, researchers Spence, Kirn, and Benson (2022) have expanded on the concept of extension.

Spence, Kirn, and Benson (2022) use FTP to evaluate middle-year engineering (MYE) students. Using future possible selves as a model, the authors evaluated how MYE students envision and contextualize their future selves relating to their academic outcomes and future careers. Using semi-structured interviews, the authors use phenomenography to profile MYE students' experience with engineering coursework and develop generalizable categories that capture the participants' individual experiences with their FTP. The study found three distinct categories (cone, cup, bowl) placed on two axes (extension and alignment). Extension represents the length at which the participant conceptualizes their future, and alignment profiles the extent (less aligned, more aligned) they perceive their future possible careers (FPC). We present these topologies in Figure 1 and describe them in detail below.

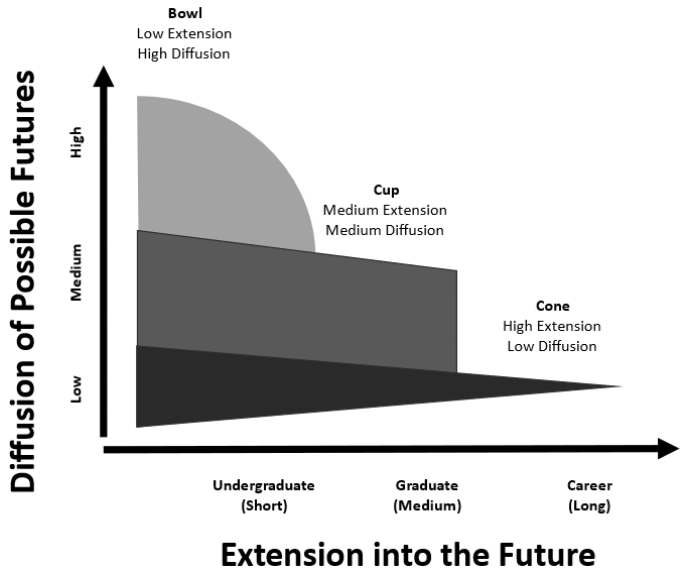

Figure 1. Representation of the bowl, cup, and cone profiles by extension and diffusion

Note. Figure adapted from Spence et al., 2022

The bowl profile is a shallow but wide future. A student with a short extension focuses on short-term goals and may have many vague future career goals. For example, a university student in their last two years of school may focus most of their goals on completing an undergraduate degree and, when asked about careers, talk about being a doctor, physicist, or artist.

The cup profile represents a more extended future with greater specificity and alignment of career goals. For example, Jess is a university student who is beginning a physics degree and is focused on graduation and several career possibilities. They are indicative of the cup profile if, in addition to being future-oriented, these future possibilities are aligned with their chosen current degree path. Jess sees connections between their current goals and their futures. Although Jess's future is not as wide (containing many possible futures similar to the "bowl" future profiles), they have several possible future careers they imagine in their future, and these careers are well aligned. For example, Jess may be considering graduate school in bioengineering or entering an industry specializing in medical device manufacturing.

Students with the cone profile have an extended future focused on a well-defined career. For example, Billie is a biochemistry student who plans to work as a food scientist at NESTLÉ. Prior work in future time perspective theory has demonstrated that extended future thinking and well-defined goals are related to positive outcomes. However, limited research indicates that there can be too much of a good thing. The highly specific future goal may prevent imagining or preparing for different outcomes, making students feel lost and confused when the one desired future goal is blocked. What if NESTLÉ is not hiring or internships in food science are not offered?

Considering the breadth and depth of students' extensions may be an important contribution to research on FTP. This framework illustrates the importance of considering the qualities of how students imagine futures, not simply the psychological distance of those goals. Spence and colleagues' research provides us with one way to examine students' extension; they focused on the number, specificity, and distance

of career goals. They utilized possible future selves research (Oysterman et al., 2006) to consider how students were extending their future goals. The cluster of goals (diffuse – bowl; constrained but varied – cup; highly specific and extended – cone) constituted a possible self. We argue that considering the breadth, specificity, and psychological time extension is a valuable expansion of FTP. However, Spence and colleagues' (2022) work was preliminary as it focused on one population: undergraduate engineering students in their second year of studies.

We seek to examine the topology of students' goals, utilizing a similar yet different population. Spence and colleagues (2022) focused on students in the second year of a four-year program. We will extend this literature by considering students' emerging perceptions of their careers as they transfer from a 2-year community college to a 4-year university. The students will be in a similar part of their program, 2 years into a 4-year program. However, the students will transfer from a less competitive program with no clear career focus to a university major, moving to a difficult program of study with a clear career focus.

Episodic Future Thinking

In addition to understanding the topology of students' FTP, we explore the attributes of students' episodic future thinking. We argue that this may provide useful insight into their experiences as they transition from 2-year to 4-year academic contexts. Episodic memory (Tulving, 2002) is re-experiencing an event, and episodic future thinking is pre-experiencing an event (Schacter et al., 2017). This pre-experiencing highlights future goals' emotional significance and the value of future events (Benoit et al., 2011). The primary context for research in EFT has focused on its effect on the trade-offs people make between short-term and long-term gains. Most of this research has examined intertemporal economic or health-related decisions (Rösch et al., 2022). In laboratory settings, delay-discounting protocols (DD; Green & Myerson, 2004)—asking participants to choose a small reward (e.g., $4) now or larger (e.g., $10) but delayed (3 months) reward in the future—are typically used as "stand-ins" for real-world

inter-temporal choice (e.g., staying home to study on the weekend). Researchers have demonstrated that EFT can be elicited in experimental settings, and eliciting EFT can reduce delay discounting (Rösch et al., 2022). Establishing this causal relation is important because DD is an indicator of choice impulsivity and is related to poorer health decisions (e.g., Peters & Büchel, 2011). Outside of the laboratory, research has focused on directly examining the impact of EFT on health behaviors. This research has demonstrated the impact of EFT on health outcomes (e.g., medication adherence, Epstein et al., 2021). Limited research has examined EFT in the context of learning or academic performance. Our work represents a first step in applying EFT to academic learning and students' career aspirations. Research in FTP has demonstrated that understanding the future is critical for undergraduate students facing a demanding educational path (Husman et al., 2016). Applying EFT research to understanding students' motivation and self-regulation can provide us with an understanding of the cognitive processes involved in students' thinking about the future, with the possibility of developing interventions to support these processes.

Research on the effect of EFT on healthy behaviors and inter-temporal choice has examined EFT by asking participants to describe future events or desired future states and then examining the effect of eliciting these imagined future states on participants' DD and health behaviors. Rösch and colleagues conducted a meta-analysis of 48 studies and found a medium effect size of EFT on participants' willingness to delay rewards. They also found differences in the impact of different features of EFT. Specifically, the effect was stronger when the imagined events were vivid. One proposed hypothesis is that the vividness of an imagined future affects delayed gratification or self-regulation because vividness may evoke stronger emotions (D'Argembeau & Van der Liden, 2012), increase the value of delayed incentives, and increase the perceived plausibility of future events (Szpunar & Schacter, 2013). Research has also found that episodic future thinking is imagining a specific event rather than imagining a generalized future event. Therefore, the specificity of future thinking is also an important contributor to the effect of future

thinking on delay discounting (Chiou & Wu, 2018). We consider both the sensory vividness (affective and physiological experience) and the specificity (episodic) of describing an imagined future (e.g., who, what, when). The specificity of an event differentiates the description from a semantic description of a general event.

Research on EFT illustrates the importance of imagining the future, specifically the vividness and specificity of those imaginings (Rosch et al., 2022). It is possible that students' EFT, specifically pre-experiencing that students do as they imagine future careers, may be related to the structure of their extension.

The Present Study

In this study, we utilize a quantitative-dominate sequential mixed-methods design to address our research questions. We first use a deductive thematic analysis to explore the quality and quantity of students' FTPE by examining students' narratives of their future and their descriptions of a specific day five years in their future. This allowed us to examine the utility of the Bowl, Cup, and cone profiles for understanding students' FTPE. We utilized quantitative analysis to examine the relationships between the profiles that emerged from coding and quantitative measures of future thinking. To better understand the intersection of EFT and FTPE, we engaged in a thematic analysis of their narratives from the perspective of characteristics of EFT that are most likely to impact self-regulation, vividness, and specificity. We anticipated that students' descriptions of their futures and ability to construct a specific and vivid picture of their future would be quantitatively related to their commitment to their future careers. Research questions 1 and 2 were approached qualitatively, while research questions 2 and 4 were approached quantitatively.

Specifically, we answer the following research questions:

RQ1. Do participants' responses about their possible futures map onto the bowl, cup, and cone topologies proposed by Spence and colleagues (Spence et al., 2022)?

RQ2. What is the relation between the qualities of participants' topologies (Spence et al., 2022) and quantitative measures of their career commitment, perception of their enjoyment and feasibility they can achieve their desired career, their connectedness to the future, and their academic self-efficacy?

RQ3. Do participants' specificity and vividness vary based on their FTPE topology?

RQ4. What is the relation between the qualities of participants' episodic future thinking and quantitative measures of their career commitment, perception of their enjoyment and feasibility they can achieve their desired career, their connectedness to the future, and their academic self-efficacy?

Method

We used a quantitative-dominate sequential mixed-methods design (Leech & Onwuegbuzie, 2009) to answer our research questions. In this study, participants' interview data were used to categorize participants into different groups according to the attributes of their responses. These categories were then used to examine quantitative differences in how participants responded to subsequent surveys. This method allowed us to answer our individual qualitative and quantitative research questions and test our theory regarding the importance of episodic future thinking.

Participants

Participants in this study (n = 13) were from two cohorts of students in their final term at various United States Pacific Northwest community colleges. Students were recruited from a scholarship program designed to provide them with financial support as they progress from community college to high-wage careers in science and engineering. Students in the scholarship program received up to four

years of financial aid, starting in their final year at community college, continuing through a bachelor's degree in physics, chemistry, or biochemistry, and culminating in an industry-focused master's program. The program offers mentoring, networking opportunities, community-building activities, and financial aid. It concludes with a 9-month paid industry internship in the science and engineering fields. Each cohort of students had a population of approximately 10 students.

Students in both cohorts transitioned from two-year programs at local community colleges to science degree programs at a large four-year research university. To protect participant confidentiality, we do not report demographic information and use gender and race/ethnic non-specific pseudonyms in our reporting, as we had no hypotheses related to students' gender or race/ethnicity. Participants indicated they planned to pursue majors in chemistry, biochemistry, and physics at the four-year institution.

Procedure

All data for this project were collected using procedures approved by the University of Oregon Institutional Review Board. Qualitative data were collected during approximately one-hour-long semi-structured interviews (Raworth et al., 2012) conducted either online (n = 6) or in-person (n = 7) by members of the research team. Team members used a uniform interview protocol in all cases to ensure continuity across both cohorts and between members of the research team. Interviews were recorded and transcribed to facilitate qualitative analyses.

All interviews took place towards the end of participants' last term in their respective community colleges. We utilized the life story protocol developed by McAdams (2007). This protocol allows us to understand participants' narrative sense of self in the past, present, and future (e.g., Adler et al., 2017; Atkinson, 1998; McAdams, 2007). This part of the interview asked participants to identify, name, and describe key chapters in their past and explore the next chapter of their lives. Participants were also asked to imagine their lives five years in the future and describe what a day in the life of their future career might look like

in as much detail as possible. Finally, to better understand their self-efficacy, participants were asked to reflect on their confidence in their ability to be successful at the four-year institution (Bandura, 1997).

In addition to participating in the semi-structured interviews, participants were also sent a link to a digital survey where responses were collected using an online survey platform (i.e., Qualtrics). Participants provided identifiable information to allow members of the research team to align the qualitative responses to participants' quantitative data. After participants were given pseudonyms, all data were deidentified to ensure participant confidentiality.

Qualitative Analysis

Qualitative data were analyzed using two different techniques. First, participants' responses were classified according to established profiles (e.g., Hilpert & Husman, 2015; Spence et al., 2022) using a deductive thematic analytic approach (Braun & Clarke, 2012). Second, different attributes of participant responses were rated using a content analytic approach (Tracy, 2019). For both our thematic analyses and qualitative rating, a small subset of responses were coded by all members of the research team to assess interrater agreement. Findings were near-unanimous, with an interrater agreement of> 90%. Interrater agreement of greater than 90% is generally considered a strong level of agreement, indicating high reliability in coding and analysis. According to McHugh (2012), an interrater reliability above 80% is deemed acceptable, with values exceeding 90% reflecting near-perfect agreement.

Thematic Analyses

A team of three raters independently coded participant responses using two different frameworks. First, participants' future chapters and descriptions of their lives five years in the future were categorized using the framework developed by Spence, Kirn, and Benson (2022). This framework examines participant perceptions of their future on

two axes: extension (how far participants project into the future) and the breadth of their descriptions of possible futures. Three distinct profiles have been identified using this framework: 1) cones characterized as having narrowly focused futures (e.g., having a singular idealized future career) that extends far into the future, 2) cups who have well-defined futures but differ both in holding multiple related possible futures and in projecting less far into the future, and 3) bowls who held multiple unrelated possible futures and projected the least far into the future.

Additionally, we examined the content of participants' next chapter and description of their lives five years into the future using a framework established by Hilpert, Husman, and Carrion (2014). This framework identifies six unique and distinct forms of narrative content: 1) academic content related to courses, graduation, or other school events, 2) professional content related to career aspirations, advancement, or achievement, 3) monetary content focused on improving financial status, 4) domestic content related to interpersonal relationships such as family, 5) community-building content focused on the betterment of the community or general public, and 6) personal content that is self-centered on individual improvement or enjoyment.

Academic content relates to educational pursuits, including milestones such as completing coursework, achieving specific grades, securing internships, or graduating with various degrees. Professional content centers on career aspirations and achievements, such as obtaining promotions, advancing in a profession, or making notable contributions in a chosen field. Monetary content emphasizes financial goals, including earning, saving, investing, or managing resources to enhance financial stability and prosperity. Domestic content highlights interpersonal relationships and family-oriented goals, such as marriage, raising children, or establishing a home. Community-building content reflects efforts to improve societal well-being, such as volunteering, participating in local politics, or contributing to communal development. Lastly, personal content focuses on individual growth

and enjoyment, encompassing goals like improving health, engaging in hobbies, or traveling for leisure. Together, these categories provide a comprehensive framework for understanding people's diverse aspirations for their futures.

Qualitative Rating

The team of raters also evaluated several attributes of participants' responses. This included the qualities of their episodic future thinking (e.g., McCue et al., 2019; Schacter et al., 2017) and their academic self-efficacy (Bandura, 1997).

Raters evaluated two key attributes of participants' episodic future thinking as they discussed the next chapter in their lives and how they imagined a day in their future career in five years: specificity and vividness.

Specificity. In this context, specificity refers to the level of detail and concreteness of these imagined future events. Content with more details, such as these narratives' who, what, where, and when, was rated higher in specificity. Participants responses were rated from 1 (low specificity) to 3 (high specificity). Individuals who provide only general descriptions of their imagined future events without providing specific details (e.g., "I will work in a lab and do experiments") were rated a 1 (low specificity). Individuals who provided a detailed accounting of the who, what, where, and when of their imagined future (e.g., "I'm going to be working a XYZ company laboratory where I'll be managing a research team doing biochemical research on a treatment Alzheimer's and dementia") were rated a 3 (high specificity).

Vividness. In contrast to specificity, vividness relates to the clarity and sensory richness of the narrative. In coding for vividness, raters examined the qualitative attributes of the narrative for the degree to which they provided detailed descriptions of the experience of the event. Responses were rated from 1 (Low Vividness) to 5 (High Vividness). Responses that lack any sensor, emotional, or affective description (e.g., "I will work in a lab and do experiments") were rated 1 (low vividness).

Responses that had included rich descriptions of participants' imagined future events (e.g., "I see myself working a chemistry lab - the smell of the lab and the excitement of making discoveries make me feel proud of creating solutions that help people") were rated 5 (high vividness).

In rating these two attributes of episodic future thinking, narratives could be highly specific but not very vivid (detailed but lacking sensory richness) or vivid but not very specific (strong sensory imagery but vague on the details).

Quantitative Data Analysis

Measures

We present all measures included in the quantitative analysis in Table 1. For this study, we used several established survey measures related to students' future careers. In addition to the qualitative rating of participants' academic self-efficacy at the four-year institution, these measures included their Career Commitment, their Perception of Career Feasibility, Perception of Career Enjoyment, and Future Connectedness.

Students' career commitment (Satterfield, 2023) asked students to evaluate the degree to which they were committed to their career goals (e.g., "I am strongly committed to pursuing my career goals") using a seven-point Likert-type scale with values ranging from 1 (strongly disagree) to 7 (strongly agree). Prior research (Satterfield, 2023) presented the reliability and validity of this measure. In our study internal consistency for the scale was acceptable; α = .83.

Students' perception that their future career would be feasible after completing their bachelor's degree. This scale was previously developed and examined for reliability and validity (Tsugawa-Nieves et al., 2017; Satterfield, 2023) was measured using three items (e.g., "I believe I can obtain the career I want") with a seven-point Likert-type scale with values ranging from 1 (strongly disagree) to 7 (strongly agree). In our study, internal consistency for the scale was acceptable; α = .94.

Table 1

Number of Items, Sample STEM, Scale, and Citation for Quantitative Measures

Measure	# Items	Sample Item Stem	Scale	Citation
Career Commitment	2	I am strongly committed to pursuing my career goal(s).	1 (Strongly Disagree) to 7 (Strongly Agree)	Satterfield, 2023
Perception Career Feasibility	3	I believe I can obtain the career I want.	1 (Strongly Disagree) to 7 (Strongly Agree)	Tsugawa-Nieves et al., 2017
Perception Career Enjoyment	2	I think I will be satisfied with the career I will be able to achieve.	1 (Strongly Disagree) to 7 (Strongly Agree)	
Future Connectedness	2	My future career influences what I want to learn	1 (Strongly Disagree) to 7 (Strongly Agree)	Perkins et al., 2019
Self-efficacy	Qualitative	Do you feel confident in your ability to be successful at UO?	1 (Low Self-efficacy) to 3 (High Self-efficacy)	Bandura, 1997

Students' perceptions that they would enjoy their future career after completing their bachelor's degree (Tsugawa-Nieves et al., 2017; Satterfield, 2023) were measured using two items (e.g., "I think I will be satisfied with the career I will be able to achieve") on a seven-point Likert-type scale, with values ranging from 1 (strongly disagree) to 7 (strongly agree). This scale was successfully used previously, and reliability and validity have been examined (Tsugawa-Nieves et al., 2017). In our study, internal consistency for the scale was acceptable; α = .86.

Students' connection to the future, or the degree to which their idea of a future career influenced their behavior in the present (Perkins et al., 2019; Satterfield, 2023), was measured using two items (e.g., "My future career influences what I want to learn") with a seven-point

Likert-type scale with values ranging from 1 (strongly disagree) to 7 (strongly agree). These items were tested in prior research (Scatterfield, 2023), which demonstrated its internal consistency. In our study, internal consistency for the scale was acceptable; α = .90.

Analyses

We examined mean differences to understand how the topology of students' responses and the attributes of students' episodic future thinking related to differences in our quantitative measures. For topology, we examined the descriptive statistics for each of our three shapes of future narratives (i.e., bowl, cup, cone). Given the small number of participants, we did not conduct an empirical test but rather examined differences for suggestive patterns that may warrant future research. To understand how attributes of students' episodic future related to differences in their survey responses, we divided our sample into participants with high and low episodic future thinking to answer our last research question. Participants who were medium or higher in specificity and vividness were categorized as having high episodic future thinking, and participants below medium in either category were sorted into low episodic future thinking. We then used a one-sided t-test to test our hypotheses that participants who were high in EFT would also score higher in our quantitative measures. Given the small sample size, we also examined the effect size (Cohen's *d*) in order to evaluate the practical significance of mean differences in addition to statistical significance.

Results

We present the results of our qualitative thematic analyses and rating by participants in Table 2.

Table 2

Topography and Description of Participants Future Thinking

Participant	Topography			Episodic Future Thinking		
	Shape	Extension	Diffusion	Specificity	Vividness	Content
Alex	Cup	Undergraduate	Medium	Medium	Medium-Low	Academic, Professional
Taylor[1]	Cup	Graduate School	Medium	High	Medium-High	Academic, Professional
Jordan[1]	Cone	Career	Low	Medium	Medium	Academic, Professional, Personal
Casey	Cup	Career	Medium	Medium	Low	Academic, Professional
Morgan	Cup	Undergraduate	Medium	Medium	Low	Academic, Professional
Avery[1]	Cup	Career	Medium	High	Medium	Academic, Professional
Riley[1]	Cup	Career	Medium	Medium	Medium	Academic, Professional
Quinn	Bowl	Graduate School	High	Low	Low	Academic
Cameron	Bowl	Undergraduate	High	Low	Low	Academic, Professional, Personal
Dokota[1]	Cone	Graduate	Low	High	Medium-High	Academic, Professional, Personal
Skyler	Cup	Career	Medium	Medium	Medium-Low	Academic, Domestic
Finley	Bowl	Undergraduate	High	Low	Medium-Low	Academic, Professional, Domestic
Rowan[1]	Cup	Career	Medium	Medium	Medium	Academic, Professional

Qualitative Thematic Analyses

Shape

In exploring the shape of participants future time perspective (e.g., Spence et al., 2022), we found that although members of the research team felt that the existing frameworks (i.e., bowl, cup, cone) mapped onto how participants talked about the future, there was a disconnect between this sample and prior research. Spence, Kirn, and Benson (2022) found a strong relation between the breadth of participants' possible selves and the distance they extended the future. However, this relation was much weaker in the present sample. For example, in part of Quinn's interview, as they discussed the next chapter in their life, they ruminated on a possible future in graduate school, extending it further than many of their classmates: "I kind of want to go for master's thing. I could do that, and then maybe even after the small segments, like, oh, really, another two years into that, but I could go for a PhD or something."

We see in this example that, while they can extend their description of their next chapter several years into the future (five or more years), they express uncertainty about their direction. This is further exemplified as they describe a day in the life of their future career five years in the future:

> So that could be one thing where I'm staying in school, doing PhD, doctorate research, giving presentations about that, mostly sitting in a lab, probably hunched over, doing chemistry or physics or whatever. And then, in a separate timeline, I would be a year at a school with a master's degree, and I would in terms of, like a dream job, or like the job after that, I don't really know what's out there, which is one reason I'm doing a lot of this is like, kind of figure out what's out there.

Here, we can see them express uncertainty about a possible career (or what possible careers might be available to them in five years) and uncertainty regarding whether they will be in a career path or still in school. On the one hand, the length of Quinn's extension may be more in line with a "cone", but the lack of specificity or commitment to a

single, or any, possible future would make their profile more closely resemble a "Bowl" (Spence et al., 2022).

Conversely, we found examples like Alex, whose extension was more grounded in the near future as they looked to the next chapter of their life: "So my next kind of next step is 'alright [talking to self], you got your [transfer degree], now things are gonna ramp up and you got like physics and math, you gotta finish like your Bachelor's that you want.' Right?". Although Alex later makes a passing allusion to graduate school, "If I do that [bachelor's degree], then plan C was oh, as a master's program, grad school. I'm kind of like, I'd like to do that," Alex quickly comes back to focusing on the near-term, as they articulate in their next statement, "Step one is doing now you're gonna get through [four-year school] that's kind how I'm thinking about it."

Although Alex's extension was not as far in the future as others (such as Quinn), when asked to describe his life in five years, he had a much more concrete, though still open, idea of where he saw himself:

> It might be kind of neat to do like, like geophysics or something. And the people go down to like Antarctica, and they're like, do like sample the ice cores and everything. And they measure like the earth's temperature to see like, what climate change is, like, that might be kind of neat. You get to travel. Right? Still doing like the math-y, physics science-y stuff.

Here we see that Alex, unlike Quinn, has a clear possible future job in mind, though still not overly committed to it, suggesting a breadth more appropriate for a "cup." Still, their extension is grounded in a more immediate future akin to a "bowl" (Spence et al., 2022).

Other participants better mapped onto the extant frameworks. For example, Dokota's next chapter extended further than many of their classmates into graduate school and beyond:

> So immediately, it's going to be academia for the next three years [through graduate school], but with a real focus on I'm not here to check boxes and just knock out classes, I want to gain a real understanding of everything around genetics.

They also had a firm idea of where they saw themself in five years, as they describe in great detail their possible future of working in a genetics lab:

> I think I have like glimpses of what I could picture the lab. And I think a typical day for me would probably be I, uh, crunching all the data we just got from another run of some experiment, and that half of that work for me would be, you know, regressive analysis on what's been done, and then come up, coming up with the next model for our next iteration, because I imagine my work to be such iterative process.

Here, we see not only greater extension than many of their classmates but also greater conception and commitment to a possible future.

Content

In examining the content of participants' plans for the future (e.g., Hilpert et al., 2014), we found that participants near-unanimously describe both academic (as Riley articulated, "it's exciting to finally be getting to [four-year school], to go to school here and to -it just feels like an important, exciting chapter") and professional goals (as Rowan articulated, "I'm not sure about my exact career, but I've been thinking of semiconductor manufacturing, you know, like [Company] or something"). This is largely a function of our protocol and the interview context, as participants were asked about their future careers and the next chapter of their lives as they look to transfer from their two-year community college context into Science, Technology, Engineering, and Mathematics (STEM) programs at the four-year institution. However, we did see some participants discuss content beyond these two domains. For example, several participants discussed domestic topics, including Finley, who sandwiched their marriage in between graduating from the two-year school and moving to the four-year institution: "So I'm finishing my time at [community college]. That's been a great achievement for me, and then I am getting married, which is exciting, and then I have a summer to prepare for transferring to [four-year institution]."

Other participants discussed personal content. For example, Jordan highlights the importance of prioritizing personal enjoyment and well-being, in tension with the demands of schoolwork, as they look towards the next chapter of their lives.

> But the other part of my brain, thankfully to my older brother, who had graduated already, who was talking to me about his experiences, is still to focus on just to those cheesy, you know, things they tell you and TV show lessons were like you're young, 'enjoy your youth while you have it', you know, and that's something I genuinely had to think about.
>
> Jordan goes on to say,
>
> And so right now, that's the other part of it, is I'm trying to focus on reconnecting with old friends, doing things while I can. Spending money irresponsibly, if possible. Having that sort of fun, because a lot of my time is focused on school, focus on school constantly. And—but at the same time, I'm filling up my plate with hobbies, with things I like to do with things that give me happiness, meeting people.

Here, Jordan highlights a perceived tension between their academic and professional life and youthful enjoyment.

Qualitative Rating

Participants' responses were rated for two aspects of their episodic future thinking (specificity and vividness) as well as their self-efficacy in response to a question about their confidence they could be successful at the four-year institution. We present the results in Table 2.

Episodic Future Thinking

Members of the research team examined participants' episodic future thinking, focusing on both the specificity and vividness of their narratives.

In examining specificity, we found three participants' descriptions were of low specificity, indicating they lacked detail. For example, as Finley articulated in discussing their future career,

> Well, five years from now, I'll be out of the program, and I'll be out of my internship. So, I hope that I have hope that I'll stay at the job that or the career that I interned at, ideally, and I'm hoping it's close. I'm hoping it's in [State], but I don't know what to expect.

Although their response continues past that, Finley describes a possible career in vague terms despite attempts to elaborate further. Conversely, three participants had highly specific future careers in mind; for example, we previously shared the details Dokota provided when discussing their future careers in the previous section. Similarly, Taylor provided a great deal of specificity in describing a day in the life of their future career:

> Some days I will be drawing up designs in, in [software]. Some days I'll be doing my, my own fabrication, I'll be using the milling equipment . . . doing my thin metal coating, I'll be growing my carbon nanotube.

In both examples, we can see much greater detail about who, what, where, and how they perceive themselves engaging in their future careers.

We found a similar pattern when examining the vividness of participants' responses; 7 participants had low or medium-low vividness in their description of the future. These examples, such as Finley, who, when pressed to give more detail in their future career, went on to say, "And so I imagine my job like I go to work with my group of like associates or whatever, and working on the project, and hopefully using like cool machines." Here we see little in terms of affective description of what they expect to experience when they actually get into a profession.

On the opposite side, two participants had medium-high vividness in their responses. For example, Cara, in going into more detail

about their specific career, went on to describe some of the stress associated with working in a research laboratory:

> I would have the pressure of it [working in a research laboratory]. You know, the next iteration needs to be worth everyone's time and effort and funding, and so wanting to put everything that can into making sure that it's progress in the project, while knowing that if it's not, it's still okay.

Here, we can see a difference in the degree to which these different participants can vividly describe what they expect the experience of their future career to be like.

Quantitative Analyses

Self-efficacy

We examined participants' self-efficacy and found that one participant had low self-efficacy, five had medium self-efficacy, and seven had high self-efficacy.

Alex was clear in his articulation of low self-efficacy to be successful at the four-year institution. When asked if he was confident that he could be successful, their response was, "Oh my gosh, no. I'm gonna try my best. But, like do I think I'm gonna get through it? Man? I don't know. We'll see." In this response, we saw a clear lack of confidence.

Conversely, participants like Avery exhibited much more confidence:

> I've been very successful at community college. But then again, my class sizes are a lot smaller, so I have more access to ask questions. So going there, it's going to be a lot harder [at the four-year institution]. But I always, I always believe in myself, I believe I can do anything I set my mind to. So, I feel like I will be very successful. And I have [transfer program] to help me along the way.

Here, we see a much more complex, though ultimately still highly efficacious, appraisal. We see some concern about the differences between the two contexts and acknowledge that things may be more difficult in the context of the four-year institution. However, we

see Avery pulling from that experience as a source of their self-efficacy (Bandura, 1997) in the related academic context. Additionally, we see how Avery thinks through using learning strategies and academic resources to reinforce their self-efficacy (Gaskill & Hoy, 2002).

Mean differences by topology

As presented in Table 2, we identified three students as bowls (low extension, high breadth), eight as cups (medium extension, medium breadth), and two as cones (high extension, low breadth). We then examined descriptive statistics for our quantitative measures for participants in these topologies. We present the results in Table 3; these results are descriptive of our sample and were not tested to determine the generalizability of these findings to the population. In general, we found that students identified as cones scored higher across most measures than either cups or bowls, except for their future connectedness. This finding deviates from previous research (e.g., Spence et al., 2022), which found that cups were more likely to outperform other topologies, particularly in adaptive motivational and self-regulatory measures. This finding may be due to the differences in our population, students on the threshold of transfer from community college to university. University students who have already committed to a major (as the students in the Spence et al. study did) may have a greater understanding of multiple career plans.

In contrast, the students in our study may have less information and thus have difficulty imagining clear career paths. For the students who can identify specific careers, their commitment to their careers may be higher because those careers are seen as the only possible pathway. We only identified two students as having cone-shaped extensions, and both were identified as having middle to high EFT. This indicates some degree of pre-experiencing in their future careers, consistent with Spence and colleagues' findings; cups scored higher than bowls, except for their perception of career enjoyment and self-efficacy.

Table 3

	Bowl		Cup		Cone	
	Mean	SD	Mean	SD	Mean	SD
Career Commitment	6.33	0.29	6.50	1.00	7.00	< 0.01
Perception Career Feasibility	5.56	1.35	5.75	1.89	7.00	< 0.01
Perception Career Enjoyment	5.83	1.26	5.38	2.36	6.75	0.35
Future Connectedness	5.83	0.76	6.75	0.29	6.25	1.06
Self-efficacy	2.33	0.58	2.25	0.96	3.00	< 0.01

Mean difference by Episodic Future Thinking

After rating participants' responses for specificity and vividness, we categorized participants into either high or low episodic future thinking. Participants (n = 6) rated medium or higher in both categories were identified as having high episodic future thinking. Participants (n = 7) below medium in one or more categories were rated as having low episodic future thinking. We observed no participant who had a significant mismatch between the specificity and vividness of their responses, which would create a challenge for this categorization.

We then used this classification to examine differences in participants' responses to our quantitative survey measures and qualitative ratings of their self-efficacy. We present descriptive statistics, mean-difference test results, and effect size (Cohen's d) in Table 4. Overall, we found some evidence to support our hypothesis that participants who are higher in episodic future thinking (specifically, their specificity and vividness) would demonstrate greater commitment, perceived feasibility, perceived enjoyment, connectedness, and efficacy. Although none of our findings were statistically significant, this was largely a function of sample size, as effect sizes for all findings were medium to large for all measures.

Table 4.

Means, SD, and Difference Test for Measures by High/Low Episodic Future Think

	Mean (*SD*)		Mean Difference		
	High EFT	Low EFT	*t*(*df*)	*p*	Cohen's *d*
Career Commitment	7.00 (< 0.01)	6.33 (0.75)	1.48 (7)	.09	1.26
Perception Career Feasibility	7.00 (< 0.01)	5.44 (1.57)	1.66 (7)	.07	1.41
Perception Career Enjoyment	6.83 (0.29)	5.33 (1.89)	1.32 (7)	.11	1.11
Future Connectedness	6.50 (0.87)	6.25 (0.69)	0.48 (7)	.33	0.32
Self-efficacy	2.67 (0.21)	2.29 (0.76)	1.04 (11)	.16	0.68

Notes. Statistical significance by one-sided *t*-test.

Discussion

In this study, we examined students' narratives of their future through the lens of future time perspective extension and episodic future thinking. Our goal was to explore the concept of FTPE topology (Spence et al., 2022), which considers the interconnectedness among possible futures and psychological distance. We also sought to explore the intersections of students' future time perspectives and the cognitive processes involved in imaging the future, specifically EFT. Prior reviews of the literature have argued that Future Time Perspective is supported by Episodic Future Thinking (Husman & Hilpert, 2017). However, few studies have examined the interplay between FTPE and EFT. In this study, we used both qualitative and quantitative methods to explore the intersection.

Research on episodic future thinking explores the cognitive memory processes, specifically episodic memory, involved in thinking about the future (Szpunar & Schacter, 2013). Through this work, researchers have identified the aspects of future thinking that create self-regulatory and motivational pressure to delay gratification

(Rösch, et al., 2022). Episodic future thinking, however, is rarely examined outside of laboratory studies (e.g., D'Argembeau & Van der Liden, 2012). When it is, it has been focused on health and economic decision-making rather than education or career development (Rösch, et al., 2022). EFT intervention studies have improved health and economic decision-making and have demonstrated an impact on delay discounting (Epstein et al., 2022). We argue that it is possible that EFT interventions could be developed to support students' self-regulation; however, we must better understand students' EFT in educational and career contexts before beginning on the long road toward interventions. In addition to qualitative exploration of students' EFT, we anticipated that using topologies of students' FTPE would assist us on the road to understanding students' future thinking in the specific context of students' thinking about careers in science and engineering. FTPE topologies tell us what students imagine for their futures, while EFT tells us how they imagine it.

To understand the intersection of FTPE and EFT, we engaged in a thematic analysis of students' responses to interview questions, which asked them to describe the chapters of their lives and a "day in their life" of five years in the future. Researchers have argued that in addition to focusing on psychological distance, FTPE should consider the alignment of future goals; examining both the alignment and extension produced a two-dimensional topology of students' FTPE that aided in understanding students' career expectations (Spence et al., 2022). In this study, we sought to apply this topology to undergraduate students' narratives about their future.

The students in our study were preparing to transition from a two-year community college to a four-year research-intensive university. They were beginning to understand where their new degree program would take them. Their perceptions of future possible careers and FTPE may be critical in shaping their initial impressions of their difficult degree program. It is, therefore, important to understand their FTPE and identify how it shapes students at major life transition points.

Our first research question addressed the utility of the FTPE topology to understand students' thoughts about their future careers. Specifically, we asked, "Do participants' responses about their possible futures map onto existing profiles?" (Spence et al., 2022). One key difference between the present study and prior work on Spence, Kirn, and Benson (2022) profiles is the differences in the protocols. In this study, we focused on allowing participants to narrate their lives in chapters (e.g., Atkinson, 1998; McAdams & McLean, 2013) and then, separately, to describe a day in the life of their future career in five years. This differed quite a bit from the protocol Spence, Kirn, and Benson (2022) used, in which participants were asked to describe their future goals and elucidate how far they could extend their conception of their future. Despite these differences, we found that participants mapped onto a "bowl, cup, cone" profile, particularly concerning the breadth of their possible futures.

In answering our second research question, by examining how these topologies predict differences in our quantitative measures of students' self-efficacy and their perception of future careers, we found that our findings echo this prior research (e.g., Spence et al., 2022) and our predictions. Students who articulated less breadth in their narratives about their future and greater extension (i.e., cones) demonstrated greater career commitment, feasibility, and self-efficacy. We found that Cups were more closely aligned with Cones in these measures than students with bowl topologies and higher in career connectedness. Together, these findings suggest that observing these topologies in students' narratives of their futures is possible. These findings provide further evidence for the utility of the FTPE topology.

In answering our third research question, we were able to reliably code students' future narratives for both the specificity and vividness of their imagined futures. Although people's descriptions of their futures can be different in specificity and vividness, narratives tend to be highly specific but not very vivid (detailed but lacking sensory richness) or to be vivid but not very specific (strong sensory imagery but vague on the details); we did not find evidence of that in this dataset.

Across all participants, we found that specificity and vividness were closely linked, with all participants being within a rating across the two categories.

In answering our fourth research question, we examined the relationship between the qualities of participants' episodic future thinking and quantitative measures of their career commitment, perception of their enjoyment and feasibility they can achieve their desired career, connectedness to the future, and academic self-efficacy. We found that the observed mean differences were more pronounced for career commitment, perception of career feasibility, and perception of career enjoyment and less pronounced for future connectedness and self-efficacy. For future connectedness (Husman & Shell, 2008), in which participants were directed to identify the degree to which they take the future into consideration when acting in the present, we observed that participants in the high episodic future thinking group were lower on that measure compared to the other measure. In contrast, participants in the low episodic future thinking group responded higher than others. It may be that both students, in the context of the survey questions, shared a similar belief in the degree to which their future should dictate their present behaviors. Similarly, we saw smaller differences in self-efficacy. This may be due to the smaller rating scale used for this measure (rated on a 3-point scale). Still, because the self-efficacy questions were grounded in a more proximal future that overlapped with the extension, all participants could envision.

Limitations

Students' narratives of their futures provide insight into their imagining of their futures and allow us to explore their future thinking utilizing existing frameworks from prior qualitative studies (e.g., Spence et al., 2022). However, the deductive nature of the coding process did not allow for novel theory development, and the limited number of students did not allow for generalization. Rather, we explored the utility of an existing protocol (Adler et al., 2017) for exploring future time perspective extension. The homogeneity of our sample (science students

transitioning from community college to university settings) provides a window into a specific, important, and understudied population but further limits generalizability. To maintain the anonymity of the participants, we have not provided sociodemographic information about them. This limits our ability to discuss any differences based on gender or race. The participants were on the cusp of a major academic transition from community college to university. Although that transition was on the student's minds, the lack of a longitudinal component does not allow us to examine the stability of their FTPE or EFT across this transition.

Future Research

This study represents a first step in examining the efficacy of using narrative prompts to explore the intersection of EFT and FTPE. The findings demonstrate the efficacy of using an existing protocol for exploring FTPE and EFT. Future research is needed to deploy this protocol with a larger sample and different populations. Longitudinal research could elucidate the variability of FTPE and EFT and provide information about contextual factors that may shape students' EFT and FTPE. Future research should also consider potential differences in students' EFT and FTPE based on gender or race. Further understanding of the factors influencing students' future thinking makes it possible to begin to adapt existing thinking intervention protocols (e.g., Epstein et al., 2022) to educational settings.

Conclusions

The bowl, cup, and cone profiles (Spence et al., 2022) may be useful for expanding our understanding of the quality and quantity of FTP extensions. Linking both EFT (Epstein et al., 2022) and FTP (e.g., Fong & Kim, 2021; Godwin & Kirn, 2020), extension research, we see evidence that considering the vividness and specificity of students' descriptions of their futures also seems productive and related to important quantitative outcomes such as career commitment and feasibility.

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