UNIVERSITY OF CALIFORNIA

Santa Barbara

The role of Student Fit in College Environments (S'FICE) in the academic performance of Under-Represented (UR) students

A dissertation submitted in partial satisfaction of the requirements for the degree Doctor of Philosophy in Psychological and Brain Sciences

by

Anudhi Praharshinie Munasinghe

Committee in charge:

Professor Diane M. Mackie, Chair

Professor Heejung S. Kim

Professor Nancy L. Collins

Professor Kyle G. Ratner

Professor Andrew Maul

June 2022

The dissertation of Anudhi Praharshinie Munasinghe is approved

_____

Heejung S. Kim

_____

Nancy L. Collins

_____

Kyle G. Ratner

_____

Andrew Maul

_____

Diane M. Mackie, Committee chair

May 2022

ACKNOWLEDGMENTS

I would like to express my special thanks and deep gratitude to my supervisor, Dr. Diane M. Mackie, who took me under her wing six years ago. I am so grateful for all her advice and guidance, the hard work she put into helping me fine-tune so many of my projects, grants, presentations, and papers, the opportunities she exposed me to, her belief in my potential, and the support she provided me in my pursuit of goals within and beyond graduate school. Thank you so much for everything and for helping me get to where I am today.

I would next like to thank my committee member, Dr. Andrew Maul, for introducing me to Item Response Theory and tirelessly helping me develop and validate my own instrument. At times when I felt completely overwhelmed by the prospect of developing my own instrument, you kindly answered a torrent of my questions and guided me to helpful resources. The single thread of 98 emails that were sent back and forth between us has become a source of knowledge that I refer to regularly, and I will save it as a PDF to ensure that it stays with me long-term.

Next, I would like to thank my committee member, Dr. Nancy L. Collins, who carved so much time out of her busy schedule to patiently walk me through the analysis and results for both Study 2 and Study 4. I learned so much about complex mediation models, structural equation modeling, and new software, and was extremely grateful for her kind mentorship throughout the whole process. I cannot help but reflect on how much my knowledge in statistics has evolved since being a first-year graduate students in her 221A class in 2016, and how along the years she has instilled in me a sense of appreciation for statistics.

Next, I would like to thank my committee member, Dr. Heejung S. Kim. I really valued being part of your lab meetings, getting to see how cultural psychology research flourished, and receiving feedback on my own studies. I hugely benefited from our meetings regarding my research interests as well as my career interests, as I always found our meetings to be insightful and helpful. I also appreciate all her help through my dissertation research process.

Next, I would like to thank my committee member, Dr. Kyle G. Ratner. His mentorship through my graduate school years has been extremely valuable. I really appreciated attending his lab meetings and receiving feedback on my projects. I fondly remember the helpful advice he gave to me on my Mini-Con presentation, which I found extremely helpful. I also really appreciated him supporting my interests in neuroscience and allowing me to contribute to this research space in his lab. I also appreciate all his help through my dissertation research process.

Finally, I would like to dedicate this manuscript to my parents. I owe all of who I am and everything that I have achieved to them. Ever since I was young, my parents talked about how I would go on to college and pursue graduate studies just like the both of them. It was my lifelong goal to pursue a PhD just like Thaththa (my father, who served as Department Chair of Architecture at the University of Moratuwa when we lived in Sri Lanka). Throughout this journey they have been a constant source of support and a ray of guiding light, always ready to chat with me about any big or small issue I was facing, and always ready to fly to me at a moment's notice to support me in any way.

My heart is full of gratitude thinking about the sacrifices they made and the love and guidance they put into everything that they did to help me and my sisters gain a better education and greater opportunities. I cannot put into words how grateful I am to you, Amma and Thaththa, for everything that you have done. Thank you for believing in me, for your pride in me, and for your love, support, and guidance. *Budusaranai!*

VITA OF ANUDHI PRAHARSHINIE MUNASINGHE
May 2022

EDUCATION

Bachelor of Arts in Psychology, York University, Toronto, June 2016 (summa cum laude)
Master of Arts in Psychological and Brain Sciences, University of California, Santa Barbara, December 2021
Doctor of Philosophy in Psychological and Brain Sciences, University of California, Santa Barbara, June 2022

PROFESSIONAL EMPLOYMENT

2016-22: Teaching Assistant, Department of Psychological and Brain Sciences, University of California, Santa Barbara
2020-21: Instructor of Record, Department of Psychological and Brain Sciences, University of California, Santa Barbara
2021-22: Research Intern, Data Analyst Intern, Research Scientist, NeuroLeadership Institute, Clean Skincare, Western Governors University Labs

PUBLICATIONS

"Perceptions of emotional functionality: Similarities and differences among dignity, face, and honor cultures," *Journal of Cross-Cultural Psychology, 53* (2022), 263-288.

"Lightness matching and perceptual similarity," *Journal of Vision, 18* (2018), 1-13.

AWARDS

SPSSI Spring 2020 Grants-In-Aid Award (USD 1000) 2020 – 2021
Psi Chi Mamie Phipps Clark Diversity Research Grant (USD 1500) 2021 – 2022

FIELDS OF STUDY

Major field: Intergroup relations

Studies on the academic underperformance of underrepresented students with Professor Diane Mackie

ABSTRACT

The role of Student Fit in College Environments (S'FICE) in the academic performance of Under-Represented (UR) students

by

Anudhi Praharshinie Munasinghe

Despite increasing enrollment, several groups of underrepresented (UR) college students underperform academically relative to their peers. I first review six psychological constructs that have been hypothesized to affect UR students' academic performance, but which remain theoretically independent of one another. I then introduce the State Authenticity as Fit to the Environment model (SAFE; Schmader & Sedikides, 2018) as a theoretically integrative model that focuses on what causes people to thrive or to struggle in certain environments. In the third section, I discuss the similarities between the psychological processes thought to underlie currently studied constructs affecting UR academic performance and those purported by the SAFE model to determine psychological fit with an environment. I then introduce the Student Fit in College Environments (S'FICE) model – that I developed based on the SAFE model – as a framework for predicting UR college students' academic performance. To test the S'FICE model, I developed a standardized instrument (the S'FICE instrument) to assess the psychological fit concepts central to the S'FICE model and provided preliminary evidence for its validity in Study 1. Study 2 was an experimental test of the causal role of the three components of psychological fit in increasing engagement within an academically relevant domain with Latina/o/x participants. Study 3 was a second round of instrument development to further improve the validity of the S'FICE instrument. Study 4 was a correlational, longitudinal test of the S'FICE model that assessed the ability of the

three subcomponents of fit in academic contexts (as measured by the S'FICE instrument) to predict the actual academic outcomes of UR college students (again, Latina/o/x students) as well as their wellbeing (the latter dependent variable was an exploratory extension of the S'FICE model). Study 1 and Study 3 found significant validity for the S'FICE instrument. Apart from a minority of items, most items showed that they captured the measurement of self-concept, goal, or social fit. These results provided support for the use of the S'FICE instrument in measuring psychological fit when testing the S'FICE model. Study 2 and Study 4 provided consistent correlational support for the S'FICE model, but also suggested changes to the original relationships of the model. Confirming the predictions of the S'FICE model, each type of psychological fit was found to predict students' engagement and therefore their academic performance, although each type of fit showed a more complex relationship to fluency and/or engagement than predicted. When wellbeing was tested, although all three types of psychological fit were found to predict wellbeing, social fit (feeling a sense of belonging among your peers), in particular, was found to have a direct relationship with wellbeing, whereas the other two types of fit related to wellbeing through motivational fluency (the ease with which goals are pursued). Motivational fluency was, in turn, directly related to wellbeing, thus showing that engagement did not mediate the relationship between psychological fit and wellbeing. Therefore, the S'FICE model predicting wellbeing differed slightly from the S'FICE model predicting academic performance. Study 4 also provided evidence to suggest that sub-components of the S'FICE instrument were the strongest predictors of UR academic performance and wellbeing in comparison to previously used instruments. In conclusion, psychological fit was found to be a significant predictor of both UR academic performance and wellbeing. The development and testing of this new model of

UR performance in academic domains was intended to contribute both theoretically and practically to our understanding of UR students' academic performance in college and to bridging the academic gap between UR students and their peers.

I. Introduction

Despite increasing enrollment, several groups of underrepresented college students perform less well in college than their peers. For example, Black students (Blascovich et al., 2001; Steele & Aronson, 1995; Walton & Cohen, 2007), Latina/o/x students (Armenta, 2010; Nadler & Clark, 2011; Rodriguez, 2014), first-generation students (students whose parents did not receive a college education; Stephens, Fryberg et al., 2012; Fryberg et al., 2012), and female students in STEM majors (Cheryan et al., 2009; Steele & Aronson, 1995) underperform in college in comparison to their non-underrepresented peers. Although other underrepresented students also underperform in comparison to their peers, (e.g. Native American students in comparison to White students; Fryberg et al., 2013), and although each of these groups has unique characteristics, these four groups - Black and Latina/o/x students, first-generation students, and female students in STEM - have received the most research attention. For the sake of building on previously established results, I will focus on these groups in this series of studies and refer to them collectively as underrepresented students (UR students). "Underperformance" in these UR groups includes lower rates of joining STEM majors (e.g. Cheryan et al., 2009), achieving poorer grades (e.g. Walton & Cohen, 2011), and higher rates of dropping out of college (e.g. Murphy et al., 2010).

In this introduction I first review research regarding six psychological constructs that have been proposed to affect UR students' academic performance. Despite the fact that all six have made empirical contributions to our understanding of UR students' academic performance, these approaches remain largely theoretically independent of one another. In the second section, I introduce the recently proposed State Authenticity as Fit to the Environment model (SAFE; Schmader & Sedikides, 2018) as a theoretically integrative

model that focuses on the key question underlying academic success: What causes people to thrive or to struggle in certain environments? In the third section, I discuss the similarities between the psychological processes thought to underlie currently studied constructs affecting UR students' academic performance and the constructs argued in the SAFE model to determine psychological fit with an environment. In the fourth section, I introduce the modified version of the SAFE model, the Student Fit in College Environments (S'FICE) model, which subsumes the previously proposed multiple constructs underlying UR students' academic performance, as a theoretically more compelling explanation of UR students' academic underperformance in college and university settings.

Testing the S'FICE model is the focus of my dissertation studies. Testing the S'FICE model required, however, a well-validated standardized instrument to assess the psychological fit concept central to the S'FICE model as it applies to UR students in college and university settings. I describe the development of this instrument (the S'FICE instrument) in the fifth section, and detail the process I undertook to provide initial validity evidence for this instrument in Study 1 (section six). Study 2 (section seven) was an experimental test of the causal role of the three components of psychological fit in increasing engagement within an academically relevant domain. In section eight, I detail how I conducted Study 3 as a second round of validation for the S'FICE instrument. Study 4 (section nine) was designed as a correlational and longitudinal test of the S'FICE model that assessed the ability of the construct of fit in academic contexts as measured by the S'FICE instrument to predict the actual academic outcomes of UR college students and their wellbeing, as an exploratory extension of the S'FICE model. This study was designed to also elucidate whether the three subcomponents of fit have independent or interactive effects on

the outcome variable of interest. The development and testing of this new model of UR students' performance in academic domains was intended to contribute both theoretically to our understanding of UR students' academic performance in college and practically to our ability to validly assess conditions contributing to UR students' academic underperformance and interventions designed to improve such performance.

II. Section 1: Constructs proposed to explain UR students' academic performance

Why do UR students admitted to college underperform relative to their non-UR college peers? Attempts to answer this question have focused either on constructs proposed to uniquely inhibit the academic performance of UR students, or on constructs proposed to improve academic achievement in all students.

UR students are by definition new to, infrequent in, unassociated with, or unused to college pursuits. Researchers have highlighted these facts in several key theories that have been proposed to explain the constructs contributing to UR students' academic underperformance. I will discuss these constructs roughly in the order in which they were proposed: performance versus mastery goals (Elliot & Dweck, 1988), stereotype threat (Steele & Aronson, 1995), belonging uncertainty (Walton & Cohen, 2007), fixed versus a growth mindset (Dweck, 2008), the lack of ambient belonging (Cheryan et al., 2009), and cultural mismatch (Stephens, Fryberg et al., 2012)[1].

[1] Another prominent theory in the academic performance literature is self-efficacy. Self-efficacy refers to a person's confidence that they have the ability to perform a certain activity (Bandura, 1977). Self-efficacy has been shown to be positively correlated with GPA, as well as performance and persistence on coursework and difficult tasks (Vuong et al., 2010; Zimmerman, 2000). Multon, Brown, and Lent's (1991) meta-analysis indicated that self-efficacy was positively related to academic performance in both correlational and experimental studies. These studies also indicated that self-efficacy did not differ in UR students compared to non-UR students. Raque-Bogdan and Lucas (2016) found that self-efficacy strongly predicted career aspirations of first-generation students, and Wang, Chan, Soffa, and Nachman (2017) reported that math and science self-efficacy were positively related to most female students' desires to transfer to STEM majors. Self-efficacy does

A. Performance versus mastery goals

Performance goals are defined as goals that focus on obtaining high grades, or in other words, *performing* well in the class (Elliot & Dweck, 1988). Mastery goals, in contrast, are defined as focusing on learning the material, or in other words, *mastering* the concepts that are being taught. Possessing mastery (versus performance goals) is positively correlated with improved academic performance (Elliot & Dweck, 1988; Hong et al., 2020; Matos et al., 2017; Phan, 2010), an effect mediated by use of deeper learning strategies, increased planning of study practices, and higher self-efficacy (Hong et al., 2020; Matos et al., 2017).

Although it is not clear that UR students as a whole endorse performance versus mastery goals more than other students, some research findings are consistent with the idea that having mastery versus performance goals might contribute significantly to their college outcomes. Low-income Black students showed an improvement in their mathematics GPA when they endorsed more mastery than performance goals (Gutman, 2006). Black and Latina/o/x students showed an increased desire to pursue a scientific research career the more they endorsed mastery goals (Woodcock et al., 2016). Finally, Darnon and colleagues (2018) found that mastery approach goals were positively correlated with academic grades only for first-generation students and not for continuing-generation students.

B. Stereotype threat

Individuals experience stereotype threat (Fiske, 2003; Steele & Aronson, 1995) when they are reminded that the social group they identify with (e.g., being a woman) is stereotypically known for performing poorly at an activity (e.g., a math test) they are about to

not appear to be a factor that specifically explains underperformance in UR students and thus it is not considered further.

engage in. Such a reminder leads individuals to perform more poorly than usual at this activity.

In a typical experiment, individuals with a stereotyped identity (e.g., Black college students, female students, etc.) are invited to participate in a task on which their group stereotypically performs poorly (e.g., intelligence test for Black college students, math test for female students). Before individuals begin the task, they are reminded of their identity in a subtle manner (e.g., asking individuals to indicate their race and/or gender as part of the demographics; Danaher & Crandall, 2008) or explicit manner (e.g., informing individuals that their individual performance on this task will be used to evaluate how members of their social group as a whole perform at this activity; Shih et al., 2015), presumably activating the stereotype.

Although individuals in this situation typically wish to prove the stereotype wrong, their concern ironically gives rise to cognitive and physiological processes that reduce working memory capacity and bar them from performing at their usual level (Beilock et al., 2007; Forbes & Leitner, 2014; Pennington et al., 2016; Schmader et al., 2008; Schmader et al., 2015; Schmader & Johns, 2003). Cognitive processes found in stereotype threatened individuals include increased attention to mistakes made during task performance (Forbes & Leitner, 2014), increased feelings of anxiety and shame (Albuquerque et al., 2007; Cadinu et al., 2005), and increased efforts to quell negative thoughts and emotions that may arise during task performance (Johns et al., 2008; Krendl et al., 2008). Physiological processes identified in individuals experiencing stereotype threat include lowered cardiac output and heightened total peripheral resistance (Vick et al., 2008), and increases in cortisol ratios compared to participants' baseline levels (Matheson & Cole, 2004; Townsend et al., 2011).

All these physiological responses are associated with a heightened threat response (Blascovich & Mendes, 2010). As a result of these processes, the working memory capacity of stereotype threatened individuals is significantly reduced (Schmader et al., 2008) and thus their performance at the given task is poorer than usual.

C. Belonging uncertainty

Belonging uncertainty (Walton & Cohen, 2007) arises out of the awareness that one is not surrounded by similar others (e.g., in terms of one's race/ethnicity) in one's environment. For example, Black students subtly led to believe that fewer of their friends would be a good fit in their major questioned their belonging in the major more than Black students who were not led to believe that they had fewer friends who would fit well into their major (Walton & Cohen, 2007). According to these researchers, experiencing belonging uncertainty leads individuals to become more sensitive to cues that might reflect their lack of belonging in the current context (e.g., major or college). This oversensitivity then skews how these students interpret negative incidents that are, in fact, a normal part of a college student's life (e.g., having an argument with a roommate). Whereas other students may attach no deeper meaning to such incidents, a UR student, numerically infrequent in such an environment, might interpret such an argument as a further sign that they do not belong in the environment. Such lack of belonging is then assumed to undermine engagement and achievement in the environment (Furrer & Skinner, 2003; Storms & McCaul, 1976). Consistent with such reasoning, Walton and Cohen (2011) showed that when UR students were exposed to an intervention that encouraged them to reinterpret negative events in college as a normal part of college life, they showed better academic performance across the span of three years than UR students not exposed to this intervention. Belonging uncertainty thus arises when individuals

find themselves in a context in which they share social identities (e.g., race/ethnicity) with almost no-one else present, and then experience belonging hypervigilance. Its effects can be alleviated using techniques that reduce individuals' oversensitivity to potential cues of lack of belonging to this context.

D. Ambient belonging

A conceptually similar construct, ambient belonging, has been posited by Cheryan and colleagues (2009) as also responsible for a lack of motivation and engagement in a situation or domain. A lack of ambient belonging arises when individuals see features of the environment (the objects that populate the context, the layout of the context, and the types of people that they imagine must inhabit the context) as unsuited to or unlike themselves. If the context communicates that a very specific group of people (e.g., "nerdy" males) inhabit this context, individuals viewing the environment who don't belong to this group (e.g., female students) feel less interest in engaging in or becoming part of this context. For example, Cheryan and colleagues (2009) found that when women were shown a classroom where computer science classes would be taught, they expressed a lower desire to enter the computer science major if the classroom contained stereotypically masculine objects, such as Star Trek posters and videogames, as opposed to neutral objects, such as nature posters and coffee mugs. Thus, ambient belonging refers to the extent to which individuals feel that a new context would welcome them given who they are as individuals. If individuals perceive that their identity would not be a good match to the "ambience" of the context, they are less likely to enter the context.

E. Cultural mismatch

The concept of cultural mismatch (Stephens, Fryberg et al., 2012) refers to differences that first-generation students may perceive between their largely working-class values (Stephens, Fryberg et al., 2012; Stephens et al., 2011) and the largely middle-class values endorsed in college environments. For example, many first-generation students endorse interpersonal goals and values, such as becoming a college student to help out their family, give back to their community, or provide a better life for their children. In contrast, typically college environments often implicitly or explicitly express values such as learning to become a leader, learning to express oneself, and learning to solve problems on one's own (Stephens, Fryberg et al., 2012). According to Stephens, Fryberg, and colleagues (2012), this mismatch in goals and values increases stress and negative emotions when individuals are asked to complete tasks reflecting values of the new environment rather than their own, leading, in turn, to poorer academic performance.

Consistent with this reasoning, Stephens, Fryberg, and colleagues (2012) found that first-generation students were more likely to endorse a greater number of interdependent reasons for coming to college (e.g., giving back to the community) than independent reasons (e.g., becoming a leader) and that this tendency negatively predicted their grades in college in their first and second year. Further, Stephens, Townsend, and colleagues (2012) found that when first-generation (versus continuing-generation) students were exposed to a welcome letter from their college, they showed greater stress and experienced more negative emotions when asked to give a speech about their college goals if the welcome letter highlighted independent values (e.g., the aim of the university was to allow students to explore their passions) rather than interdependent values (e.g., the aim of the university was to build a community). Thus, cultural mismatch is described as negatively affecting UR students'

performance because they perceive their goals for entering and completing college as at odds with the goals typically emphasized by college itself.

F. Fixed mindset versus growth mindset

Dweck (2008) highlighted the detrimental effects of having a fixed versus growth mindset regarding one's academic abilities. A fixed mindset is the belief that intelligence and abilities are fixed and cannot be changed, whereas a growth mindset is the belief that intelligence and abilities are fluid and can be improved upon with hard work. Students with a growth mindset employ deeper learning strategies when engaging with material, resulting in their outperforming students with a fixed mindset. As one possible mechanism by which mindset translates into academic performance, Grant and Dweck (2003) showed that growth mindsets encouraged mastery goals, and mastery goals led to students adopting deeper learning strategies which enabled them to outperform those with a fixed mindset and performance goals.

Although research does not suggest that UR students as a whole endorse fixed mindsets more than other students, some research does indicate that having a growth versus fixed mindset helps these students achieve better academic outcomes. When Black students were involved in a training program to improve their sense that intelligence is malleable (they were asked to write a letter to a middle-school students about how intelligence is malleable), they showed greater enjoyment and interest in academics and obtained higher grades than those in the control condition (Aronson et al., 2001). Female students and Black and Latina/o/x students showed improvements in math and reading tests respectively, when they participated in a similar training program under the supervision of a mentor, who taught them that intelligence was malleable (versus fixed) and asked them to create a webpage

regarding this that could be accessed by other students (Good et al., 2003). Latina/o/x students (Broda et al., 2017) and students who were at the bottom of their class in terms of performance (Paunesku et al., 2015) showed improvements in their GPAs if they read an article discussing the plasticity of the brain and the fluidity of intelligence and participated in writing exercises that made these teachings more salient (writing about this malleability of intelligence to a student in school, etc.) in comparison to those who read a control article about getting used to the physical conditions of their academic institution. Good and colleagues (2012) showed that women in STEM showed less belonging in their degree when they perceived their context (e.g., professors, other students, etc.) as supporting a fixed mindset with regards to its students than a growth mindset, and this perception negatively predicted their grades as well, provided that they also perceived gender stereotypes in their context (Good et al., 2012).

G. Theoretical synthesis of constructs impeding UR academic performance

A significant body of research thus exists regarding the constructs that negatively affect the academic performance of UR students. Each theory has made important empirical contributions to the understanding of UR students' academic performance, providing partial explanations for why such students underperform academically in college.

However, these theories have remained relatively distinct from one another, with few attempts made to compare or combine them (for an exception, see Yeager et al., 2016). This means first, that little is known about whether these theories are proposing similar, overlapping, or complementary potential explanations for UR underperformance. Is feeling a lack of ambient belonging the same psychological experience triggered by belonging uncertainty? Is the mismatch experienced in terms of one's cultural values the same as the

mismatch experienced in terms of belonging to a social group that is stereotyped in the current context? The relative vagueness with which these constructs are defined is further complicated by the lack of literature on the cognitive and motivational processes that mediate these constructs' impact on engagement and performance (apart from stereotype threat, which has attracted considerable process-oriented research, see Schmader et al., 2008). Second, this piecemeal approach has obscured potential interactive effects of the various constructs posited to activate the suggested mechanisms, as well as possible interactive effects of the mechanisms themselves on the performance of UR students. Little is known about how the activation of one mechanism can affect the activation of another, or if students may experience additive negative effects depending on whether one or more mechanisms are activated. For instance, how would experiencing cultural mismatch affect the experience of stereotype threat? Perhaps the experience of cultural mismatch can change the experience of stereotype threat in a manner that would change the effects of stereotype threat on students' performance. Third, there has been little theoretical consideration of how or why certain constructs may have a greater impact on certain UR groups than others. The negative experiences suggested by the different theories are not experienced equally by every UR group in the college context. First-generation students may see many others like them in the context, and therefore be less likely to be affected by belonging uncertainty, whereas Latina/o/x or Black students may be more likely to suffer stereotype threat and belonging uncertainty than goal mismatch. The lack of integration among the theories leaves such comparisons speculative. Finally, the lack of theoretical integration in this literature also has practical consequences. Without this theoretical integration, there is no way to assess the relative benefit of interventions that take into account the experience of single precipitating

constructs compared to multiple constructs or that target one mechanism rather than many of them. Neither does research exist on whether targeting one group of constructs through an intervention have implications for other groups of constructs.

Underlying these individual theories of constructs that undermine UR underperformance in academic settings is a broader assumption that interactions between people and their environments are likely to activate social psychological processes that facilitate or impede engagement with and motivation in, and therefore success in, those environments. I argue that synthesizing current approaches to UR academic underperformance in terms of a more general theory of whether and why people flourish or flounder in environments will contribute to a more thorough and nuanced theoretical understanding of a) the range of mechanisms by which certain groups are vulnerable to failure, b) the interaction of such constructs, both among themselves and with groups of different susceptibility, and c) the possible mechanisms of vulnerability yet to be considered. Such a systematic consideration of features of individuals in environments focused on academic underachievement will also contribute to our practical understanding of the effectiveness of current interventions and identifying possibly more effective strategies to improve academic underperformance in UR students.

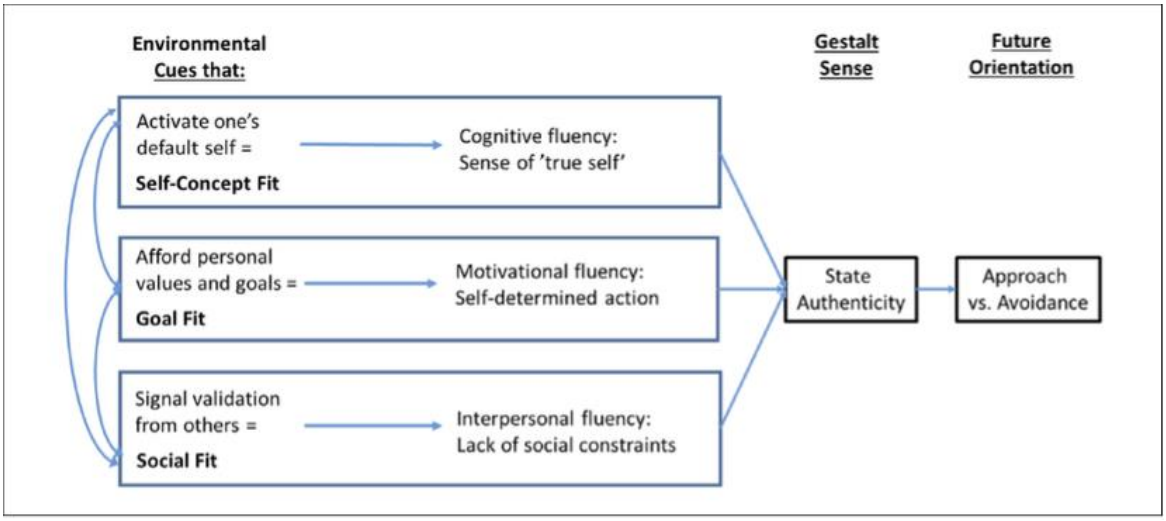
I use the recently proposed theory of State Authenticity as Fit to the Environment (SAFE; Schmader & Sedikides, 2018) as a general theory of whether and why people flourish in environments to provide a framework in which the theories of UR academic underperformance can be systematized and synthesized.

III. Section 2: The SAFE model

The SAFE model was proposed as a general model of why individuals experience authenticity in any given context (see Figure 1; Schmader & Sedikides, 2018; see also Aday & Schmader, 2019). According to the SAFE model, individuals can experience three different types of person-environment fit: self-concept, goal, and social fit. Experiencing these types of fit leads to experiencing authenticity, a state described as feeling comfortable, motivated, and accepted in a context. This in turn leads individuals to approach such contexts more, and successfully engage in them.

Figure 1

The SAFE model, demonstrating how fit, fluency, authenticity, and approach are related to one another.



Note. From Schmader & Sedikides, 2018, p. 229.

A. Self-concept fit

The first type of person-environment fit in this model is self-concept fit, which is defined as the extent to which a person perceives an environment as activating integral aspects of their identity or who they are as a person. People experiencing high self-concept fit feel as if they can be their "true self" in the given context, that the traits and qualities

uniquely important to them are ones that also "work in' or "work with" the environment. In contrast, when people feel as if they have to change aspects of their personality to fit into the context and that their qualities and characteristics are not those needed, valued, or allowed in the environment, they experience low self-concept fit. For example, imagine a college student in a biology major who considers the appreciation of biological sciences to be an integral part of their personality. They have hobbies that involve some aspect of biology and regularly read about new discoveries in biology during their spare time. Such an individual is likely to feel like the environment of their major allows them to express these characteristics and their true selves, leading to them experiencing higher self-concept fit. On the other hand, a student in a biology major who does not engage in the biological sciences in their spare time and does not have a strong passion for this topic may feel like the environment of their major demands traits and attributes that are not integral aspects of who they are, thus making them feel that they need to become someone else in order to fit in and succeed in college, leading to them experiencing low self-concept fit in college.

B. Cognitive fluency

According to the SAFE model, experiencing self-concept fit leads to experiencing cognitive fluency. This is described as the ease with which self-relevant information is processed in a given context (Aday & Schmader, 2019; Maslow, 1999; Schmader & Sedikides, 2018). The greater cognitive fluency people feel, the less likely they are to think about *how* they fit into a context, and the more likely they are to just be themselves with no concerns about how their behaviors are being interpreted or perceived. Individuals with higher cognitive fluency are likely to feel focused during tasks and be able to concentrate fully on what they are doing, whereas individuals with low cognitive fluency are likely to

feel self-conscious and distracted by thoughts regarding themselves. Increases in cognitive fluency, in turn, lead to greater feelings of authenticity, that in turn lead to increased approach of the context and improved performance in it.

C. Goal fit

Goal fit refers to how closely a person's internal goals match the goals of the environment. If working in a particular environment allows for the pursuit of goals valuable to the self, the person experiences high goal fit, whereas pursuing goals incompatible with one's own results in low goal fit. For example, when college students feel as if they are pursuing their own goals in pursuing the goals set by their major, they feel high goal fit, whereas college students who feel as if the goals set by professors teaching their classes are not the same as the goals they personally value experience low goal fit.

D. Motivational fluency

Experiencing goal fit leads to motivational fluency, which is an ease with which goals in the context can be pursued because they are intrinsically important to the individual (Aday & Schmader, 2019; Schmader & Sedikides, 2018). People who experience motivational fluency are described as experiencing self-determination when fulfilling the goals set by their context, because these goals are the same as their own personal goals. Thus, motivational fluency also leads to a greater feeling of authenticity, as individuals can pursue goals that they feel are important, which in turn leads to them approaching this context more and performing better in it.

E. Social fit

Social fit refers to the extent to which a person feels that others in the environment are either like them and accept them for who they are. The social fit component of the SAFE

framework encompasses the feeling of belonging to an environment in terms of being in the presence of others who share one or more social identities with you, and/or being in the presence of others who accept you for who you are. For example, college students who see other college students with whom they share one or more social group membership, or who feel as if they are accepted and valued when interacting with other college students, experience high social fit, whereas college students with low social fit will feel as if they must change parts of their personality or mannerisms to get along with other college students. Although self-concept fit and social fit are somewhat similar, Schmader and Sedikides (2018) differentiate these two in terms of the social component involved in social fit. Whereas students can experience high or low self-concept fit without interacting with the people present in that context, high and low social fit require interactions with the people who inhabit the context.

F. Interpersonal fluency

Experiencing social fit leads to interpersonal fluency, which is the ease with which social connections can be formed because other individuals in the context are similar to or accepting of the individual. Individuals who experience interpersonal fluency feel that they can be their true selves around the people in the context and be accepted by these people (Goffman, 1959; Schmader & Sedikides, 2018), and thus they worry less about how they are presenting themselves to these others. Individuals who do not experience interpersonal fluency remain extremely conscious of their behaviors and not feel comfortable being themselves in front of others. High interpersonal fluency leads to individuals feeling more authentic. Such individuals therefore approach such contexts more and again perform better in them.

G. Authenticity

Authenticity is described as the extent to which an individual feels that aspects of their self and identity fit in the environment (Schmader & Sedikides, 2018). These researchers argue that authenticity comprises feeling high self-concept, high goal, *and* high social fit (all three are necessary), and results in individuals approaching and engaging with an environment to a greater extent.

H. Approach motivation

Approach motivation is described as an individual's desire to engage with a context and obtain positive results in this context (Elliot & Church, 1997; Schmader & Sedikides, 2018). It is the drive to succeed versus the drive to avoid failure. Individuals who experience approach motivation in the college context or within the context of their major are more likely to cultivate mastery goals in college and therefore actively engage in the learning environment and obtain better learning outcomes (Elliot & Church, 1997).

IV. Section 3: SAFE as a theoretical model explaining UR academic underperformance

I argue that the SAFE model provides a theoretically coherent framework for synthesizing and integrating current approaches to UR academic underperformance in terms of a more general theory of whether and why people flourish or fail in environments. In essence, the SAFE model argues that the psychological experience of authenticity, derived from various kinds of "fit" between the individual and an environment, allows for engagement with and motivation in that environment. It thus provides an overarching theoretical explanation for the social psychological conditions under which UR college students might engage in, be motivated by, and presumably therefore succeed in, college environments, or not. Indeed, Schmader and Sedikides (2018) note that members of

underrepresented groups may be more likely to experience lower levels of fit in environments created by members of non-underrepresented groups. The three component structure of the SAFE framework suggests that college success occurs as the result of motivated and engaged performance that results from authenticity, which in turn results from the level of fit students feel between their own identity and the college environment (self-concept fit), between their own goals and the goals set in the college environment (goal fit), and between themselves and other students in the college environment (social fit). In fact, the main theories proposed to account for the lack of UR college success (described above) can be interpreted as appealing to one of each of these three components of person-environment fit.

A. Self-concept fit in academic settings

Self-concept fit refers to experiencing fit between one's identity and the characteristics of the context. The construct of ambient belonging seems to reflect self-concept fit. Academic ambient belonging depends on the perception that one's own traits, characteristics, or identity (e.g. being a woman) do or do not match the traits, characteristics, and identities called forth by one's academic surroundings (e.g. a computer science classroom adorned with either stereotypically masculine objects or neutral objects). Thus, the experience of ambient belonging (or lack thereof) is an example of high (versus low) self-concept fit.

Stereotype threat might also be seen as producing its well-known effects via the lack of self-concept fit. Individuals experiencing stereotype threat are aware (or are made aware) that the traits and characteristics they presumably have as members of a particular social group (that is, as a woman) are not considered to work in or fit with the current academic

context (that is, taking a math test) given the negative stereotypes tied to their performance in this context. Thus, stereotype threat can be argued to arise when individuals experience low self-concept fit. Stereotype threat is part of the experience of a lack of self-concept fit.

Finally, having a growth mindset might also be thought of as relevant to self-concept fit. Although having a growth mindset does not refer directly to experiencing a match between an individual's integral traits, characteristics, or identity and the current environment, it implies the ability to develop the attributes that do match or are required in that environment. In an academic setting, having a growth mindset allows students to feel as if they are capable of developing the skills and attitudes that are required for success in college, thus facilitating high self-concept fit.

B. Goal fit in academic settings.

Goal fit refers to how well your own goals and the goals of your context match each other. Thus, the idea of cultural mismatch fits perfectly as an example of low goal fit, as one way of measuring cultural mismatch focuses on whether your goals for being in college are different from those upheld or endorsed by the college environment in general, or by any particular major.

The importance of mastery versus performance goals for academic achievement are also directly relevant to the concept of goal fit. Holding mastery goals and experiencing the improved academic outcomes typically associated with them can be interpreted as experiencing (and reaping the benefits of) high goal fit. Mastery goals are typically promoted as ideal by colleges and universities (for example, colleges emphasize the importance of pursuing your passions and getting a well-rounded education; Stephens, Fryberg et al., 2012) and thus groups who hold them will experience the sense that their goals align with those

encouraged in the context, leading to high goal fit. Holding performance goals (passing the required number of classes or concentrating on a major with strong career prospects), in contrast, may lead to low goal fit in such environments.

C. Social fit in academic settings

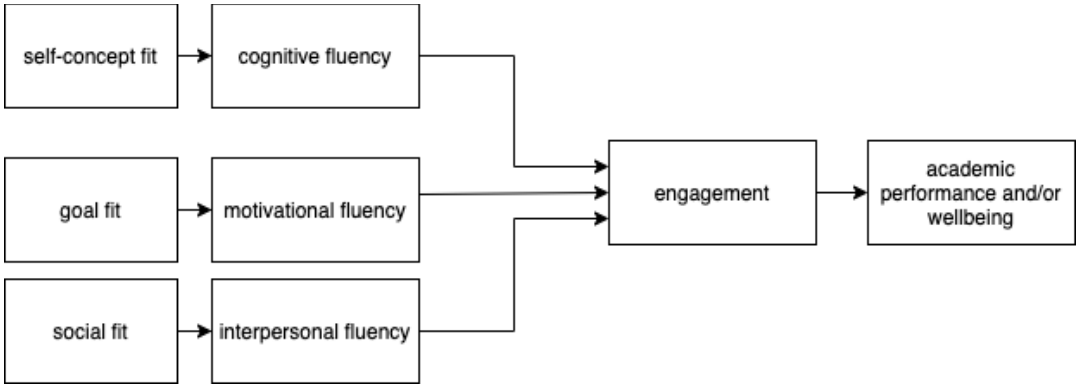
Finally, social fit refers to seeing similar others around oneself in a given context and/or feeling accepted and valued by others in a given context. Belonging uncertainty is described as arising out of the perception that one is unique or different in an academic context and that similar others do not inhabit the context. Thus, the experience of belonging uncertainty appears almost identical to the experience of low social fit. Interestingly, none of the major theories of UR academic underperformance focuses primarily or directly on individuals feeling like their true personality would not be accepted by the people around them, which is the other aspect of social fit.

V. Section 4: The Student Fit in College Environments (S'FICE) model

As this discussion reveals, the main current theories suggested to explain the academic underperformance of UR students can be interpreted using the SAFE model as focusing on conditions that produce low self-concept fit, goal fit, or social fit. I proposed a modified version of the SAFE model, the Student Fit In College Environments (S'FICE; see Figure 2) model, which subsumes the previously proposed multiple constructs underlying UR academic performance, as a theoretically more compelling explanation of UR academic underperformance in college and university settings.

Figure 2

The S'FICE model



A. Self-concept, goal, and social fit in the S'FICE model

I argue that the experiences of individuals facing stereotype threat, ambient belonging, and so forth are actually the experience of self-concept fit, goal fit, and/or social fit, which are more proximal psychological predictors of how these experiences influence academic outcomes.

Although Aday and Schmader (personal communication, November 20, 2018) developed their own instrument for measuring self-concept, goal, and social fit (see Appendix B), I argue that this instrument cannot be used because there is no indication that the authors used current disciplinary standards for scale development (Wilson, 2005) or scale validation (AERA et al., 2014) when developing the items for their instrument (discussed in further detail later). Thus, I developed a new instrument (the S'FICE instrument) that measures self-concept, goal, and social fit within the context of being a college student in a university setting in the U.S.

B. Cognitive, motivational, and interpersonal fluency in the S'FICE model

The effect that low self-concept, goal, and social fit have on academic performance may be explained through a negative impact on UR students' sense of cognitive, motivational, or interpersonal fluency. In the SAFE model, these constructs are the mediators

between feelings of fit and the experience of authenticity, which in turn triggers approach or engagement. These constructs have potential theoretical interest in the S'FICE model because they may be more direct mediators of engagement within academic contexts. For example, cognitive fluency, or the ease with which self-relevant information is processed in a given context, allows resources to be applied to the task important in the context, rather than to be consumed or diverted in a way that promises to reduce performance (as is suggested by stereotype threat, for example). Similarly, motivational fluency refers to the ease with which goals in the context can be approached, a factor that is important for constructs such as mastery goals and cultural mismatch. Interpersonal fluency allows individuals to easily form relationships with other individuals in the context, which is important in preventing a sense of belonging uncertainty. Thus these factors are retained in the S'FICE model.

In the studies detailed below, the three types of fluency were measured using the instrument developed by Aday and Schmader (personal communication, November 20, 2018; see Appendix B). This instrument consists of three subscales: cognitive fluency, motivational fluency, and social fluency. Each of these subscales consists of five 7-point Likert scale items (the anchors for the items differ). An example of an item used to measure cognitive fluency is "My concentration levels have been ___" (the Likert scale ranged from 1 Low to 7 High). An example of an item used to measure motivational fluency is "My ability to pursue my goals has felt ___" (the Likert scale ranged from 1 Difficult to 7 Effortless). An example of an item used to measure interpersonal fluency is "My ability to interact with others has felt ___" (the Likert scale ranged from 1 Forced to 7 Natural).

Although there is no evidence to show that this instrument was developed and validated according to current standards (AERA et al., 2014; Wilson, 2005), the unpublished

data collected on this instrument point toward it being relatively better than the instrument the researchers designed to measure fit. The correlations between the subscales do not exceed .7 (A. Aday, & T. Schmader, personal communication, November 20, 2018) and thus do not point towards an issue of multicollinearity, unlike the fit items (discussed in detail below). Thus, I propose that the fluency instrument suffices for the purposes of my studies, although future work in further developing this instrument will be beneficial.

C. Authenticity

On the other hand, authenticity, as the construct that results from experiencing all three types of fluency in the SAFE model, appears largely redundant. From its description, authenticity is very similar to the subcomponent self-concept fit, as it is described as the extent to which individuals can be completely comfortable in their environment. The single item used to measure authenticity is an adapted version of Aron and colleagues' (1992) Inclusion of Self in Other (IOS) measure and asks respondents to focus on the extent to which their real self overlaps with their environment (see Appendix B). This item has significant overlap with the construct of self-concept fit, given that self-concept fit is about the extent to which individuals feel like they can be their real self in their environment. Further, initial data analyses conducted by Aday and Schmader (personal communication, November 20, 2018) have also revealed inconclusive results about the extent to which authenticity mediates the relationship between fit and approach towards the context. For these theoretical and measurement reasons, I do not consider the general concept of authenticity in the S'FICE model.

D. Approach motivation versus engagement as a predictor of academic performance

In the SAFE model, high levels of all three types of fluency (cognitive, motivational, and interpersonal) are theorized to be necessary for greater authenticity, and therefore for greater approach motivation, to be experienced. Greater approach motivation toward an environment was in turn theorized to lead to greater performance in this environment. In unpublished data, Schmader and Aday (personal communication, November 20, 2018) collected responses on a widely used instrument designed to measure sensitivity to the Behavioral Inhibition System and the Behavioral Activation System (BIS/BAS; Carver & White, 1994) that has been used to measure tendencies to engage in approach and/or avoidance (Jorm et al., 1999).

However, in previous literature, performance in college environments has been tied to a similar, but distinct concept: engagement. Walton and Cohen (2007), for instance, found that compared to students in a control condition, Black students targeted with a manipulation designed to reduce belonging uncertainty showed a greater desire to participate in activities that showed engagement to the college environment (e.g., attending office hours, going to review sessions, organizing study groups). Stephens and colleagues (2014) also found that first-generation students who were the subjects of an intervention aimed at reducing cultural mismatch showed more engagement-oriented academic behaviors (e.g., email professors for extra help). Cheryan and colleagues (2009) demonstrated that experiencing a lack of ambient belonging made women considering entering a computer science major less willing to approach and engage with this major. Finally, experiencing stereotype threat has been shown to lead to disidentification with the stereotyped domain (Schmader et al., 2015) and reduced desire to engage in this domain (Smith et al., 2015).

Thus, I argue that engagement is a more fitting construct for the S'FICE model. The first piece of evidence for this argument is that previous research on the academic performance of UR students focused on increasing UR students' academic engagement in order to improve their academic performance. The second piece of evidence is that previous research has found a connection between engagement and academic performance, whereby greater engagement has been associated with better academic performance (Martínez et al., 2019; Simpson & Burnett, 2017; Vizoso et al., 2018).

E. Predictions regarding the S'FICE model

To summarize my predictions for the S'FICE model, I first argue that increased self-concept fit, goal fit, and social fit lead to increased cognitive, motivational, and interpersonal fluency, respectively. Further, I argue that self-concept, goal, and social fit are all related to each other but that each of them uniquely predict engagement in academic-related activities via their respective type of fluency. I also posit that students who experience all three types of fit show greater engagement compared to students who experience one or two types of fit. This increased engagement in turn leads to improved academic performance and I predict that each type of fit will predict academic performance via its respective type of fluency and engagement.

In conclusion, I argue that the S'FICE model has the potential to replace previously proposed constructs in explaining the processes underlying UR students' academic underperformance.

I make an additional exploratory prediction regarding UR students' wellbeing. I predict that UR students' engagement will also predict wellbeing and that each type of fit will predict wellbeing via its respective type of fluency and engagement. The exploratory

expectation that engagement will be associated with wellbeing stems from previous research showing a positive relationship between these two constructs (Upadyaya & Salmela-Aro, 2013).

Testing the S'FICE model was the focus of my dissertation research. As a first step in this process, I developed an instrument that can appropriately measure the levels of self-concept, goal, and social fit that undergraduate UR students experience in their university and/or major setting and provide validity evidence for the instrument in Study 1 and Study 3. Using this instrument, I tested a series of hypotheses regarding the S'FICE model in Study 2 and Study 4:

Model Hypothesis 1: self-concept, goal, and social fit will be positively and moderately correlated (correlations ranging between .1 - .3; Cohen, 1988) to one another (Study 2 and Study 4)

Model Hypothesis 2: self-concept fit, goal fit, and social fit will each be uniquely associated with engagement (Study 2 and Study 4)

Model Hypothesis 2a: higher levels of all three types of fit will be associated with greater engagement compared to higher levels of one type of fit or lower levels of all three types of fit

Model Hypothesis 2b: higher levels of self-concept fit will be associated with higher levels of engagement compared to lower levels of all three types of fit

Model Hypothesis 2c: higher levels of goal fit will be associated with higher levels of engagement compared to lower levels of all three types of fit

Model Hypothesis 2d: higher levels of social fit will be associated with higher levels of engagement compared to lower levels of all three types of fit

Model Hypothesis 3: fit will predict fluency (Study 2 and Study 4)

Model Hypothesis 3a: higher levels of self-concept fit will be associated with higher levels of cognitive fluency

Model Hypothesis 3b: higher levels of goal fit will be associated with higher levels of motivational fluency

Model Hypothesis 3c: higher levels of social fit will be associated with higher levels of interpersonal fluency

Model Hypothesis 4: fit will be associated with engagement via fluency (Study 2 and 3)

Model Hypothesis 4a: higher levels of self-concept fit will be associated with greater engagement via higher levels of cognitive fluency

Model Hypothesis 4b: higher levels of goal fit will be associated with greater engagement via higher levels of motivational fluency

Model Hypothesis 4c: higher levels of social fit will be associated with greater engagement via higher levels of interpersonal fluency

Model Hypothesis 5: engagement will positively and strongly correlate (correlations exceeding .3; Cohen, 1988) with academic performance (Study 4)

Model Hypothesis 6: fit will be associated with academic performance via fluency and engagement (Study 4)

Model Hypothesis 6a: higher levels of self-concept fit will be associated with greater academic performance via higher levels of cognitive fluency and greater engagement

Model Hypothesis 6b: higher levels of goal fit will be associated with greater academic performance via higher levels of motivational fluency and greater engagement

Model Hypothesis 6c: higher levels of social fit will be associated with greater academic performance via higher levels of interpersonal fluency and greater engagement

Model Hypothesis 7 (Exploratory): engagement will positively and strongly correlate (correlations exceeding .3; Cohen, 1988) with wellbeing (Study 4)

Model Hypothesis 8 (Exploratory): fit will be associated with wellbeing via fluency and engagement (Study 4)

Model Hypothesis 8a (Exploratory): higher levels of self-concept fit will be associated with greater wellbeing via higher levels of cognitive fluency and greater engagement

Model Hypothesis 8b (Exploratory): higher levels of goal fit will be associated with greater wellbeing via higher levels of motivational fluency and greater engagement

Model Hypothesis 8c (Exploratory): higher levels of social fit will be associated with greater wellbeing via higher levels of interpersonal fluency and greater engagement

I tested these Model Hypotheses regarding the S'FICE model in an experimental study (Study 2) and a correlational longitudinal study (Study 4).

The development and testing of this new model of UR performance in academic domains was intended to contribute theoretically to our understanding of UR students'

academic performance in college and also exploratively expand our understanding of factors influencing UR students' wellbeing. It was also intended to contribute practically to our ability to validly assess conditions contributing to UR students' academic underperformance and interventions designed to improve such performance.

VI. Section 5: Development of the S'FICE Instrument

An adequate test of the S'FICE model required the development of a theoretically-derived well-validated instrument for assessing self-concept, goal, and social fit in the college environment for use with UR populations. Such an instrument could then be used a) to assess the effectiveness of manipulations or interventions designed to manipulate the three aspects of fit independently or together and b) identify UR students experiencing a lack of one or more of the three kinds of fit in college or in their major. This instrument would also be able to be used a) to test whether the three types of fit of the SAFE model encompass the currently proposed constructs that previous theorists have shown to affect UR students' academic performance, and b) whether experiencing a lack of multiple types of fit has interactive effects that are different from experiencing a lack of a single type of fit.

In unpublished work, Aday and Schmader (personal communication, November 20, 2018) used a 14-item instrument (Appendix B) to measure environment fit. There is no evidence that disciplinary standards for instrument development (Wilson, 2005) or for instrument validation (AERA et al., 2014) were followed in the creation of these items. Regarding scale development, for example, although Schmader and Sedikides (2018) specified that self-concept, goal, and social fit were separate subcomponents somewhat related under the umbrella term of fit to the environment, the specific levels of fit (high or low, or more nuanced degrees) people could experience were not specified. Their items used

a 7-point scale ranging from Strongly Disagree to Strongly Agree, but it is unclear whether Schmader and Sedikides anticipate respondents showing 7 different levels of self-concept, goal, and social fit each (note that in their theoretical discussion Schmader and Sedikides (2018) merely describe high or low levels of each type of fit). Aday and Schmader (personal communication, November 20, 2018) thus leave it unclear as to how the responses on their 14-item instrument with a 7-point rating scale can be used to categorize students into the different, also unspecified, levels of self-concept, goal, and social fit. Nor did Aday and Schmader's instrument (personal communication, November 20, 2018) follow disciplinary practice in consulting with those who have more real-life experience in dealing with the construct of interest to ensure that appropriate types of items were included. In unpublished data, Aday and Schmader (personal communication, November 20, 2018) reported concerningly high correlations between these three types of fit. According to current guidelines (Darlington & Hayes, 2017) correlations that exceed .7 are indicative of multicollinearity among variables, suggesting that the items measuring self-concept, goal, and social fit may be tapping into constructs that have a lot of overlap. This may either mean that the constructs of self-concept, goal, and social fit are conceptually more similar than the authors (Schmader & Sedikides, 2018) anticipated them to be, or that the items designed to measure each type of fit were not designed well enough to measure the variability of the construct they were intended to measure. Given that Aday and Schmader (personal communication, November 20, 2018) do not show an indication of having followed the current standards for item development and validation, it is impossible to know the reason behind the high correlations between self-concept, goal, and social fit scores.

As regards validity, no research validating this instrument has been published. Although Aday and Schmader (personal communication, November 20, 2018) report Cronbach's α scores for self-concept, goal, and social fit items, they used factor analysis rather than a measurement model to see how these items relate to the individuals responding to them or how these items contribute to an understanding of the construct of SAFE. Cronbach's α has been critiqued as a tool for measuring reliability because of how it is calculated (Sijtsma, 2009), which includes being overly dependent on the number of items in the instrument (Nunnally, 1978). Cronbach's α has also been incorrectly used as a measurement of internal consistency (Sijtsma, 2009), an aspect of validity that refers to the extent to which the results of an instrument can be psychologically interpreted (Cronbach, 1951). Sijtsma (2009) argues that Cronbach's α cannot be used to make estimations of the unidimensionality of an instrument (because it is not sensitive to the factor structure of an instrument) and thus cannot be used to estimate the internal consistency of an instrument, and functions as a somewhat inaccurate judge of instrument reliability. Therefore, Aday and Schmader's (personal communication, November 20, 2018) measure has not been subjected to the appropriate tests to ensure that their items measure the presence of self-concept, goal, and social fit in individuals. It is unclear whether the items in their instrument are worded in a manner that taps into how individuals of varying levels of fit experience each type of fit, how many levels of each type of fit individuals are likely to experience, and how the items and the responses they elicit contribute to the theoretical understanding of the SAFE model.

Given the importance of the fit constructs to the S'FICE model of UR academic underperformance, I therefore developed the S'FICE instrument to capture the constructs of

self-concept, goal fit, and social fit in college and university academic settings following disciplinary standards for test development and validation.

A. The four building blocks of construct modeling

According to Wilson (2005), researchers intent on creating an instrument that measures a construct that they have created must follow a cyclic process consisting of: construct mapping, item design, the development of an outcome space, and the use of a measurement model to test the relationship between the items and the construct map.

Construct mapping involves specifying the construct of interest, its subcomponents, and the different levels of "ability" for each component. Ability refers to the "amount" of the construct that the person can possess. Construct mapping also requires consulting with people outside the immediate network available to researchers, people who have more real-life experience in dealing with the construct of interest and can give input on the levels of "ability" for each subcomponent as well as guide researchers to the types of items that they should develop.

Item design, the next step, involves creating items that can measure how the construct manifests itself in the real world. Researchers use the construct map and their understanding of the levels of ability people can have to create items that tap into these different levels of ability of the construct. During this phase, researchers also carefully choose a response scale based on their understanding of the different levels of ability of the construct. Wilson (2005) warns that if item design is done without the use of a construct map and without giving thought to how the items can encompass the construct of interest, item development and/or item selection will be arbitrary, with the consequence that such items will not be helpful in

understanding how individuals experience the construct or how the construct manifests itself among the population of interest.

Creating an outcome space refers to constructing a structured approach to how each item is scored and how these scores can be categorized into the different subcomponents and their respective levels of "ability." Thus, at this phase researchers need to generate examples of how students with different levels of ability would answer a given item.

Finally, running a measurement model requires using a statistical model to evaluate how each of the items contributes to the measurement of the construct of interest. The chosen model assesses whether the scoring system specified in the outcome space mapping phase ties to the construct mapping phase. The statistical test assesses the extent to which participants' scores on the items purportedly measuring low, medium, and high levels of each subcomponent of the construct hang together, to ensure that participants respond similarly to all items that measure each level of a specific subcomponent of the construct.

B. Standards for Test Validation

According to the guidelines for validating standardized instruments that measure the presence of a psychological construct in individuals (AERA et al., 2014), different types of validity are no longer recognized. Instead, different types of evidence are collected in support of various aspects of a single construct of validity. Not all types of evidence are required to establish validity. Instead, researchers must establish a set of propositions that would support the validity of their test, and use various types of evidence (theoretical, logical, and/or empirical data) to support these propositions. AERA, APA, and NCME (2014) highlight the standards that must be followed in order to provide support for the validity of a test within the context, purpose, and population it is intended for. Standard 1.1 requires the purpose of

the instrument to be stated. Standard 1.2 requires propositions to be stated that upon being supported with evidence will in turn support the claim of validity.

I therefore developed the S'FICE instrument to capture the constructs of self-concept, goal fit, and social fit in college and university academic settings following disciplinary standards for test development (see below) and validation. Following Standard 1.1, I stated the following intentions regarding validating the S'FICE instrument:

- I intended to validate the S'FICE instrument to use it as a measure of the level of self-concept fit, goal fit, and social fit that UR college students in the U.S. experience with regard to the university setting and/or the major that they are in.
- I intended for the S'FICE instrument to be used to make decisions about the levels of self-concept, goal, and social fit individual students are experiencing to direct them to workshops and/or interventions designed to increase the specific type of fit to college that they are lacking.

Following Standard 1.2, I stated the following propositions regarding validity:

- Proposition 1: The psychological experiences captured by the constructs of self-concept fit, goal fit, and social fit in the S'FICE model are assessed by the items included in the S'FICE instrument. (see section five)
- Proposition 2: The internal structure of the S'FICE instrument as revealed by data collected using it will match the structure of the S'FICE model (that is, participants' responses will reveal three distinct subcomponents of: self-concept fit, goal fit, and social fit). (see Study 1)
- Proposition 3: Responses to the S'FICE instrument will be moderately correlated with, but distinct from, responses to other instruments used to assess the constructs of

stereotype threat, belonging uncertainty, ambient belonging, and cultural mismatch (see Study 4).

C. Development of the construct map and interview instrument

Wilson's (2005) item response modeling approach was employed in the development of the S'FICE instrument. Construct maps were created that described what the expected levels of fit in self-concept, goal, and social fit were. Given Schmader and Sedikides' (2018) conceptual descriptions, three levels of fit were specified (high, medium, and low) and explanations of how students experiencing each level of each type of fit were generated.

Using the construct map as a guide, interview questions were generated that would allow for UR participants to explain how they thought about the constructs of self-concept fit, goal fit, and social fit. These interview items consisted of a set of open-ended questions, Likert scale items, and items adapted from the IOS (Inclusion of Self in Other; Aron et al., 1992) instrument (see Appendix C). A set of 37 questions intended to provoke differing responses from students across the entire spectrum of each type of fit were created, so that the thought processes of students with low, medium, and high levels of self-concept, goal, and belonging fit could be identified.

1. Cognitive interviews for the interview questions

To ensure that the generated interview questions were interpreted in the manner that they were intended to be interpreted in, a set of cognitive interviews were run on a small group of undergraduate and graduate students (N = 5, M_{age}= 24.6, 3 females, 2 females in STEM, 2 Latina/o/x students, and 1 first-generation student). Following standard cognitive interview procedures, I took notes as each participant described how they interpreted the 37

questions, how they decided to answer them, and their thought processes as they answered them.

The cognitive interviews identified questions that were confusing, misleading, or too broad and questions that led to answers that did not differentiate among various components of the construct map. They also suggested new questions necessary to accurately measure the different types of fit as well as new wording for some items to focus respondents' attention on either college as a whole or their particular major. Many questions were also restructured so that they mentioned the students' major at the end (e.g., And if you don't mind, I'd like to ask a few demographics questions about you as a [insert student's major] major as well). Follow-up questions that were specific to the type of answers the students provided were also designed (e.g., students who said some/most of their closest friends were in UCSB with them answered follow-up questions that were different from those who said that their closest friends were not at UCSB). These adjustments led to the development of the final interview instrument measure with 40 items.

D. Administration of interview instrument

The interview instrument was administered to a sample of UR STEM students (N = 13; 10 females; 7 Latina/o/x students, 6 first-generation students). All students were interviewed separately by a Research Assistant matched to interviewees by gender and race/ethnicity. All participants received a $10 Amazon gift card for their participation. The interviews were recorded and later transcribed.

The transcripts of the interviews were used to understand how students were interpreting and experiencing self-concept, goal, and social fit in their college and major. The concepts that they discussed within each of the fit constructs were used to create the next

instrument: the S'FICE instrument that comprised 65 Likert scale items. The intention of creating the S'FICE instrument was to design a standardized instrument that could be administered to large groups of students simultaneously or online. These 65 items comprised the first draft of the S'FICE instrument.

E. Cognitive interviews for the S'FICE instrument and final generation of S'FICE items

Following Wilson's (2005) iterative process, cognitive interviews were conducted on the first draft of the S'FICE instrument to confirm that the responses produced by participants in the interviews reflecting their experiences of self-concept, goal, and social fit were covered by the items in the S'FICE instrument (see Proposition 1). My sample consisted of undergraduate UR students (N = 6; 3 Latina/o/x and 1 Black; 4 females in STEM; 1 first-generation). Once again, I requested participants to discuss their thought processes as they answered each question.

The cognitive interviews confirmed that the items in the S'FICE instrument sufficiently covered the constructs of self-concept, goal, and social fit. The results also guided the rewording of items that were flagged as confusing and the changing of all items on to the same Likert scale. The cognitive interviews also highlighted a set of items that were semantically redundant with other items in my instrument. I eliminated these redundant items. Although the first round of Likert items had "Agree", "Neutral", and "Disagree" to differentiate among the three levels of fit, interviewees indicated a need to have more options than this. None of them selected "Neutral" as a scale option and tended to either agree or disagree with each item. However, they agreed or disagreed with an item either to a lesser extent or to a stronger extent, so to allow for this responding style, I removed "Neutral" as a

scale option, and instead gave my instrument a 4-point scale that ran from “Strongly Agree” to “Agree” to “Disagree” to “Strongly Disagree.” Although this contradicted the earlier construct map, it was strongly supported by the cognitive interviews I conducted with the actual items that I selected to include in the S’FICE instrument. This change led to a revision in the construct map whereby the levels of fit were changed from Low, Medium, and High, to Extremely Low, Somewhat Low, Somewhat High, and Extremely High. Changes recommended from the cognitive interviews were again made to individual items.

Following Wilson’s (2005) item response modeling approach resulted in Version 1 of the S’FICE instrument that had a set of 34 Likert scale items (see Appendix A).

VII. Section 6: Study 1 - Initial validation of the S’FICE instrument

The S’FICE instrument was administered online to a sample of UR college students in the U.S. to examine how they responded to these 34 Likert scale items. The goal of Study 1 was to provide initial validity evidence consistent with Proposition 2 that responses to the S’FICE instrument had an internal structure that conformed to the structure proposed by the S’FICE model. That is, data collected using the S’FICE instrument from UR college students in the U.S. would show evidence of three distinct subcomponents of self-concept fit, goal fit, and social fit, each with four levels of degree of fit. The veracity of Proposition 2 was evaluated by using the multidimensional Rasch rating-scale approach (justification for using this model is given below; Andrich, 1978) to model the data, as recommended by Wilson (2005).

A. Justification for using the Rasch rating-scale model

Self-concept, goal, and social fit are commonly modeled as continuous variables (Schmader & Sedikides, 2018), but participants responded to questions of these types of fit

on Likert scales, which are inherently categorical, as they consist of finite, ordered options that participants choose from. In other words, the four scale points for each item in the S'FICE instrument represents a stage of fit that UR students of only a particular level of fit are more likely to choose. For instance, let us assume a UR student possesses extremely high self-concept fit. This student would find it relatively easy to choose "Strongly Agree" to an item that indicates high self-concept fit, whereas a student with somewhat less self-concept fit might be less likely to choose "Strongly Agree" for this item. Thus, although self-concept fit is a continuous latent variable (as are the other types of fit), UR students' probability of choosing between the four different scale options renders the outcome space of each item of the S'FICE instrument categorical. Given this nature of the latent and observed variables of fit, I selected to use a measurement model based on Item Response Theory rather than factor analysis to analyze the data (Mari & Wilson 2014).

To justify the specific type of measurement model I chose from the series of models available under Item Response Theory, I need to elaborate on my theoretical expectations of the S'FICE instrument.

Item Response Theory maps out the relationship between item difficulty and (in this case) a person's fit to college to estimate the likelihood that a person would respond in an expected way to an item (Wilson, 2003). According to the model of a dichotomous item (i.e., an item with only two response options, such as "yes" and "no"), if a person's fit to college and the difficulty of an item are equally matched, there's a 50% chance that the person will agree with this item. The higher a person's fit to college is in comparison to the item difficulty, the more likely the person is to endorse this item and the lower a person's fit to college is in comparison to the item, the lower the likelihood of them endorsing this item.

This concept extends to items with multiple answer choices as well, such as the items of the S'FICE instrument. In the case of the S'FICE instrument, each item has four answer choices: Strongly Disagree, Disagree, Agree, and Strongly Agree. Now one must think of the probability of selecting a particular answer choice in terms of the thresholds between the items. In this case, there are thresholds between Strongly Disagree and Disagree, Disagree and Agree, and Agree and Strongly Agree. So, if Person A has fit to college that matches the difficulty of a particular threshold (e.g., between Agree and Strongly Agree), there is a 50% chance Person A will choose Strongly Agree and a 50% chance they will choose one of the options below this threshold (i.e., Strongly Disagree, Disagree, or Agree). If another person (Person B) has a higher level of fit to college than Person A, there is a greater likelihood that Person B will choose Strongly Agree compared to the other options. As another example, if Person A's fit to college matches the difficulty of the threshold between Strongly Disagree and Disagree, there is a 50% chance that they will choose Strongly Disagree and a 50% chance they will choose Disagree, Agree, or Strongly Agree. Now if Person B's fit to college was lower than Person A's fit, then Person B is even more likely to choose Strongly Disagree compared to Disagree, Agree, or Strongly Agree.

This quality applies to all measurement models under Item Response Theory. The theoretical expectation that sets the S'FICE instrument apart is invariance. I theorize that the difference between a difficult item and a somewhat less difficult item remains the same regardless of the ability of the person. Let's examine a specific item to elaborate on this concept: "I am basically the same person in college as I am in the place I am most comfortable in". This is an item designed to measure self-concept fit. Theoretically speaking, I designed this item to measure very high self-concept fit, because the highest form of self-

concept fit to college is described as feeling like one can be one's true self in college. Based on previous discussion, this means that a student with very high self-concept fit ability, would select "Strongly Agree" to this item at a probability of .5 and students with lower self-concept fit ability would select "Strongly Agree" at a lower probability. Now, let's consider another item: "Being a student in my major taps into who I truly am". This item also measures self-concept fit, but I theorize that it addresses a lower level of self-concept fit. I argue that a student can feel like their major taps into who they are as a person with a relatively lower levels of self-concept fit, because being a student automatically occupies a large part of their identity and life. Even students who do not feel like they are the exact same person in college as they are elsewhere need to account for classes that they attend and homework that is due in their daily lives. Thus, in terms of their daily behaviors and thinking patterns, all students, to varying extents, are more likely to acknowledge that being a student is part of their identity at this particular time of their lives. On the other hand, a smaller portion of students are likely to feel that they are the exact same person in college as they are elsewhere. In this case, a student with somewhat high self-concept fit will Strongly Agree to this item at a probability of .5 whereas a student with greater self-concept fit will Strongly Agree to it at a greater probability. So, for a student with somewhat high self-concept fit, the first item would be harder to agree with than the second item. I argue that this is the same for a student with low self-concept fit. Although their likelihood of Strongly Agreeing to either of these items is low, their probability of Strongly Agreeing with the first item (indicating higher self-concept fit) would be lower than their probability of Strongly Agreeing with the second item (see Appendix D for a further discussion of how Item Characteristic Curves

illustrate this). This hypothesized invariance is what requires the data produced by the S'FICE instrument to be analyzed using a Rasch model.

Next, I assumed, based on the cognitive interviews, that each item possesses the same rating scale. As justification for this assumption, first, each item has the same scale points (Strongly Disagree, Disagree, Agree, and Strongly Agree). Furthermore, participants who were interviewed about this instrument confirmed that they perceived the scale points similarly across items. In other words, I assumed that the distance between, for instance, Strongly Disagree and Disagree would be interpreted as similar across all items. Therefore, I chose to use the Rating Scale Model (Andrich, 1978).

Finally, given that the S'FICE theory described a multidimensional model of fit (self-concept, goal, and social fit) and that I received confirmation of that multi-dimensional structure during the cognitive interviews, I ran a multidimensional model.

Thus, I analyzed my data using the multidimensional Rasch rating-scale model.

B. Method

1. Participants

The suggested sample size for a rating-scale model is 10-20 participants per parameter. Given four scale options for each item (Strongly Disagree - Strongly Agree, yielding three step thresholds) and 34 items, the model has 37 parameters. Thus, testing the S'FICE instrument required a sample of 370-740 participants to validate using rating-scale modeling.

A sample of UR students (N = 673) and a sample of non-UR students (N = 169) were collected for this study (M_{age} = 21.45, SD_{age} = 8.54). Participants were recruited from

Amazon Mechanical Turk (MTurk) and Prolific Academic and were compensated with $3 if they were from MTurk and $2.7 if they were from Prolific.

Given that most research on UR students' academic performance has centered on Black and/or Latina/o/x students, females in STEM, and first-generation students, the sample for this study was drawn equivalently from these four UR groups. On MTurk and Prolific, each group was recruited separately, such that the study was made available only to college students who identified as Black (N = 168), Latina/o/x (N = 172), female in a STEM major (N = 174), or first-generation (N = 159). A sample of non-UR students (N = 169) was recruited as well. This sample consisted of students with no UR identities, and thus were White or Asian continuing-generation students who were not female students in STEM majors (e.g., female Asian continuing-generation student in Sociology, male White continuing-generation student in Physics, etc.).

2. Procedure

Participants were informed that the purpose of the study was to test an instrument created to assess students' college experiences. After indicating informed consent, participants first answered the S'FICE instrument (Appendix A) with the items randomized, and then answered a set of demographics questions assessing UR group memberships (e.g., race/ethnicity, gender and whether their major is STEM or not, parents' education; Appendix E). They responded to all the questions online. The procedure and measures for this study were approved by the UCSB ethics committee (under the IRB protocol 196-200016).

3. Data analysis

I ran a multidimensional Rasch rating-scale model (RSM; Andrich, 1978) to assess the internal structure of the S'FICE instrument.

a. The multidimensional Rasch rating-scale model. The multidimensional Rasch model takes into account two separate statistics: the difficulty of an item (the number of individuals who answered this item "correctly") and the "ability" of the individual (the number of items this individual answered "correctly") and computes the probability that a particular individual would answer a particular item correctly (Bond & Fox, 2015). Within the context of the S'FICE instrument, answering an item "correctly" would translate to answering an item in a way that indicates high self-concept fit, high goal fit, or high social fit (e.g., indicating "Strongly Agree" on the goal item, "The goals emphasized in my major match my own goals for being in college"). The "ability" of an individual translates to having high self-concept, goal, or social fit in this context. With Likert scale data, the model must also account for the different "thresholds" for every step (the threshold between indicating Strongly Disagree and Disagree, i.e., the level of fit a person must have for them to be equally likely to choose Disagree (or higher) versus Strongly Disagree on a given item). In a multidimensional Rasch rating-scale model, instead of plotting only item difficulty and person ability, the thresholds of each step for each item are also plotted since not all items may be of equal difficulty. For instance, the S'FICE instrument contains the following two items, "I feel out of my depth in my major" and "I have seriously considered switching my major" for measuring self-concept fit. These are both reverse-scored items since higher values indicate less self-concept fit. However, choosing Strongly Agree on the second of these two items indicates a much lower self-concept fit than choosing Strongly Agree on the first item. It is, after all, possible to feel out of one's depth in one's major without seriously considering switching out of the major. Thus, plotting the thresholds for each item accounts for how high a person's ability needs to be to endorse Disagree versus Strongly Disagree,

Agree versus Disagree, and Strongly Agree versus Agree, given the overall difficulty of the item.

The purpose of running a multidimensional Rasch rating-scale model was to provide evidence for Proposition 2 by confirming that individuals' responses fell into three distinct categories of self-concept, goal, and social fit. To provide evidence for Proposition 2, a set of more specific Instrument Hypotheses were tested in Study 1. These hypotheses were:

(1) The categories of ability would be distinct: I expected the four ability categories into which participants' responses were theorized to fit, to be reflected in how participants responded to the S'FICE instrument.

(2) The data would best fit a three-dimensional model: I expected the data to best fit a model that distinguished among the dimensions of self-concept fit, goal fit, and social fit.

(3) The items would show good fit to the model: I expected that the items would show good fit statistics, thereby indicating that they fit the overall model well and are well constructed items that do not require change or removal from the instrument.

Providing evidence for these three Instrument Hypotheses would provide evidence that the S'FICE instrument taps into three distinct categories of ability (fit in college) as proposed by the S'FICE model. This data analysis would thus provide internal structure-based evidence in partial support for the validity of using the S'FICE instrument to measure the constructs of the S'FICE model across all UR groups in U.S. colleges.

C. Results

1. Descriptive statistics

Participants' fit scores are displayed in Tables 1-4. Table 1 displays the overall S'FICE scores (after reverse-scoring negatively worded items) for participants, split by the UR group they belong to. As mentioned in the Methods section, 1 indicates extremely low fit and 4 indicates extremely high fit. As Table 1 indicates, overall S'FICE scores appear roughly similar across all measured demographic groups.

Table 1

S'FICE scores split by demographic group

Demographic group	Means and standard deviations of overall S'FICE scores	
	M	*SD*
Black	2.7	0.36
Latina/o/x	2.65	0.33
Females in STEM	2.69	0.33
First-generation	2.69	0.33
Non-UR	2.76	0.31

As Table 1 indicates, the total S'FICE scores appeared very similar across UR groups and between UR and the non-UR groups. This indicates that the S'FICE instrument appears to measure self-concept, goal, and social fit similarly across all groups.

Table 2 displays the self-concept fit scores for participants with, again, 1 indicating extremely low self-concept fit and 4 indicating extremely high self-concept fit. Similar to Table 1, Table 2 also indicates that self-concept fit scores appear consistent across all demographic groups.

Table 2

Self-concept fit scores split by demographic group

Demographic group	Means and standard deviations of self-concept fit scores	
	M	*SD*
Black	2.69	0.42
Latina/o/x	2.63	0.38
Females in STEM	2.65	0.36
First-generation	2.66	0.38
Non-UR	2.73	0.35

Table 3 displays the goal fit scores for participants with 1 indicating extremely low goal fit and 4 indicating extremely high goal fit. Similar to previous responses, goal fit scores appeared similar across all demographic groups.

Table 3

Goal fit scores split by demographic group

Demographic group	Means and standard deviations of goal fit scores	
	M	*SD*
Black	2.94	0.45
Latina/o/x	2.95	0.41
Females in STEM	2.89	0.45
First-generation	2.96	0.43
Non-UR	2.99	0.4

Finally, Table 4 displays the social fit scores for participants with 1 indicating extremely low social fit and 4 indicating extremely high social fit. Similar to previous responses, social fit scores appeared similar across all demographic groups.

Table 4

Social fit scores split by demographic group

Demographic group	Means and standard deviations of social fit scores	
	M	*SD*
Black	2.52	0.42
Latina/o/x	2.45	0.41
Females in STEM	2.57	0.38
First-generation	2.51	0.39
Non-UR	2.6	0.38

Given that Cronbach's α scores are typically reported for psychological instruments (for example, Tabatabaee-Yazdi et al., 2018), Cronbach's α scores for the S'FICE instrument are included in Table 5.

Table 5

Cronbach's α scores for the S'FICE instrument

Type of fit within the S'FICE instrument	Cronbach's α
Self-concept fit	0.61
Goal fit	0.72
Social fit	0.63

Based on George and Mallery's (2003) guidelines, the internal consistency of the self-concept and social fit sub-instruments is questionable (because they do not exceed .7), and the internal consistency of the goal fit sub-instrument is acceptable (Gliem & Gliem, 2003). However, I must again note that as per previous research (Sijtsma, 2009), Cronbach's α has been identified as incapable of measuring internal consistency and is therefore considered a somewhat inaccurate measure of reliability. Given this ambiguity about interpreting the results of Cronbach's α, the results of the multidimensional Rasch rating scale model are reported next.

2. Tests of the hypotheses

A multidimensional Rasch rating scale model was conducted to analyze the data using the statistical software, RStudio (R Core Team, 2018) and the statistical package, TAM (Robitzsch et al., 2019).

a. Instrument Hypothesis 1: Testing the distinctiveness of categories. First, I investigated whether the decision to define four response categories was supported by the data. The four response categories were:

1. Strongly Disagree – I theorized participants with extremely low levels of fit would choose this category
2. Disagree – I theorized that participants with somewhat low levels of fit would choose this category
3. Agree – I theorized that participants with somewhat high levels of fit would choose this category

4. Strongly agree – I theorized that participants with extremely high levels of fit would choose this category

If the four categories were distinct, the participants who selected these categories would differ based on their "ability" (in other words, their self-concept, goal, or social fit). This ability is measured in terms of each participant's theta estimate. Each participant has three thetas, one for self-concept fit, one for goal fit, and one for social fit. Taking the average of the self-concept fit theta estimates of all the participants who indicated Strongly Disagree on item 1 of the S'FICE instrument (which measures self-concept fit), provides the average self-concept fit theta of that item for those who chose "Strongly Disagree." In this manner, I obtained theta estimates for every category (from Strongly Disagree to Strongly Agree) of item 1. If these theta averages are in ascending order, it indicates that participants with lower self-concept fit "ability" selected categories to item 1 that indicated lower levels of self-concept fit. This would confirm that the four categories provided for item 1 were sufficiently distinct, so as to distinguish between participants of extremely low self-concept fit, somewhat low self-concept fit, somewhat high self-concept fit, and extremely high self-concept fit.

I computed the average self-concept fit thetas for each of the self-concept fit items, the average goal fit thetas for each of the goal fit items, and the average social fit thetas for each of the social fit items. Whereas 27 items showed the expected ascending order of average thetas, seven items did not show this pattern (see Table 6).

Table 6

Theta averages (of respective fit type) for each response category for each item

Item name	Strongly Disagree	Disagree	Agree	Strongly Agree
self-concept 1**	-0.38	-0.18	0.1	0.07
self-concept 2r*	-0.11	-0.36	-0.01	0.57
self-concept 3r	-0.26	-0.06	0.13	0.35
self-concept 4	-0.52	-0.3	-0.04	0.23
self-concept 5	-0.57	-0.43	-0.02	0.48
self-concept 6	-0.89	-0.56	-0.09	0.44
self-concept 7	-0.64	-0.23	0.07	0.57
self-concept 8r	-0.52	-0.39	-0.02	0.52
self-concept 9r	-0.5	-0.17	0.11	0.52
self-concept 10	-0.31	-0.09	0.11	0.39
self-concept 11r	-0.53	-0.32	0.06	0.63
self-concept 12r	-0.42	-0.14	0.19	0.59
self-concept 13r*	0.33	-0.25	-0.34	0.28
goal1***	-1.39	-0.15	0.72	-0.38
goal2	-1.76	-0.69	-0.23	0.59
goal3	-0.82	-0.37	0.03	0.8
goal4	-1.29	-0.78	-0.21	0.59
goal5	-1.38	-0.7	-0.09	0.7
goal6	-0.98	-0.61	-0.03	0.89
goal7r ***	-0.37	-0.53	-0.14	0.62
goal8	-0.87	-0.46	-0.11	0.57
goal9r	-0.7	-0.34	0	0.73

social1 *	-0.6	0	0.33	0.12
social2r **	0.06	-0.39	0.07	0.75
social3r	-0.82	-0.27	0.09	0.46
social4r	-0.45	-0.01	0.12	0.4
social5r	-0.5	-0.08	0.26	0.7
social6	-1.19	-0.42	0.05	0.46
social7	-0.52	-0.06	0.09	0.38
social8	-0.38	0.02	0.15	0.49
social9r	-0.68	-0.28	0.08	0.42
social10	-0.84	-0.38	0.15	0.53
social11r	-0.65	-0.2	0.08	0.47
social12r	-0.2	-0.02	0.14	0.38

Note. The asterisks indicate the five items that did not show an ascending pattern in theta averages. A single asterisk refers to items that showed underfit to the model as well (discussed later). Two asterisks refer to items that showed misfit to the model but did not significantly underfit or overfit the model (discussed later). Finally, three asterisks refer to items that did not show an ascending pattern in theta averages but did fit the model.

Overall, these findings indicate that the four categories (Strongly Disagree, Disagree, Agree, and Strongly Agree) were sufficiently distinct for most of the S'FICE items and that to a large extent participants selected the categories that matched their "ability" in each type of fit.

b. Instrument Hypothesis 2: Testing whether the data best fit a three-dimensional model. The next step was to see if the dimensional structure specified by the S'FICE model was the best fit for the data. To determine this, I compared the three-

dimensional model (dimensions: self-concept fit, goal fit, and social fit) to a unidimensional model that assumed that all the items measured one overarching theme of "fit to college". According to previous research (Briggs & Wilson, 2003) determining how and whether the two models significantly differ from each other requires examining their Akaike's Information Criterion (AIC; Akaike, 1981), G^2 values, and number of parameters (see Table 7).

Table 7

AIC, G^2 values, and the number of parameters for the three-dimensional and unidimensional models

Model type	AIC	G^2	Number of parameters
Unidimensional	68509.22	68435.22	37
Three-dimensional	68431.46	68347.46	42

First, the two AIC values are compared to determine which model has the lower AIC as this indicates better fit to the data. As Table 7 indicates, the three-dimensional model had a lower AIC than the unidimensional model. Next, in order to determine whether this improvement in fit is significant, researchers suggest conducting a chi-square test on the difference between the G^2 deviance scores (Briggs & Wilson, 2003). This is because the differences in deviance between a unidimensional model and a three-dimensional model form a chi-square distribution, and if the difference between the unidimensional and three-dimensional model is statistically significant, the model with a smaller AIC (the three-dimensional model) fits the data better than the other model.

The difference in deviance between the two models was 87.76 ($G^2_{\text{unidimensional}} - G^2_{\text{three-dimensional}}$). To determine the critical chi-square value that the difference in deviance had to exceed, I subtracted the two numbers of parameters (42-37) to determine that this test had 5 degrees of freedom. At $\alpha = .001$, the critical chi-square value for 5 *df* was 20.52. The chi-square difference between the deviance of the unidimensional model and the three-dimensional model 87.76 thus exceeded the critical chi-square value, indicating that the three-dimensional model was statistically a better fit to the data than the unidimensional model.

I also computed a consecutive model, creating three separate unidimensional models for self-concept fit, goal fit, and social fit (Briggs & Wilson, 2003). A consecutive model identified whether the S'FICE instrument contained items measuring three separate dimensions of fit to college, without considering the correlations among these three dimensions. In other words, the consecutive model required computing three separate models, one for self-concept fit, one for goal fit, and one for social fit, thus handling the three types of fit as separate constructs that are not related to each other at all. To determine the differences between the unidimensional, consecutive, and three-dimensional models, I compared the reliability of dimensions across these models. The dimension reliability in the unidimensional model was .83 (since the unidimensional model only had one dimension). The reliabilities of each of the three dimensions for the consecutive and three-dimensional model appear in Table 8.

Table 8

The reliabilities of the self-concept fit, goal fit, and social fit dimensions for the consecutive and three-dimensional models

Model type	Dimension		
	Self-concept fit	Goal fit	Social fit
Consecutive	.61	.72	.63
Three-dimensional	.77	.73	.73

As Table 8 and the information mentioned above indicates, the unidimensional model had the highest reliability, the three-dimensional model had the second highest set of reliabilities, and the consecutive model had the lowest set of reliabilities. Although the unidimensional model had the highest reliability, this is not a cause for concern as reliability is largely due to the number of items and in this case, the unidimensional model had more items than either of the other two models. However, the greater reliabilities in the three-dimensional model in comparison to the consecutive model indicated that the model that fit the data best considered the S'FICE instrument to consist of three dimensions of fit to college that are somewhat related.

c. Instrument Hypothesis 3: **Examining the item fit statistics.** The next step was to look at whether each item in the S'FICE instrument showed good fit to the three-dimensional (self-concept fit, goal fit, social fit) S'FICE model. According to Wilson (2003), for data obtained from large sample sizes, both an item's weighted mean square (infit statistic) and weighted t value (infit t statistic) indicate whether it is well-fitting. This is because larger samples have more power to detect misfit in items and will therefore have more items that significantly misfit (that is, have infit t values that are significant; Wu & Adams, 2013). However, inspecting the infit statistic for such items indicates whether their level of misfit is

concerning. Items with an infit less than .75 overfit the model, whereas items with an infit greater than 1.33 underfit the model. Of these two possibilities, underfitting the model is worse, as it indicates that this item is performing worse than the model overall at measuring the tested ability (e.g., self-concept, goal, or social fit).

Table 9 contains the infit statistics, weighted t statistics, and the p values associated with each item. When taking into consideration Wilson's (2013) two rules of fit (significant t value and mean square values that are less than .75 or exceed 1.33), 14 items in the S'FICE instrument indicate poor fit (see Table 9; asterisks indicate poorly fitting items). However, only four items (indicated with 2 asterisks) showed misfit due to the item underfitting the data. Thus, 10 of the items that showed misfit actually overfit the model, indicating that they did better than average at measuring the tested ability. I also examined the outfit values (unweighted fit mean square values; Wu & Adams, 2013) and associated t values and found that these values matched exactly what the infit statistics indicated.

Table 9

The fit statistics for each S'FICE item

Item	Fit indices (α = .05)		
	Weighted mean square (infit)	Infit t statistic	Infit p value
sc1*	0.72	-7.17	<0.001
sc2r**	1.79	15.84	<0.001
sc3r	1.22	5.03	<0.001
sc4	1.04	0.91	0.36
sc5*	0.69	-7.75	<0.001

sc6*	0.66	-8.07	<0.001
sc7	0.85	-3.79	<0.001
sc8r	0.88	-2.85	<0.001
sc9r	1.08	1.81	0.07
sc10	1.18	4.25	<0.001
sc11r	0.84	-3.93	<0.001
sc12r	1.12	2.96	<0.001
sc13r**	1.96	18.13	<0.001
goal1	0.87	-3.27	<0.001
goal2*	0.7	-6.95	<0.001
goal3*	0.73	-6.8	<0.001
goal4*	0.7	-6.82	<0.001
goal5*	0.65	-8.58	<0.001
goal6*	0.6	-10.28	<0.001
goal7r	1.01	0.27	0.79
goal8	0.93	-1.59	0.11
goal9r	1.12	2.65	0.01
social1**	1.52	10.79	<0.001
social2r	1.2	4.64	<0.001
social3r	0.98	-0.35	0.73
social4r	1.13	3.16	<0.001
social5r	0.91	-2.27	0.02
social6*	0.67	-8.35	<0.001
social7**	1.41	8.74	<0.001

social8	1.29	6.53	<0.001
social9r	0.8	-4.99	<0.001
social10*	0.65	-9.43	<0.001
social11r	0.82	-4.36	<0.001
social12r	1.14	3.4	<0.001

Note: In this table, sc indicates self-concept fit items, goal indicates goal fit items, and social indicates social fit items. Items with an "r" at the end indicate reverse-scored items.

The items that showed overfit to the model (and therefore did better than the model) appear in Table 10. Once again, as a reminder, these 10 items fit the model better than average, thus indicating that they may be better items.

Table 10

S'FICE items that overfit (did better than) the model

Item code	Item
sc1*	My family and I always assumed that I would go to college.
sc5*	Being a student in my major taps into who I truly am.
sc6*	I am comfortable in my major.
goal2*	When I'm working on my major, I feel like I'm getting closer to achieving goals that are important to me.
goal3*	I feel like many professors and/or TAs in my major went to college for the same reasons as I did.
goal4*	I find the coursework for my major naturally interesting.
goal5*	I enjoy working on the coursework for my major.

goal6*	I am happy with how coursework in my major is taught.
social6*	I know many people in college who like me for who I am.
social10 *	When I think about the other students in my major (friends or otherwise), I feel like I belong among them.

The items that showed underfit (the more troubling type of fit) appear in Table 11. As a reminder, these items fit worse than average and are thus items that may require to be removed from the instrument or changed.

Table 11

S'FICE items that underfit (did worse than) the model

Item code	Item
sc2r**	The transition to college was very difficult for me.
sc13r**	I am nervous about going to TAs' office hours and asking them questions.
social1**	When I am in the classes for my major, I see a lot of people who are very similar to me (in terms of things like my race, gender, financial background, etc.).
social7**	At least some of my closest friends are in college with me.

Although this analysis revealed four items that underfit the model, this statistical proof was insufficient to justify excluding these items (Wilson, 2003). Excluding items requires considering both the qualitative and quantitative data collected in Stages 2 and 4 of construct development, as well as revisiting the construct map designed for the instrument.

It is of interest to note that almost all the goal fit items showed overfit to the model. This may be due to participants responding to these items in a more predictable way than the

other items. This may indicate that these items were interpreted in a more uniform manner, although this is merely speculation.

The larger message revealed by this examination of item fit statistics is that the S'FICE instrument showed sufficient validity to be used in Study 2 to experimentally test the S'FICE model.

3. Assessing the appropriate use of S'FICE scores in practical settings

The test of the hypotheses of Study 1 revealed that the S'FICE instrument was sufficiently valid to be used as an instrument to measure self-concept, goal, and social fit. This test also indicated that a three-dimensional model that distinguished among items measuring self-concept, goal, and social fit showed better fit to the data than the unidimensional model that lumped them together. Although this finding determined how the scores of the three types of fit would be handled in statistical analyses in Studies 2 and 3, I also wanted to know how the S'FICE instrument would be best used in a practical context. Knowing how the three separate scores for each type of fit as measured by the S'FICE instrument should be treated when deciding on students' levels of fit to college would inform decisions regarding these students' need for help and the types of help needed.

To answer the question of how the S'FICE instrument should be treated in a practical context, I calculated a discrepant index for each student (Briggs & Wilson, 2003). Briggs and Wilson introduce this technique as a way of interpreting how an instrument should be interpreted in a practical context where this instrument has high-risk implications. In their case, the instrument for which they calculated discrepant indices was intended to be used to make educational decisions for school-aged students. In the case of the S'FICE instrument, I intended the responses on the S'FICE instrument to be used to determine what types of fit

students are lacking and the types of workshops and/or interventions they should be directed to in order to improve their academic performance and/or wellbeing. Given that these interventions may determine such a crucial component of UR students' college experience, I argue that the S'FICE instrument is also intended to be used in a high-risk scenario.

When validating an instrument with high-risk, real-life implications, Briggs and Wilson (2003) recommend considering whether the scores of the separate dimensions of an instrument (in this case, the scores for self-concept fit, goal fit, and social fit) should be interpreted separately, or whether these scores should be averaged for a mean score of the ability that the given instrument is measuring. In this case, I had to decide whether students' self-concept, goal, and social fit scores should be interpreted as separate scores for each dimension, or whether students' scores in these three dimensions could be averaged to obtain a mean score of fit to college.[2]

To help researchers answer this question, Briggs and Wilson (2003) recommend that researchers compare the average theta scores across dimensions to ascertain whether the average thetas of participants' S'FICE responses across dimensions were representative of how participants responded to items in each dimension. Such a comparison would reveal

[2] Although this concept is very similar to Instrument Hypotheses 2 where I tested whether the data fit a three-dimensional or a one-dimensional model better, it is distinct from this test. When testing Instrument Hypothesis 2, the intention was to test if S'FICE scores adhered to the theoretical expectations derived from the S'FICE model, whereby self-concept, goal, and social fit scores would be different from each other. In the case of discrepant indices, the intention is to determine whether S'FICE scores need to be interpreted separately or as an average in the practical context of using these scores to make decisions about the academic needs of UR students. The similarity between these two procedures lies in their outcomes. Researchers with data that fit a one-dimensional model better are more likely to find that they can obtain mean scores of their various dimensions when interpreting students' scores on their instrument rather than needing to interpret students' scores on each dimension separately. The opposite is true for researchers whose data better fit a multi-dimensional model than a unidimensional model. The difference between these two procedures lies in the fact that the dimensional test addresses the theoretical expectations of the instrument and the practical procedure addresses the practical use of the instrument.

whether the average of participants' three theta scores for self-concept, goal, and social fit reflected their theta scores on the individual dimensions well, or whether each theta score should be considered separately when measuring how well participants fit overall in their college environment. To make this comparison, Brigg and Wilson introduced the concept of a discrepant index. The discrepant index calculates the extent to which participants' theta estimates for one particular dimension differ from their average theta across all three dimensions. This index thus indicates how different participants' response patterns to each dimension are. For instance, if a participant responded very positively to the self-concept and goal fit items (indicating high self-concept fit and high goal fit), but very negatively to the social fit items (indicating low social fit), their discrepant index would be high, indicating that the average theta score would not properly indicate the nuances revealed by the participant's individual theta scores.

Briggs and Wilson (2003) used the following equation in calculating the discrepant index (DI):

$$DI_p = \sum_{d=1}^{3} (\bar{\Theta} - \Theta_d)^2$$

As this equation indicates, the DI is calculated for each participant separately and their individual theta scores for self-concept fit, goal, and social fit are separately subtracted from their average theta score. Each of these three deviations are then squared and summed to obtain the DI for that particular participant.

Briggs and Wilson (2003) flagged discriminant indices that exceeded .5 as indicating that the average theta misrepresented a student's actual ability on the individual dimension.

In their sample, 30% of participants showed a DI that exceeded .5. In a high-risk setting of validating an instrument with real-life implications in the classroom, they considered this percentage a significantly large proportion of the sample about which an incorrect decision could inappropriately be made. Given that the S'FICE instrument was also intended to be used to make long-lasting, real-life decisions for UR students, I followed Briggs and Wilson's (2003) recommendations about calculating and interpreting DI scores for my sample.

I calculated DIs for each participant and found that 26.8% of participants had a DI that exceeded .5. Thus, following the recommendations of Briggs and Wilson (2003), I decided that the S'FICE scores for self-concept, goal, and social fit would be interpreted separately in the data analysis for Study 2 and an average score of fit would not be calculated.

Discussion

The results indicated complete support for Instrument Hypothesis 2 and partial support for Instrument Hypothesis 1 and 3. With regards to Instrument Hypothesis 2, the data showed better fit to the three-dimensional model that distinguished among self-concept, goal, and social fit compared to the unidimensional model that did not distinguish among these three dimensions. With regards to Instrument Hypothesis 1, the data for most of the items showed a clear distinction in ability among participants who selected Strongly Disagree, Disagree, Agree, versus Strongly Agree as their responses. Three out of the seven items that did not show the ascending pattern of ability for Instrument Hypothesis 1 also underfit the model when testing Instrument Hypothesis 3. With regards to Instrument Hypothesis 3, although 14 items showed some type of misfit, only four of these items showed underfit, indicating that these four items did worse than average. In other words, only four of 34 items

appeared worse than average at measuring the intended construct (self-concept, goal, or social fit).

Thus, the test of Instrument Hypotheses 1, 2, and 3 provided strong support for Proposition 2, indicating that the internal structure of the S'FICE instrument matched the structure of the S'FICE model (that is, participants' responses revealed three distinct subcomponents of self-concept fit, goal fit, and social fit).

According to Wilson (2005), instrument development is a cyclical process whereby the conclusion of Stage 4 (the use of a measurement model to determine if items conform to the intended theoretical model) leads back to Stage 1 (construct mapping). In the case of the S'FICE instrument, Stage 4 (the above results) showed largely positive results indicating that the S'FICE model did not require major theoretical revisions. Given these results, I concluded that the S'FICE instrument showed sufficient validity in measuring self-concept, goal, and social fit to college in UR students to be used in an experimental test of the S'FICE model (Study 2). However, following Wilson (2005), to confirm or further improve the S'FICE instrument, a second round of instrument validation was conducted after Study 2 was concluded (see Study 3).

VIII. Section 7: Study 2 - An experimental test of the S'FICE model

Given that Study 1 provided evidence to justify using the S'FICE instrument to measure self-concept, goal, and social fit, I used this instrument in the initial test of the hypotheses derived from the S'FICE model.

Study 2 was the first and only experimental test of the S'FICE model. In this study, I manipulated students' experiences of high levels of self-concept fit, goal fit, social fit, or all types of fit in the context of an academic-related environment, compared to experiences of no

fit in the same context of an academic-related environment, and examined how this information influenced their ratings of anticipated fluency and engagement in this environment.

Thus, Study 2 tested four of the proposed Model Hypotheses:

(1) Model Hypothesis 1: self-concept, goal, and social fit will be positively and moderately correlated (correlations ranging between .1 - .3; Cohen, 1988) to one another

(2) Model Hypothesis 2: self-concept fit, goal fit, and social fit will each be uniquely associated with engagement

    (a) Model Hypothesis 2a: higher levels of all three types of fit will be associated with greater engagement compared to higher levels of one type of fit or lower levels of all three types of fit

    (b) Model Hypothesis 2b: higher levels of self-concept fit will be associated with higher levels of engagement compared to lower levels of all three types of fit

    (c) Model Hypothesis 2c: higher levels of goal fit will be associated with higher levels of engagement compared to lower levels of all three types of fit

    (d) Model Hypothesis 2d: higher levels of social fit will be associated with higher levels of engagement compared to lower levels of all three types of fit

(3) Model Hypothesis 3: fit will predict fluency

(a) Model Hypothesis 3a: higher levels of self-concept fit will be associated with higher levels of cognitive fluency

(b) Model Hypothesis 3b: higher levels of goal fit will be associated with higher levels of motivational fluency

(c) Model Hypothesis 3c: higher levels of social fit will be associated with higher levels of interpersonal fluency

(4) Model Hypothesis 4: fit will be associated with engagement via fluency

(a) Model Hypothesis 4a: higher levels of self-concept fit will be associated with greater engagement via higher levels of cognitive fluency

(b) Model Hypothesis 4b: higher levels of goal fit will be associated with greater engagement via higher levels of motivational fluency

(c) Model Hypothesis 4c: higher levels of social fit will be associated with greater engagement via higher levels of interpersonal fluency

For ethical and practical reasons, I experimentally tested these hypotheses about the links among fit, fluency, and engagement not in the domain of college academic achievement, but in the domain of their future career. First, given that research has already documented that UR students tend to be more likely to experience lower belonging (e.g., Walton & Cohen, 2007) and more threat in college (e.g., Steele & Aronson, 1995), and given that lower belonging is hypothesized to decrease academic success, it was ethically inappropriate to assign some members of this already vulnerable population to conditions designed to make them feel even more misfit to college than they might have already been experiencing. Although manipulating perceived fit to students' hypothetical future career

might present some of the same concerns, the greater psychological distance between students' current circumstances and their ideal career rendered this manipulation less concerning.

Second, given that participants were currently experiencing psychologically salient fit in the college environment at the time of the study, I estimated greater difficulty effectively manipulating participants' potentially false perceptions of fit on the basis of feedback in the face of their own personal and current experiences of it. On the other hand, changing students' perceptions of their fit to a future context that they could as yet only imagine their fit to seemed more feasible.

Given these considerations, I experimentally tested the five model hypotheses described above in the domain of success in participants' ideal career, a domain related to academic accomplishment and of psychological relevance to participants.

Although the S'FICE model was designed to explain the academic performance of all UR students, I restricted the sample to only Latina/o/x participants to reduce the number of uncontrolled variables. Restricting the sample to a single UR group made data collection difficult given the smaller numbers of UR students in college in comparison to their non-UR peers. However, Latina/o/x students were selected as the target population, given their comparatively larger enrollment at the University of California, Santa Barbara (Deloitte, Datawheel, & Hidalgo, 2020)

A. Method

Study 2 was conducted online. Participants were recruited for a study that was introduced as focusing on a career guidance program that would give them an estimate of how well they were suited for their ideal career.

1. Participants

UCSB students who had previously self-identified as Latina/o/x were recruited using email addresses provided by the UCSB registrar. A G*Power analysis (Faul et al., 2007) was conducted to estimate the required sample size. To determine the effect size for this G*Power analysis, I observed the effect sizes obtained in studies where the relationship between stereotype threat (a concept similar to fit to college; see section 3) and approach motivation (a concept somewhat related to engagement) was investigated (Schmader & Johns, 2003; Smith et al., 2015). Such studies revealed large effect sizes. However, none of these studies tested the exact same relationships as I wished to test, nor did they posit fluency as the mediator of the effect of belonging on approach motivation. Therefore, I conservatively predicted a small-medium effect size. This G*Power analysis (Faul et al., 2007) showed that a sample size of 305 participants was necessary for an 80% chance of finding significance given a small-medium effect size (f = .2).

I recruited a sample of 503 students. The UCSB registrar provided me with a list of email addresses of UCSB students who identified as Latina/o/x and I recruited my sample by sending all of them messages inviting them to participate in my study. Of these students, 77 participants were excluded for providing incomplete data[3]. A further 47 participants were excluded for failing one or both of two questions designed to check that participants had properly understood the information given to them in the study. These 47 participants selected a different ideal career before compared to after taking the career guidance program

[3] "Incomplete data" was defined as data that was missing more than 2% of responses. This roughly translates to missing responses for about 4 questions. I used this strict criteria to exclude participants because I wanted to run both an experimental and correlational test on the data (see Results) which required participants to provide full responses on all the scales. Excluded participants left large sections of the dependent measures unanswered, which inhibited interpreting their results.

and/or forgot the feedback that they were given regarding their fit to their ideal career. Finally, 98 were excluded as they identified during the study as multiracial (Latina/o/x and another race/ethnicity), given that the experiences of multi-racial individuals can differ (for e.g., see Elias et al., 2021; Telles & Sue, 2009)[4]. Thus, the final sample comprised 292 Latina/o/x undergraduate students (M_{age} = 20.1, SD_{age} = 1.75). Of the sample, 77.7% were female, 18.9% were male, and 3.4% selected another option.

2. Design

The design of the study was a 5 factor (fit: self-concept fit vs. goal fit vs. social fit vs. all components fit vs. all components low fit) between subjects model.

3. Procedure

Participants were told that they were participating in a study evaluating a career guidance program that UCSB had been developing. Participants were asked to first take a "personality interests self-survey" that allowed them to describe who they are and what they care about. This personality survey consisted of three types of questions that were displayed in the following order to each participant:

(1) Participants were given a list of personality traits (labelled as "personality qualities" in the survey; see Appendix F) and asked to choose the 5 traits that made up their true self. The order in which the personality traits were presented was randomized.

(2) Participants were given a list of goals (labelled as goals in the survey; see Appendix F) and asked to choose the 5 goals that guided their decisions in life. The order in which the goals were presented was randomized.

[4] For a comparison of data analyses without the multiracial participants and with the multiracial participants, refer to the Conclusions section of the Results.

(3) Participants were given a list of possible ways of expressing identities (labelled as membership groups in the survey; see Appendix F) and asked to choose 5 membership groups that they strongly identified with. The order in which the identities were presented was randomized.

Participants were next directed to a page where they were asked to tell us about their ideal career. They were shown a list of the 10 highest-paying career categories listed by the U.S. Bureau of Labor Statistics (2020). The categories were:

- Legal Occupations (attorneys, arbitrators, etc.)
- Management Occupations (chief executives, general managers, etc.)
- Computer and Mathematical Occupations (statisticians, software developers, etc.)
- Community and Social Service Occupations (counselors, social workers, etc.)
- Architecture and Engineering Occupations (chemical engineers, mechanical engineers, etc.)
- Education, Training, and Library Occupations (professors, teachers, etc.)
- Design, Entertainment, and Media Occupations (designers, editors, etc.)
- Healthcare Practitioner Occupations (surgeons, physician assistants, etc.)
- Science Occupations (environmental scientist, physical scientist, etc.)
- Business and Financial Operations Occupations (accountants, market research analysts, etc.)

After looking at this list, participants advanced to the next page where this list of careers was presented as a set of options and participants were prompted to select their ideal career from this list.

a. Manipulation of fit to ideal career. Next, participants were told that their responses were being compared to data gathered from a large sample of recent UCSB alumni who were currently working in their ideal career. Participants were informed that this data was obtained from a database containing the responses of 10,000 successful UCSB alumni who had graduated since 2010 and were now working in various careers. Upon advancing past this page, participants were presented with a page that contained a GIF designed to look like the loading icon (Redblock, 2020). The intention of including this GIF was to convince participants that their result was being calculated (rather than it being a randomized and pre-determined result). On the same page they saw their ideal career listed as well as text informing them that their personality qualities, life goals, and membership groups were being compared to the responses of UCSB alumni working in their ideal career (for screenshot of this screen see Figure 3). They were also told that on the next page they would see how well their responses matched the responses of successful UCSB alumni working in their ideal career. After one minute, the "next" button appeared on the screen and students were able to advance to the next page.

Figure 3

Screenshot of what participants saw when they waited for their results.

The career you chose as your ideal career is **Legal occupations.**

Your personality qualities, life goals, and membership groups are now being compared to the data gathered from recent successful UCSB alumni in **Legal occupations**. This process will take about a minute.

On the next page you will see how well your personality qualities, life goals, and membership groups matched with those of recent, successful UCSB alumni in **Legal occupations**.

Participants received their "results" on the next screen. They were randomly assigned to view one of five conditions (one of four experimental conditions or the control condition):

- Experimental 1 (All components fit): Participants were told that they were an excellent match to their ideal career on all three types of responses (personality qualities, life goals, and membership groups)
- Experimental 2 (Only self-concept fit): Participants were told that their personality qualities were an excellent match to their ideal career, but their life goals and membership groups were a low match to their ideal career
- Experimental 3 (Only goal fit): Participants were told that their life goals were an excellent match to their ideal career, but their personality qualities and membership groups were a low match to their ideal career

- Experimental 4 (Only social fit): Participants were told that their membership groups were an excellent match to their ideal career, but their personality qualities and life goals were a low match to their ideal career
- Control (All components low fit): Participants were told that they were a low match on all three types of responses (personality qualities, life goals, and membership groups) to their ideal career

This information was delivered in the form of a graph, table, and set of statements. Screenshots of the screen that participants in each condition received are included in Appendix G.

b. Dependent measures. After viewing their results on the career guidance program, participants were told that the experimenter needed to gather information regarding their ideal career match. They were asked to keep their ideal career in mind when responding to these questions. Participants responded to the following measures in the following order.

i. The fluency instrument. The fluency instrument (adapted from Aday & Schmader, 2018) consisted of three subscales, the cognitive, motivational, and interpersonal fluency scales. The existing fluency instrument was adapted such that it referred to participants' ideal careers and asked them to speculate about their anticipated levels of fluency in the future when they were in their ideal career (see Appendix H). The cognitive fluency subscale consisted of 5 items, e.g., "My concentration levels on tasks at work in my ideal career will be ___". The motivational fluency subscale also consisted of 5 items, e.g., "My motivational energy will feel ____". And the interpersonal fluency subscale also consisted of 5 items, e.g., "My ability to interact with others in the context of my ideal career will feel __". Participants were asked to rate their agreement to each item on a 7-point Likert scale with item

appropriate endpoint labels, e.g., 1 (Low) to 7 (High). The order in which items were presented was randomized across all types of fluency and participants saw five questions on each page.

ii. Engagement measure I: UWES. The first engagement measure was adapted from the Utrecht Work Engagement Scale for Students (UWES-S; Schaufeli et al., 2002; Cronbach's α = .83). This instrument consisted of 14 items adapted such that they referred to participants' anticipated engagement in their ideal career, e.g., "At my job (in my ideal career), I will feel bursting with energy." (see Appendix I). Participants were asked to rate each item on a 5-point scale ranging from 1 (Never) to 5 (Always). The order in which all items were presented was randomized and participants only saw five items on each page.

iii. Engagement measure II: Self-regulation Learning. The second engagement measure was adapted from Zimmerman and colleagues (1992; Cronbach's α = .82). This instrument consisted of 11 items adapted such that they referred to participants' anticipated engagement in their ideal career, e.g., "[I will be able to] finish my work assignments by deadlines at work in my ideal career" (see Appendix J). Each item was rated on a 5-point scale ranging from 1 (No confidence at all) to 5 (Complete confidence). The order in which all items were presented was randomized and participants only saw five items on each page.

Analysis revealed that scores on the UWES and on the Self-regulation Learning engagement instruments were significantly correlated (r = .65, p < .001). Therefore, a weighted mean of engagement was calculated for each participant, and this score was used in testing the hypotheses for Study 2.

c. The S'FICE instrument. Next, participants completed an adapted version of the S'FICE instrument. The S'FICE instrument measured participants' reported self-concept,

goal, and social fit. I intended to use these scores to run a correlational test of the S'FICE model in addition to testing the experimental hypotheses. The S'FICE instrument was also adapted in reference to participants' anticipated fit to their ideal career in the future, e.g., "I think I will have at least a few close friends at work in my ideal career with me." (see Appendix K). Participants rated each of the 34 items on a 4-point scale ranging from 1 (Strongly Disagree) to 4 (Strongly Agree).

d. Manipulation check questions. Participants were asked to indicate first, the ideal career that they chose previously, and second, the feedback levels of match to their ideal career (on a 3-point scale ranging from 1 low to 3 excellent) they had received about their personality qualities, goals, and membership groups. Failure of these manipulation checks excluded participants from analysis (see Participants section). Participants were also asked to indicate how accurate they believed their results to be. Participants indicated their estimated accuracy on a slider scale that ranged from 0 (Extremely inaccurate) to 100 (Extremely accurate). Participants were requested to move the slider in accordance with how accurate they thought the feedback about their match to their ideal career was. Responses to this question were used to assess the effectiveness of the manipulation.

e. Demographics and debriefing. Finally, participants answered demographics questions (identical to Study 1; see Appendix E) and were debriefed. The debriefing emphasized the deceptive nature of the feedback and the inaccuracy of the information about match to their ideal career that participants had received (see Appendix L). After each participant completed the study, a trained Research Assistant sent them an email further emphasizing the inaccuracy of the results as well as the code to a $5 Amazon gift card (see Appendix L for the email sent).

B. Results

1. Assessing the effectiveness of the fit manipulation

Participants' perceptions of the accuracy of the feedback they were provided were used to assess the effectiveness of the manipulation: Had all participants accepted the feedback that they were a good or poor fit to their ideal career on no, some, or all components? A one-way ANOVA was conducted to test whether participants in the different conditions rated the accuracy of their results differently. For the manipulation to have worked, participants should not have differed in their ratings of accuracy across the conditions. However, the one-way ANOVA resulted in a significant main effect of condition, $F(4,286) = 35.25$, $p < .001$. A Tukey's HSD revealed that participants in the all fit condition ($M = 80.3$, $SD = 16.06$) rated their results as significantly more accurate compared to all other groups ($p < .001$). Further, participants in the no fit condition ($M = 37.42$, $SD = 24.85$) rated their results as significantly less accurate compared to all other groups ($p < .05$), except for those in the only social fit condition ($M = 49.55$, $SD = 21.42$; $p = .05$). Participants in the only goal fit condition ($M = 57.46$, $SD = 20.63$) and participants in the only self-concept fit condition ($M = 57.46$, $SD = 18.13$), despite scoring higher in accuracy than participants in the all components low fit condition, still rated their feedback significantly lower than participants in the all components fit condition. As the mean scores reveal, participants in the only self-concept, only goal, and only social fit conditions showed less confidence in the accuracy of the scores compared to the all components fit condition. Thus, it appeared that my manipulation of fit to ideal career had not produced the ideal psychological conditions necessary to test the hypotheses, a point I will return to in the discussion of the results.

2. Testing the experimental model

Study 2 was designed to test the following hypotheses about the S'FICE model:

(1) Model Hypothesis 1: self-concept, goal, and social fit will be positively and moderately correlated (correlations ranging between .1 - .3; Cohen, 1988) to one another

(2) Model Hypothesis 2: self-concept fit, goal fit, and social fit will each be uniquely associated with engagement

    (a) Model Hypothesis 2a: higher levels of all three types of fit will be associated with greater engagement compared to higher levels of one type of fit or lower levels of all three types of fit

    (b) Model Hypothesis 2b: higher levels of self-concept fit will be associated with higher levels of engagement compared to lower levels of all three types of fit

    (c) Model Hypothesis 2c: higher levels of goal fit will be associated with higher levels of engagement compared to lower levels of all three types of fit

    (d) Model Hypothesis 2d: higher levels of social fit will be associated with higher levels of engagement compared to lower levels of all three types of fit

(3) Model Hypothesis 3: fit will predict fluency

    (a) Model Hypothesis 3a: higher levels of self-concept fit will be associated with higher levels of cognitive fluency

    (b) Model Hypothesis 3b: higher levels of goal fit will be associated with higher levels of motivational fluency

    (c) Model Hypothesis 3c: higher levels of social fit will be associated with higher levels of interpersonal fluency

(4) Model Hypothesis 4: fit will be associated with engagement via fluency

(a) Model Hypothesis 4a: higher levels of self-concept fit will be associated with greater engagement via higher levels of cognitive fluency

(b) Model Hypothesis 4b: higher levels of goal fit will be associated with greater engagement via higher levels of motivational fluency

(c) Model Hypothesis 4c: higher levels of social fit will be associated with greater engagement via higher levels of interpersonal fluency

a. Testing Model Hypothesis 1. To experimentally test Model Hypothesis 1, I separated participants' self-concept, goal, and social fit scores by condition and conducted correlations between these fit scores for each condition. Although I expected all conditions to show moderate correlations between the three fit scores (correlations ranging between .1 - .3; Cohen, 1988), I expected participants in the all components fit condition and all components low fit condition to show correlations that were closer to .3 than .1, since (assuming the manipulation worked) these participants were expected to experience higher levels of all types of fit and lower levels of all types of fit, respectively. In contrast, I expected participants in the only self-concept, only goal, and only social fit conditions to show correlations that were closer to .1, since these participants were expected to experience high fit in only one type of fit.

I first conducted correlations on the self-concept, goal, and social fit scores for participants in the all components fit condition. These correlations appear in Table 12.

Table 12

Correlations between self-concept, goal, and social fit for participants in the all components fit condition

Variable	*M*	*SD*	1	2	3
1. self-concept fit	2.64	.28	-		
2. goal fit	2.99	.30	.12	-	
3. social fit	2.74	.36	.61***	.05	-

Note: ***$p < .001$

As the results on Table 12 indicate, I did not find support for the predictions of Model Hypothesis 1 in the scores of participants in the all components fit condition. Although I was expecting participants' self-concept, goal, and social fit to correlate at around $r = .3$, I found very minimal and non-significant correlations between self-concept fit and goal fit, and social fit and goal fit. Furthermore, I found a very large and significant correlation between self-concept fit and social fit.

Next, I ran the correlations for the three types of fit on the scores of participants in the all components low fit condition. These correlations appear in Table 13.

Table 13

Correlations between self-concept, goal, and social fit for participants in the all components low fit condition

Variable	*M*	*SD*	1	2	3
1. self-concept fit	2.66	.38	-		
2. goal fit	2.95	.33	.35**	-	
3. social fit	2.72	.36	.64***	.25*	-

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

The results for participants in the all components low fit condition provided more support for Model Hypothesis 1. As predicted, participants' self-concept and goal fit scores

were moderately correlated (r = .35) and their goal fit and social fit scores were close to the expected moderate correlation as well (r = .25). However, participants' self-concept fit and social fit scores were once again very strongly and significantly correlated (r = .64), which contradicted the predictions of Model Hypothesis 1.

Next, I ran the correlations for the three types of fit on the scores of participants in the only self-concept fit condition. I expected these participants to show lower moderate correlations (r =.1) between the three fit scores, in comparison to participants in the all components fit and all components low fit conditions. These correlations appear in Table 14.

Table 14

Correlations between self-concept, goal, and social fit for participants in the only self-concept fit condition

Variable	*M*	*SD*	1	2	3
1. self-concept fit	2.72	.29	-		
2. goal fit	2.94	.29	.21	-	
3. social fit	2.69	.34	.49***	.04	-

Note: ***p < .001

The results for participants in the only self-concept fit condition provide only partial support for Model Hypothesis 1. The correlation between self-concept fit and goal fit matches my prediction of there being a moderate (close to r = .1) correlation between all types of fit. However, contrary to my expectations, the correlation between self-concept fit and social fit is quite large and significant, although it is still within the range of a moderate correlation (r < .50). Finally, the correlation between goal fit and social fit also defies predictions, as it is very small.

As the next step, I ran the correlations for the three types of fit on the scores of participants in the only goal fit condition. I expected these participants to show lower moderate correlations (r =.1) between the three fit scores, similar to participants in the only self-concept fit condition. These correlations appear in Table 15.

Table 15

Correlations between self-concept, goal, and social fit for participants in the only goal fit condition

Variable	*M*	*SD*	1	2	3
1. self-concept fit	2.67	.36	-		
2. goal fit	2.92	.33	.49***	-	
3. social fit	2.73	.38	.68***	.43***	-

Note: ***p < .001

Contrary to expectations, the results for participants in the only goal fit condition indicated strong and significant correlations between all three types of fit. Although I expected participants to show moderate correlations that trended toward the lower end of the moderate range (r =.1), the results showed strong correlations that surpassed the range for moderate correlations (r > .3).

Finally, I ran the correlations for the three types of fit on the scores of participants in the only social fit condition. I expected these participants to show lower moderate correlations (r =.1) between the three fit scores, similar to participants in the only self-concept fit and only goal fit conditions. These correlations appear in Table 16.

Table 16

Correlations between self-concept, goal, and social fit for participants in the only social fit condition

Variable	*M*	*SD*	1	2	3
1. self-concept fit	2.64	.29	-		
2. goal fit	2.93	.31	.20	-	
3. social fit	2.70	.32	.50***	.06	-

Note: ***$p < .001$

The results for participants in the only social condition mirror those of participants in the all components fit and only self-concept fit conditions. Results contradicted my expectations with lower than expected correlations between self-concept fit and goal fit, as well as goal fit and social fit. On the other hand, self-concept and social fit had a greater than expected correlation.

Thus, overall, results in the five separate conditions did not support Model Hypothesis 1, with the calculated correlations either being less than or greater than the expected moderate correlations. The higher correlations between self-concept and social fit in several conditions suggest that participants' responses to items measuring self-concept versus social fit may not have been as distinct as I intended them to be.

b. Parallel multiple mediator test of the three Model Hypotheses. I next tested the other three model hypotheses using a parallel multiple mediator model (see Figure 4). This parallel mediator model was created using the PROCESS package (Hayes, 2012) in the SPSS software. This analysis tested the following hypotheses:

1. (Model Hypothesis 2) Participants' three types of fit will uniquely predict their engagement scores:

a) (Model Hypothesis 2a) participants who received high fit feedback in all three categories will show greater engagement than other participants
b) (Model Hypothesis 2b) participants who only received high self-concept fit feedback will report higher engagement scores than participants who receive low fit feedback in all three categories
c) (Model Hypothesis 2c) participants who only received high goal fit feedback will report higher engagement scores than participants who receive low fit feedback in all three categories
d) (Model Hypothesis 2d) participants who only received high social fit feedback will report higher engagement scores than participants who receive low fit feedback in all three categories

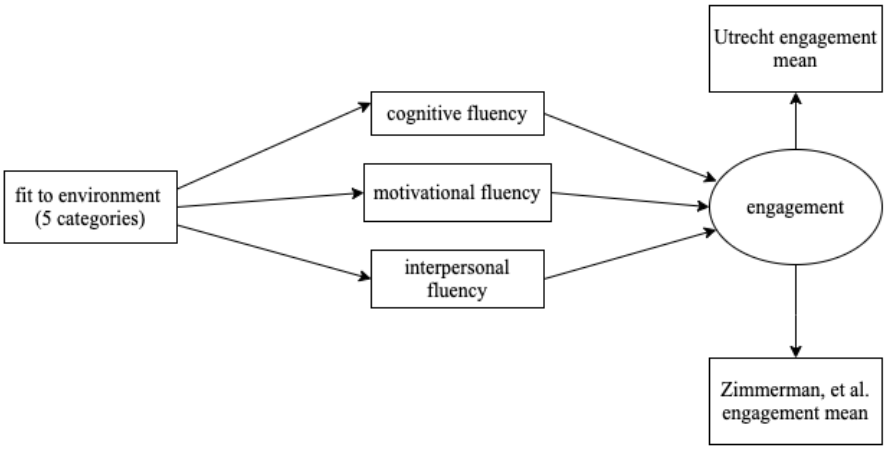
2. (Model Hypothesis 3) Participants' experienced fit will predict their fluency scores:
    a) (Model Hypothesis 3a) participants who received high self-concept fit feedback will report higher cognitive fluency scores
    b) (Model Hypothesis 3b) participants who received high goal fit feedback will report higher motivational fluency scores
    c) (Model Hypothesis 3c) participants who received high social fit feedback will report higher interpersonal fluency scores
3. (Model Hypothesis 4) Participants' experienced fit will predict their engagement via the respective type of fluency:
    a) (Model Hypothesis 4a) participants who received high self-concept fit feedback would report higher engagement scores via higher cognitive fluency scores

b) (Model Hypothesis 4b) participants who received high goal fit feedback would report higher engagement scores via higher motivational fluency scores

c) (Model Hypothesis 4c) and participants who received high social fit feedback would report higher engagement scores via higher interpersonal fluency scores.

Figure 4

The theoretical S'FICE model that is being empirically tested



i. Testing Model Hypothesis 2. To test Model Hypothesis 2, I examined whether participants in the different fit conditions showed direct relationships with engagement that significantly differed from one another.

To test Model Hypothesis 2a, I tested whether participants in the all components fit condition reported higher engagement scores than participants in all other conditions. Contrary to predictions, participants in the all components fit condition did not significantly differ from any other condition ($p > .05$) in engagement scores. As a further test of Model Hypothesis 2a, I ran a one-way ANOVA to test whether there were any differences in

engagement between participants in the different fit conditions. Although the main effect of the model was significant, $F(4, 421) = 3.00$, $p = .02$, the Tukey's HSD test provided only partial support for this hypothesis, as participants in the all components fit condition ($M = 4.1$, $SD = .4$) reported higher engagement ($p = .01$) than participants in the only goal fit condition ($M = 3.86$, $SD = .49$). Thus, some support was provided for Model Hypothesis 2a.

To test Model Hypothesis 2b, I examined whether participants in the only self-concept fit condition showed higher engagement compared to participants in the all components low fit condition. To test this hypothesis, I examined the same one-way ANOVA run to test Hypothesis 2a. Results indicated that although there was a significant main effect, $F(4, 421) = 3$, $p = .02$, the Tukey's HSD revealed that there was no difference in engagement scores ($p = .99$) between participants in the only self-concept fit condition ($M = 3.95$, $SD = .41$) and participants in the all components low fit condition ($M = 3.98$, $SD = .47$). Thus, I found no support for Hypothesis 2b.

To test Model Hypothesis 2c, I examined whether participants in the only goal fit condition showed higher engagement compared to participants in the all components low fit condition. To test this hypothesis, I examined the same one-way ANOVA run to test Hypothesis 2a and 2b. Results indicated that although there was a significant main effect, $F(4, 421) = 3$, $p = .02$, the Tukey's HSD revealed that there was no difference in engagement scores ($p = .42$) between participants in the only goal fit condition ($M = 3.86$, $SD = .47$) and participants in the all components low fit condition ($M = 3.98$, $SD = .47$). Thus, I found no support for Hypothesis 2c.

To test Model Hypothesis 2d, I examined whether participants in the only social fit condition showed higher engagement compared to participants in the all components low fit

condition. To test this hypothesis, I examined the same one-way ANOVA run to test Hypothesis 2a, 2b, and 2c. Results indicated that although there was a significant main effect, $F(4, 421) = 3$, $p = .02$, the Tukey's HSD revealed that there was no difference in engagement scores ($p = 1.00$) between participants in the only social fit condition ($M = 3.97$, $SD = .44$) and participants in the all components low fit condition ($M = 3.98$, $SD = .47$). Thus, I found no support for Hypothesis 2d.

ii. Testing Model Hypothesis 3. Next, I tested whether participants' fit feedback predicted their respective fluency scores. The parallel multiple mediator model provided results to test each of the sub-hypotheses of Model Hypothesis 3.

For Model Hypothesis 3a, I examined whether participants in the fit conditions differed from each other in their cognitive fluency scores, expecting to find that all components fit participants and only self-concept fit participants reported significantly greater cognitive fluency in comparison to participants in other conditions. As predicted, all components fit participants did not differ from only self-concept fit participants in their cognitive fluency scores ($p = .36$). However, contrary to predictions, all components fit participants also did not differ from only goal, only social, and all components low fit participants in terms of cognitive fluency ($p > .05$). As a further test of this sub-hypothesis, I ran a one-way ANOVA to see if participants in the fit conditions would differ in their cognitive fluency scores irrespective of the rest of the model. The results of this test revealed that there was no relationship between fit conditions and cognitive fluency scores [$F(4, 421) = 1.66$, $p = .16$], indicating that neither all components fit participants nor only self-concept fit participants reported cognitive fluency scores that were significantly different from other participants. Thus, no support for Model Hypothesis 3a was found.

For Model Hypothesis 3b, I examined whether participants in the fit conditions differed from each other in their motivational fluency scores, expecting to find that all components fit participants and only goal fit participants reported significantly greater motivational fluency in comparison to participants in other conditions. Contrary to predictions, the only participants who differed in ratings of motivational fluency were all component fit participants (M = 5.01, SD = .69) and only goal fit participants (M = 4.78, SD = .82), $t(286) = -2.11$, $p = .04$. As a further test of this sub-hypothesis, I ran a one-way ANOVA to see if participants in the fit conditions would differ in their motivational fluency scores irrespective of the rest of the model. The results of this test revealed that there was no relationship between fit conditions and motivational fluency scores, $F(4, 421) = 1.43$, $p = .22$, indicating that neither all components fit participants nor only goal fit participants reported motivational fluency scores that were significantly different from other participants. Thus, no support for Model Hypothesis 3b was found.

For Model Hypothesis 3c, I examined whether participants in the fit conditions differed from each other in their interpersonal fluency scores, expecting to find that all components fit participants and only social fit participants reported significantly greater interpersonal fluency in comparison to participants in other conditions. As predicted, participants in the all components fit condition (M = 5.23, SD = .77) reported higher interpersonal fluency scores than participants in the goal fit (M = 4.9, SD = .75) condition [$t(286) = -2.48$, $p = .01$], self-concept fit (M = 4.91, SD = .83) condition [$t(286) = -2.72$, $p = .01$], and all components low fit (M = 4.84, SD = .79) condition [$t(286) = -2.11$, $p = .04$]. Further, as predicted, participants in the all components fit condition did not differ in reported interpersonal fluency scores ($p = .37$) from participants in the only social fit

condition (M = 5.03, SD = .84). As a second test of Model Hypothesis 4c, I conducted a one-way ANOVA to see if participants in the fit conditions would differ in their interpersonal fluency scores irrespective of the rest of the model. The results of this test revealed that there was a significant difference in interpersonal fluency scores between participants in different fit conditions, $F(4, 421) = 3.34$, $p = .01$. Contrary to the findings of the parallel multiple mediator model, however, a Tukey's HSD revealed that the only significant difference (p = .01) was between all component fit participants (M = 5.23, SD = .77) and all component low fit participants (M = 4.84, SD = .79). Thus, more support was found for Model Hypothesis 3c than Model Hypotheses 3a and 3b.

iii. Testing Model Hypothesis 4. To test the sub-hypotheses of Model Hypothesis 4, I examined the results of the parallel multiple mediator model.

For Model Hypothesis 4a, I examined the indirect effect between fit and engagement via cognitive fluency, expecting to find that all components fit participants and only self-concept fit participants would show a significantly stronger relationship compared to participants in other conditions. As predicted, all components fit participants did not differ from only self-concept fit participants, 95% CI [-.01, .01]. Contrary to predictions, however, all components fit participants did not significantly differ from only goal fit, only social fit, and all components low fit participants either. To further investigate this sub-hypothesis, I ran a linear regression model on fit and cognitive fluency predicting engagement. The results were the same, whereby all components fit participants did not differ from only self-concept fit participants (p = .57), but all components fit participants also did not differ significantly from participants in all other conditions ($p > .05$). Next, I relevelled the fit condition such that only self-concept fit participants were the reference group and ran another linear

regression model. The results of this model were identical, whereby all components fit participants did not differ from only self-concept fit participants (p = .57), but only self-concept fit participants also did not differ significantly from participants in all other conditions (p > .05). Thus, very little support was found for Model Hypothesis 4a.

For Model Hypothesis 4b, I examined the indirect effect between fit and engagement via motivational fluency, expecting to find that all components fit participants and only goal fit participants would show a significantly stronger relationship compared to participants in other conditions. Contrary to predictions, all components fit participants only differed from only goal fit participants in their indirect relationship to engagement via motivational fluency, 95% *CI* [-.12, -.003]. To further investigate this sub-hypothesis, I ran a linear regression model on fit and motivational fluency predicting engagement. The results were somewhat different, because I found that all components fit participants did not differ from only goal fit participants (p = .93). However, the rest of the results were the same with all components fit participants not differing significantly from participants in all other conditions (p > .05). Next, I relevelled the fit condition such that only goal fit participants were the reference group and ran another linear regression model. The results of this model were identical to the previous linear regression model, whereby all components fit participants did not differ from only goal fit participants (p = .93), but only goal fit participants also did not differ significantly from participants in all other conditions (p > .05). Thus, very little (arguably not any) support was found for Model Hypothesis 4b.

For Model Hypothesis 4c, I examined the indirect effect between fit and engagement via interpersonal fluency, expecting to find that all components fit participants and only social fit participants would show a significantly stronger relationship compared to

participants in other conditions. As predicted, all components fit participants did not differ from only social fit participants in their indirect relationship to engagement via interpersonal fluency, 95% *CI* [-.05, .01]. Further in support of Model Hypothesis 4c, all components fit participants significantly differed from only self-concept fit participants, 95% *CI* [-.08, -.003], only goal fit participants, 95% *CI* [-.08, -.002], and all components low fit participants, 95% *CI* [-.06, -.0001]. To further investigate this sub-hypothesis, I ran a linear regression model on fit and interpersonal fluency predicting engagement. The results were different. As predicted, all components fit participants did not differ from only social fit participants (p = .53). However, contrary to predictions and contrary to the findings of the parallel multiple mediator model, all components fit participants also not differ significantly from participants in all other conditions (p > .05). Next, I relevelled the fit condition such that only social fit participants were the reference group and ran another linear regression model. The results of this model were identical to the previous linear regression model, whereby all components fit participants did not differ from only social fit participants (p = .53), but only social fit participants also did not differ significantly from participants in all other conditions (p > .05). Thus, more support was found for Model Hypothesis 4c in the parallel multiple mediator model.

c. Conclusions. The results of the correlations, parallel multiple mediator model, ANOVAs, and linear regressions revealed very little support for the experimental model. Model Hypothesis 1 did not receive any support, with none of the conditions showing correlations between the three types of fit that fell within the expected range (.1 - .3). Only slightly more support was found for Model Hypothesis 2, as Model Hypothesis 2a was supported, with all components fit participants showing higher engagement than only goal fit

participants. However, none of the other sub-hypotheses of Model Hypothesis 2 were supported, as none of the only fit conditions reported greater engagement compared to all components low fit participants. A similar situation arose for Model Hypothesis 3, with only one sub-hypothesis, Model Hypothesis 3c, receiving support. Results of the multiple parallel mediator model showed that all components fit participants reported higher interpersonal fluency than all other conditions, except for participants in the only social fit condition. The other sub-hypotheses did not receive support, as all components fit participants and the respective only fit condition (only self-concept fit condition when measuring cognitive fluency and only goal fit condition when measuring motivational fluency) did not differ significantly from other conditions in terms of their respective type of fluency. Finally, for Model Hypothesis 4, similar to Model Hypothesis 3, only the sub-hypothesis concerning social fit, Model Hypothesis 4c, received support. The parallel multiple mediator model revealed that there was a significant difference in strength of indirect effect between all components fit participants and only self-concept, only goal, and all components low fit participants in fit predicting engagement via interpersonal fluency. This difference was not significant between all components fit participants and only social fit participants. Thus it appears that although the sub-hypotheses involving social fit gathered some support, very little support was found overall for Model Hypotheses 1-4.

However, the manipulation check revealed that students in the all components fit condition were more likely to believe their feedback than participants in all other conditions. To augment these results, I conducted a correlational test of the S'FICE model as well using the participants' responses on the S'FICE instrument.

3. Testing the correlational model

I tested the correlational model to gather further evidence for my hypotheses, although I could provide only correlational evidence (and not experimental evidence) regarding the relationships of the S'FICE model by doing so.

4. Testing the S'FICE model with correlational data

The Model Hypotheses that I tested with the correlational model are listed below. However, since I could only provide correlational evidence with the correlational tests, I've altered the wording of the model hypotheses to indicate that I'm testing "associations", rather than "predictions". Furthermore, hypotheses involving the different levels of fit have been altered and/or removed, because fit is treated as a continuous rather than categorical scale in the correlational tests.

(1) Model Hypothesis 1: self-concept, goal, and social fit will be positively and moderately correlated (correlations ranging between .1 - .3; Cohen, 1988) to one another

(2) Model Hypothesis 2: self-concept fit, goal fit, and social fit will each be uniquely associated with engagement

   a) Model Hypothesis 2a: the interaction between all three types of fit will be significantly associated with engagement

   b) Model Hypothesis 2b: self-concept fit will be significantly associated with engagement after accounting for the variance of goal and social fit

   c) Model Hypothesis 2c: goal fit will be significantly associated with engagement after accounting for the variance of self-concept and social fit

   d) Model Hypothesis 2d: social fit will be significantly associated with engagement after accounting for the variance of self-concept and goal fit

(3) Model Hypothesis 3: fit will be associated with fluency

a) Model Hypothesis 3a: higher levels of self-concept fit will be associated with higher levels of cognitive fluency
b) Model Hypothesis 3b: higher levels of goal fit will be associated with higher levels of motivational fluency
c) Model Hypothesis 3c: higher levels of social fit will be associated with higher levels of interpersonal fluency

(4) Model Hypothesis 4: fit will be associated with engagement via fluency

a) Model Hypothesis 4a: higher levels of self-concept fit will be associated with greater engagement via higher levels of cognitive fluency
b) Model Hypothesis 4b: higher levels of goal fit will be associated with greater engagement via higher levels of motivational fluency
c) Model Hypothesis 4c: higher levels of social fit will be associated with greater engagement via higher levels of interpersonal fluency

a. Testing Model Hypothesis 1. To test Model Hypothesis 1, I conducted correlations between self-concept fit, goal fit, and social fit scores of participants. Unlike in the experimental test of this model hypothesis, I did not separate participants by condition and expected all correlations to fall between the range of .1 - .3 (Cohen, 1988) indicating a moderate relationship between the three types of fit. These correlations appear in Table 17.

Table 17

Correlations between self-concept, goal, and social fit for all participants

Variable	*M*	*SD*	1	2	3

1.	self-concept fit	2.66	.31	-		
2.	goal fit	2.95	.31	.27***	-	
3.	social fit	2.71	.35	.59***	.13*	-

Note: *$p < .05$, ***$p < .001$

As the results on Table 17 indicate, I found partial support for the predictions of Model Hypothesis 1. Whereas the correlation between self-concept fit and goal fit and the correlation between social fit and goal fit fell within the range of .1 - .3, the correlation between self-concept fit and social fit exceeded this range, showing a much stronger correlation than I anticipated.

b. Testing Model Hypothesis 2. To test Model Hypothesis 2, I conducted a multiple linear regression where I regressed participants' self-concept fit, goal fit, and social fit scores on their engagement scores. Contrary to expectations, although the model was significant [$F(7, 283) = 13.56$, $p < .001$], none of the sub-hypotheses were supported. The interaction between self-concept, goal, and social fit was not significant ($p = .51$), and self-concept fit ($p = .53$), goal fit ($p = .49$), and social fit ($p = .81$) were not significantly associated with engagement. Thus, there was no support for Model Hypothesis 2.

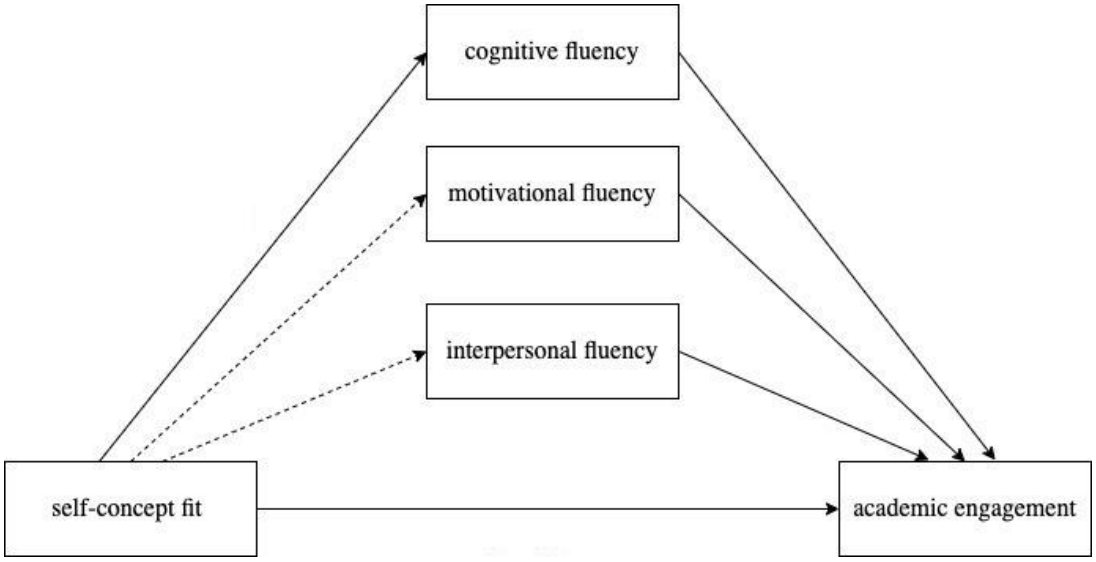
To test Model Hypotheses 3 and 4, I ran three separate parallel multiple regression models. In the first model, I entered participants' self-concept fit scores as the predictor (although I was only measuring its association with other variables since it was not experimentally manipulated) and engagement as the dependent variable and I entered cognitive fluency, motivational fluency, and interpersonal fluency as multiple parallel mediators (see Figure 5). For the second model, I entered participants' goal fit scores as the predictor (see note above about using the term "predictor") and engagement as the dependent

variable and I entered cognitive fluency, motivational fluency, and interpersonal fluency as multiple parallel mediators (see Figure 6). Finally, for the third model, I entered participants' social fit scores as the predictor (same note as above) and engagement as the dependent variable and I entered cognitive fluency, motivational fluency, and interpersonal fluency as multiple parallel mediators (see Figure 7).

c. Testing Model Hypothesis 3. To test Model Hypothesis 3a, I referred to the first parallel multiple mediator model where self-concept fit was entered as the predictor (see Figure 5). In this model, as predicted, self-concept fit scores were positively and significantly associated with cognitive fluency [b = .36, t (289) = 2.77, p = .006].

Figure 5

The parallel multiple mediator model with self-concept fit as the predictor



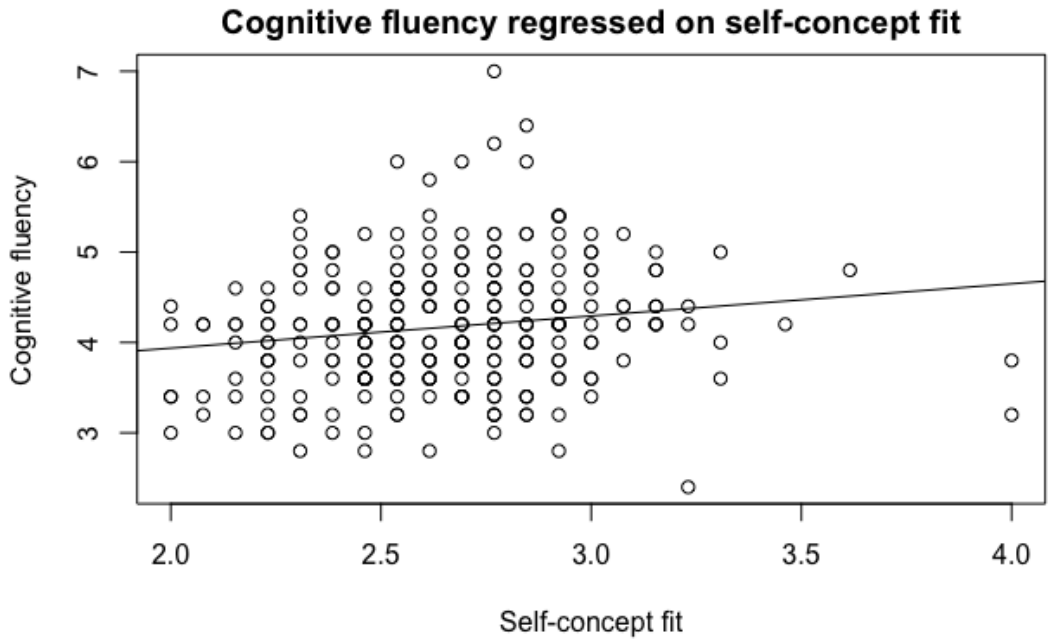
Note. Predicted relationships are indicated by unbroken lines and relationships that were not expected to be significant are indicated by dotted lines.

When I ran a linear regression where I regressed self-concept fit on cognitive fluency (see Figure 6) in order to further explore this relationship, the results were identical:

participant's self-concept fit scores positively predicted their cognitive fluency scores [b = .36, F (1, 289) = 7.69, p = .006].

Figure 6

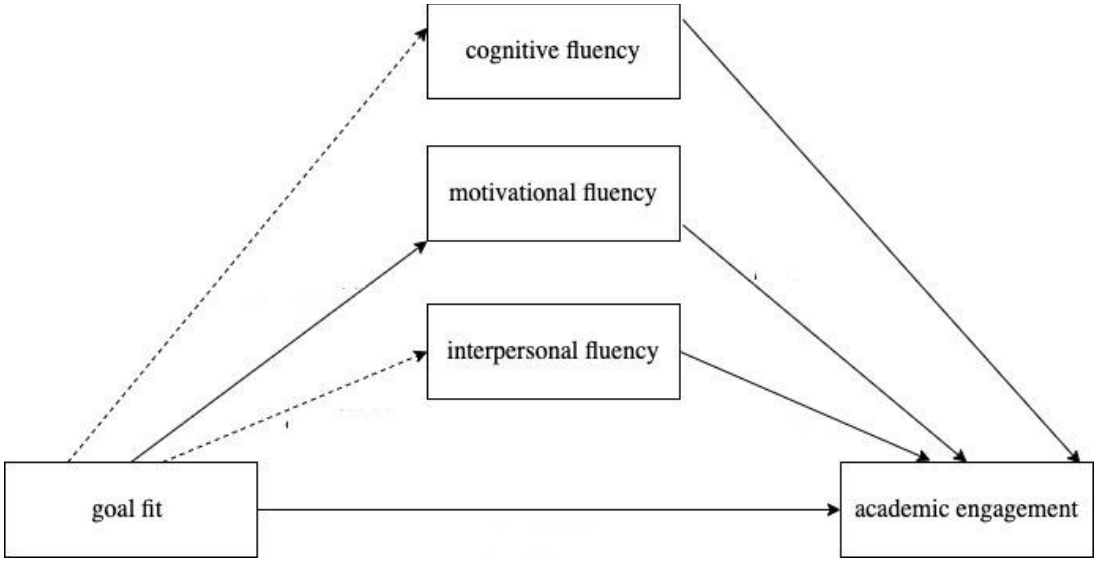
Cognitive fluency regressed on self-concept fit



Next to test Model Hypothesis 3b, I referred to the second parallel multiple mediator model where goal fit was entered as the predictor (see Figure 7). In this model, as predicted, goal fit scores were positively and significantly associated with motivational fluency [b = .61, t (289) = 4.78, p < .001]. Contradicting the predictions, the parallel multiple mediator model with goal fit as the predictor also showed a positive and significant relationship between goal fit and interpersonal fluency [t (289) = 4.19, p < .001].

Figure 7

The parallel multiple mediator model with goal fit as the predictor

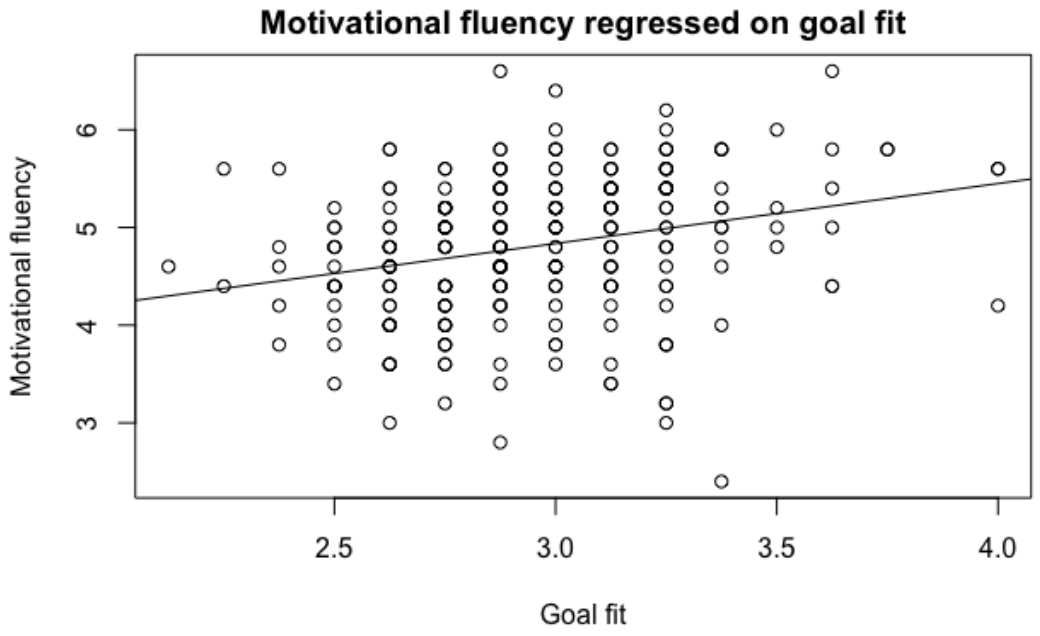


Note. Predicted relationships are indicated by unbroken lines and relationships that were not expected to be significant are indicated by dotted lines.

When I ran a linear regression where I regressed goal fit on motivational fluency, the results were identical whereby goal fit scores positively predicted their motivational fluency scores [$b = .61$, $F\ (1, 289) = 22.84$, $p < .001$] (see Figure 8).

Figure 8

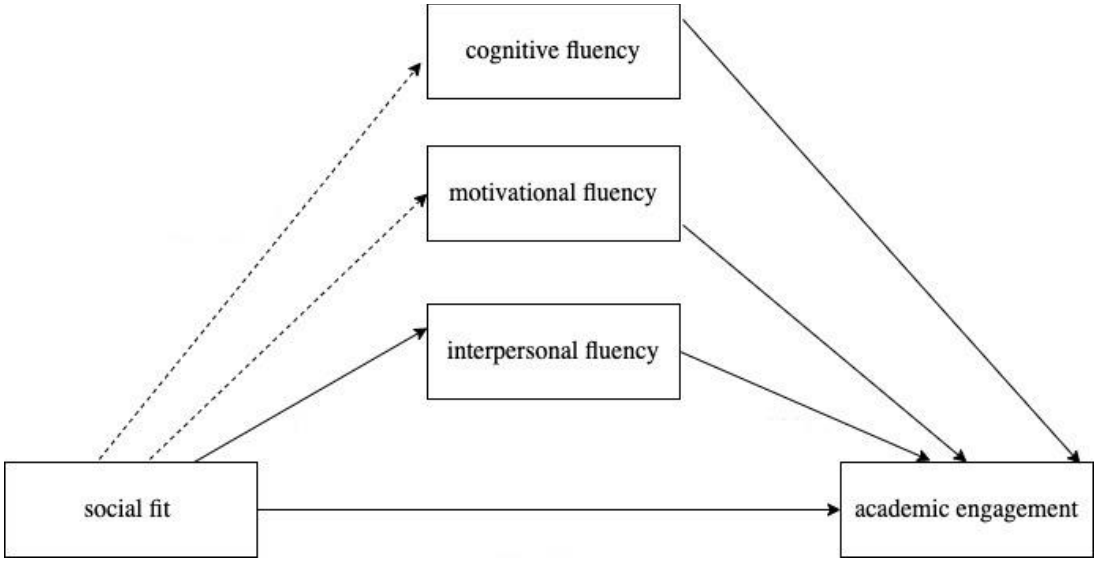
Motivational fluency regressed on goal fit



Finally, to test Model Hypothesis 3c, I referred to the third parallel multiple mediator model where social fit was entered as the predictor (see Figure 9). In this model, contrary to predictions, social fit scores were not significantly associated with interpersonal fluency [t (289) = -.2, p = .84]. Further contradicting the predictions, the parallel multiple mediator model with social fit as the predictor showed a positive and significant relationship between social fit and cognitive fluency [t (289) = 3.51, p < .001].

Figure 9

The parallel multiple mediator model with social fit as the predictor



Note. Predicted relationships are indicated by unbroken lines and relationships that were not expected to be significant are indicated by dotted lines.

When I ran a linear regression where I regressed social fit on interpersonal fluency, social fit scores did not positively predict interpersonal fluency scores, F (1, 289) = .02, p = .84.

Thus, I found full support for Model Hypothesis 3a, but only partial support for Model Hypothesis 3b (due to the unexpected relationship between goal fit and interpersonal fluency), and no support for Model Hypothesis 3c.

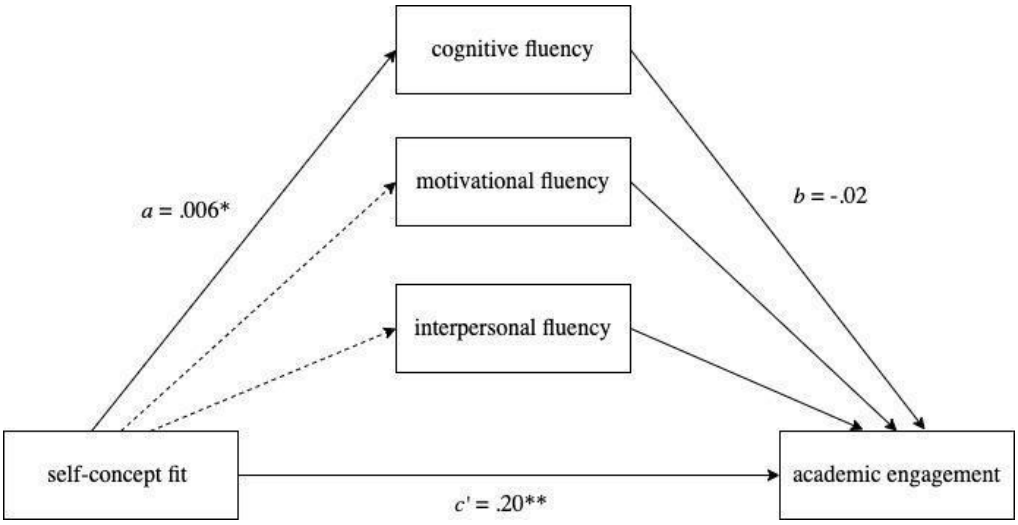
d. Testing Model Hypothesis 4. To test the fourth hypothesis, I examined the three separate parallel multiple mediator models with self-concept fit, goal fit, and social fit as the predictors, respectively. I also conducted three separate linear regression models to further probe these results.

To test Model Hypothesis 4a, I examined the first parallel multiple mediator model where self-concept fit scores were entered as the predictor variable (see Figure 5). As predicted, there was a positive and significant direct relationship between self-concept fit and

engagement when accounting for cognitive, motivational, and interpersonal fluency [b = .20, t (289) = 2.94, p = .004]. However, contrary to predictions, the indirect effect of self-concept fit on engagement via cognitive fluency was not significant, 95% *CI* [-.04, .02] (see Figure 10).

Figure 10

Multiple parallel mediator model with self-concept fit as the predictor, engagement as the dependent variable, and cognitive, motivational, and interpersonal fluency as mediators



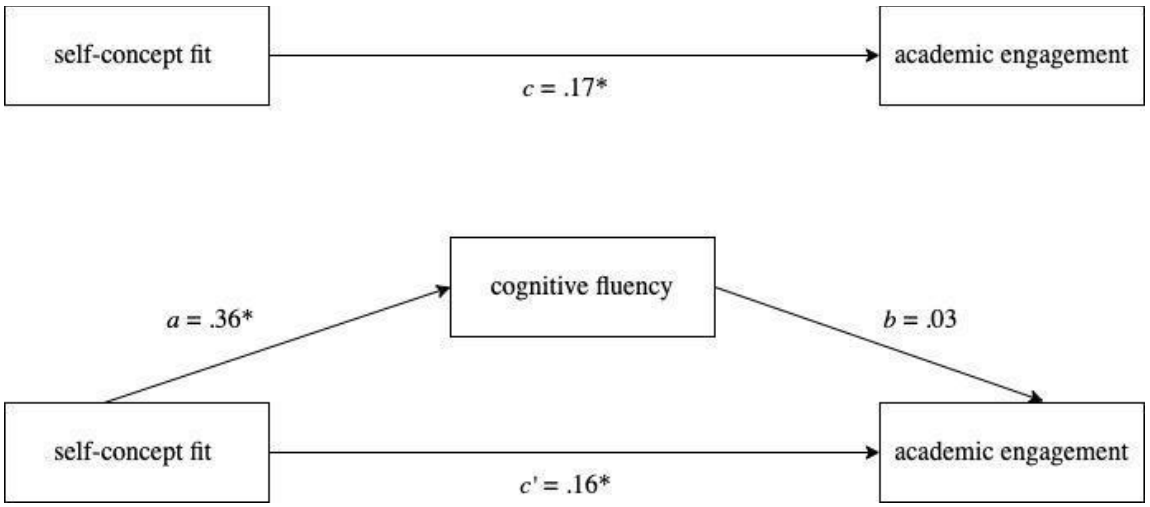
Note. Predicted relationships are indicated by unbroken lines and relationships that were not expected to be significant are indicated by dotted lines. Because the intention of this analysis was to measure the mediated relationship between self-concept fit on engagement via cognitive fluency, I only reported the significant paths that correspond to this relationship. No type of fluency showed a significant indirect relationship between self-concept fit and engagement. Of the indicated lines, *a* refers to the relationship of self-concept regressed on cognitive fluency, *b* refers to cognitive fluency regressed on engagement while accounting for self-concept fit, and *c'* refers to self-concept fit regressed on engagement accounting for

the three types of fluency. Indicated numbers refer to the coefficients for each relationship. *$p < .05$, **$p < .01$.

To further investigate this relationship, I conducted a mediation analysis, where I entered self-concept fit as the predictor, cognitive fluency as the mediator, and engagement as the dependent variable. As the first step of this analysis, I calculated the total effect of the relationship of self-concept fit and engagement. These results showed a positive and significant total relationship between self-concept fit and engagement [$b = .17$, F (1, 289) = 4.72, $p = .03$]. As the next step, I calculated the relationship between self-concept fit and cognitive fluency. These results also showed a positive and significant relationship between self-concept fit and cognitive fluency [$b = .36$, F (1, 289) = 7.69, $p = .006$]. For the third step, I conducted a linear regression where I regressed cognitive fluency on engagement controlling for self-concept fit. Contrary to predictions (but similar to the parallel multiple mediator model), results of this step indicate that when self-concept fit is accounted for, there is no relationship between cognitive fluency and engagement [F (1, 289) = 2.75, $p = .07$], thus indicating that cognitive fluency does not mediate the relationship between self-concept fit and engagement (see Figure 11). Thus, no support was found for Model Hypothesis 4a.

Figure 11

Mediator model with self-concept fit as the predictor, engagement as the dependent variable, and cognitive fluency as the mediator

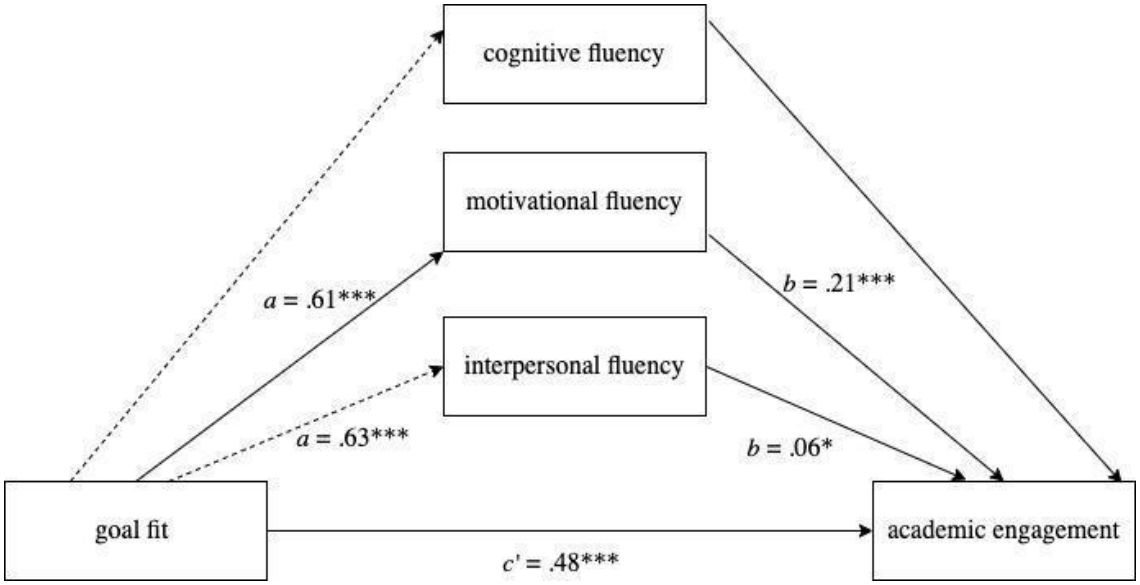


Note. Of the indicated lines, *a* refers to the relationship of self-concept regressed on cognitive fluency, *b* refers to cognitive fluency regressed on engagement while accounting for self-concept fit, and *c'* refers to self-concept fit regressed on engagement accounting for cognitive fluency. Indicated numbers refer to the coefficients for each relationship. *$p < .05$

To test Model Hypothesis 4b, I examined the second parallel multiple mediator model where goal fit scores were entered as the predictor variable (see Figure 7). As predicted, there was a positive and significant direct relationship between goal fit and engagement when accounting for cognitive, motivational, and interpersonal fluency [$b = .48$, t (289) = 7.48, $p < .001$]. Further, according to my predictions, the indirect effect of goal fit on engagement via motivational fluency was significant, 95% *CI* [.07, .20]. Contrary to predictions, however, the indirect relationship of goal fit on engagement via interpersonal fluency was also significant, 95% *CI* [.002, .09]. However, the model results also revealed that the indirect relationship of goal fit on engagement via motivational fluency was stronger than the indirect relationship of goal fit on engagement via interpersonal fluency, 95% *CI* [.008, .18] (see Figure 12).

Figure 12

Multiple parallel mediator model with goal fit as the predictor, engagement as the dependent variable, and cognitive, motivational, and interpersonal fluency as mediators



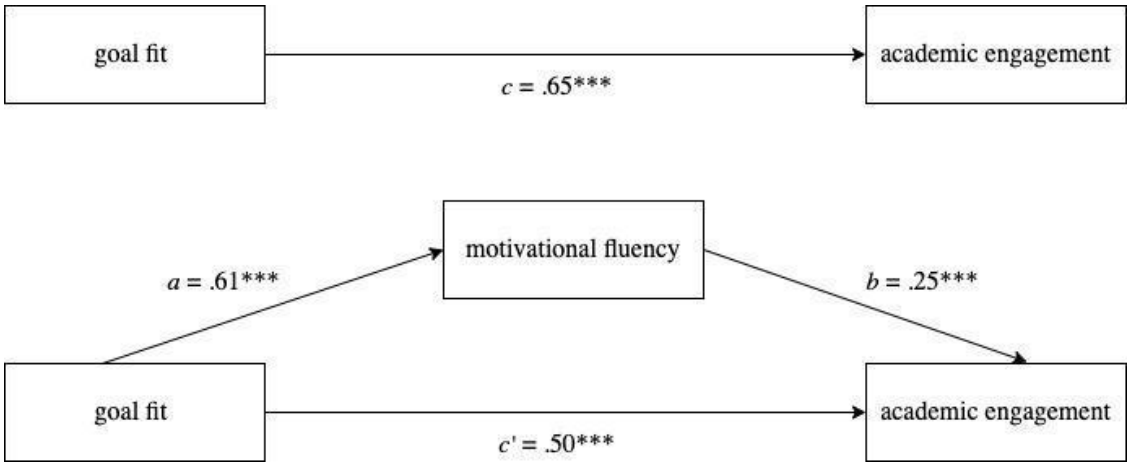
Note. Predicted relationships are indicated by unbroken lines and relationships that were not expected to be significant are indicated by dotted lines. Of the indicated lines, each *a* refers to the relationship of goal fit regressed on motivational and interpersonal fluency respectively, each *b* refers to motivational and interpersonal fluency respectively, regressed on engagement while accounting for goal fit, and *c'* refers to goal fit regressed on engagement accounting for the three types of fluency. Indicated numbers refer to the coefficients for each relationship. *$p < .05$, ***$p < .001$.

To further investigate this relationship, I conducted a mediation analysis, where I entered goal fit as the predictor, motivational fluency as the mediator, and engagement as the dependent variable. As the first step of this analysis, I calculated the total effect of the relationship of goal fit and engagement. These results showed a positive and significant relationship between goal fit and engagement [$b = .65$, F (1, 289) = 87.85, $p < .001$]. As the

next step, I calculated the relationship between goal fit and motivational fluency. These results also showed a positive and significant relationship between goal fit and motivational fluency [b = .61, F (1, 289) = 22.84, p < .001]. For the third step, I conducted a linear regression where I regressed motivational fluency on engagement controlling for goal fit. As predicted, results of this step indicated a partial mediation of goal fit on engagement via motivational fluency, because goal fit had a significant relationship with engagement, [b = .50, t (289) = 7.77, p < .001] and motivational fluency also had a significant relationship with engagement, [b = .25, t (289) = 8.68, p < .001] when accounting for each other (see Figure 13). Thus the results of the mediation analysis supported the findings from the parallel multiple mediator model, showing support for Model Hypothesis 4b.

Figure 13

Mediator model with goal fit as the predictor, engagement as the dependent variable, and motivational fluency as the mediator



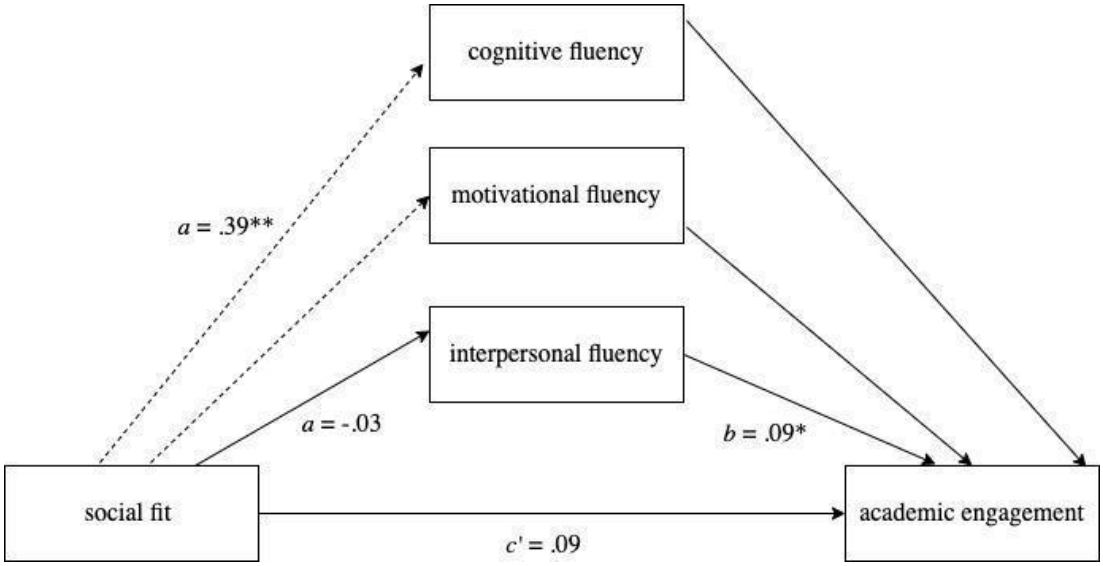
Note. Of the indicated lines, *a* refers to the relationship of goal fit regressed on motivational fluency, *b* refers to motivational fluency regressed on engagement while accounting for goal

fit, and *c'* refers to goal fit regressed on engagement accounting for motivational fluency. Indicated numbers refer to the coefficients for each relationship. ***$p < .001$

To test Model Hypothesis 4c, I examined the third parallel multiple mediator model where social fit scores were entered as the predictor variable. Contrary to my predictions, there was no significant total relationship between social fit and engagement when accounting for cognitive, motivational, and interpersonal fluency [t (289) = .08, p = .23]. Further contradicting my predictions, there was no significant indirect effect of social fit on engagement via interpersonal fluency, 95% *CI* [-.03, .03] (see Figure 14).

Figure 14

Multiple parallel mediator model with social fit as the predictor, engagement as the dependent variable, and cognitive, motivational, and interpersonal fluency as mediators



Note. Predicted relationships are indicated by unbroken lines and relationships that were not expected to be significant are indicated by dotted lines. Because the intention of this analysis was to measure the mediated relationship between social fit on engagement via interpersonal fluency, I only reported the significant paths that correspond to this relationship, in addition

to unexpected relationships concerning social fit. Of the indicated lines, each *a* refers to the relationship of social fit regressed on cognitive and interpersonal fluency respectively, *b* refers to interpersonal fluency regressed on engagement while accounting for social fit, and *c'* refers to social fit regressed on engagement accounting for the three types of fluency. Indicated numbers refer to the coefficients for each relationship. *$p < .05$, **$p < .01$.

To further investigate this relationship, I conducted a mediation analysis, where I entered social fit as the predictor, interpersonal fluency as the mediator, and engagement as the dependent variable. As the first step of this analysis, I calculated the total effect of the relationship of social fit and engagement. These results showed no relationship between social fit and engagement [F (1, 289) = 1.48, p = .23]. As the next step, I calculated the relationship between social fit and interpersonal fluency. These results also showed no relationship between social fit and interpersonal fluency [F (1, 289) = .04, p = .84]. Although this indicated that mediation is not possible, because the "predictor" variable is expected to have a relationship with the mediator, I ran the third step as well to further probe the relationship between these three variables. Therefore, I conducted a linear regression where I regressed interpersonal fluency on engagement controlling for social fit. Similar to the first step, social fit did not show a relationship with engagement [t (289) = 1.41, p = .16]. However, as predicted, interpersonal fluency did show a positive and significant relationship with engagement [b = .20, t (289) = 7.29, $p < .001$] (see Figure 15). Thus, there was no support for Model Hypothesis 4c, although interpersonal fluency did show a relationship with engagement.

Figure 15

Mediator model with social fit as the predictor, engagement as the dependent variable, and interpersonal fluency as the mediator

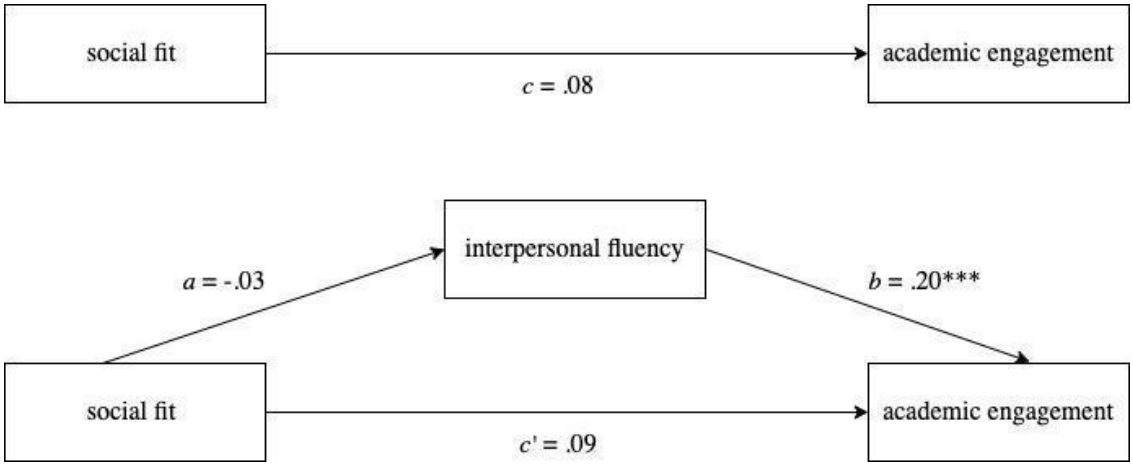
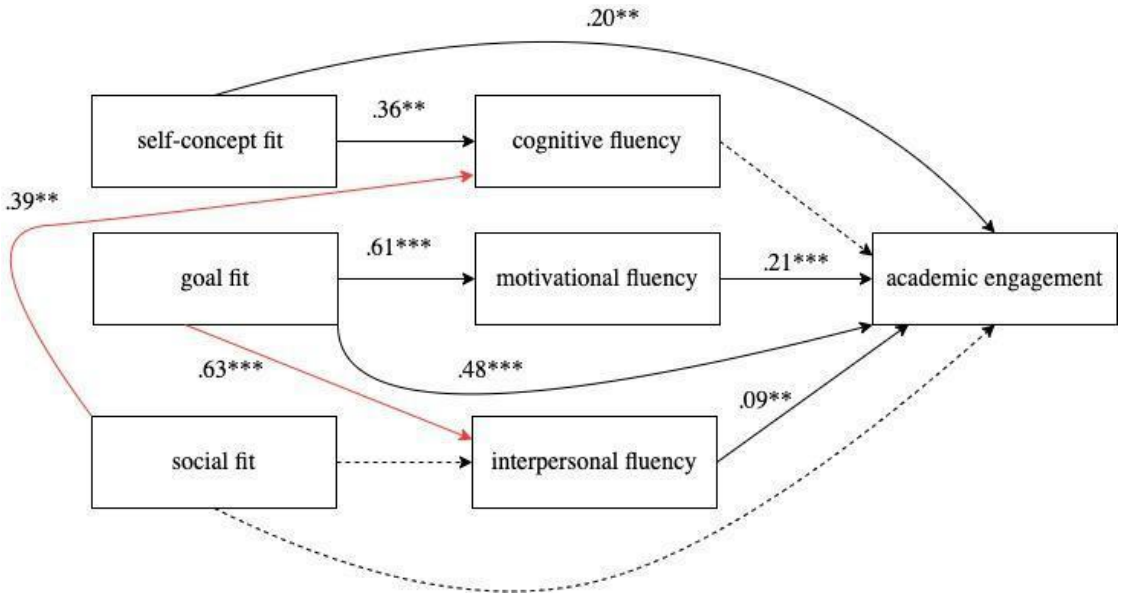


Figure 16 contains a graphical summary of the results. I have included coefficients for the theoretically expected paths that were significant as well as the theoretically unexpected paths that were significant. Theoretically expected paths that were significant are indicated by black unbroken lines whereas theoretically unexpected significant paths are indicated by red unbroken lines. Finally, theoretically expected paths that were not significant are marked with a dotted line.

Figure 16

Summary figure of Study 2 correlational test of hypotheses



5. Conclusions. The results of the correlations, parallel multiple mediator model, ANOVAs, and linear regressions revealed some support for the experimental model. The experimental analysis showed support only for Model Hypotheses 3c and 4c, that concerned the relationship of social fit to interpersonal fluency and engagement. The parallel multiple mediator model revealed that there was a significant difference in strength of indirect effect between all components fit participants and only self-concept, only goal, and all components low fit participants in fit predicting engagement via interpersonal fluency. This difference was not significant between all components fit participants and only social fit participants. Thus, it appears that although the sub-hypotheses involving social fit gathered some support, very little support was found overall for Model Hypotheses 1-4. However, the correlational analyses revealed much more support for the S'FICE model. Self-concept and goal fit both showed direct relationships with their respective types of fluency. Goal fit showed a significant indirect relationship with engagement through the mediator of motivational fluency. Motivational and interpersonal fluency both showed a relationship with engagement.

Contradicting the hypotheses regarding the S'FICE model, self-concept fit showed a direct relationship with engagement, but cognitive fluency did not mediate this relationship, because it had no direct relationship with engagement. Furthermore, social fit was related to cognitive fluency, but not interpersonal fluency and had neither a direct nor indirect relationship with engagement (see Figure 16)[5].

C. Discussion

Both an experimental and a correlational test were conducted on the data gathered in Study 2 to test Model Hypotheses 1, 2, 3, and 4. I will summarize my findings for each Model Hypothesis.

First, Model Hypothesis 1 centered on the correlations between self-concept, goal, and social fit. I predicted that the correlations between these types of fit would fall within the range of .1 - .3 (Cohen, 1988). In the experimental test of Model Hypothesis 1, I expected these correlations to slightly vary within this range according to the type of fit/s that participants were expected to experience. The results revealed no support for Model Hypothesis 1, because the correlations between the three types of fit for each experimental group and the control group did not adhere to the expected coefficients. However, in the correlational test, I found support for Model Hypothesis 1 concerning the correlations

[5] The same data analyses were run including the multiracial participants. These analyses revealed similar findings: accuracy significantly varied depending on fit condition (all components fit participants rated the feedback as more accurate than all other participants, $p < .001$; in the experimental test, only interpersonal fluency was significantly predicted by fit condition, $F(4, 374) = 3.89$, $p = .004$ and the model predicting engagement was significant, $F(4, 374) = 2.98$, $p = .02$; in the correlational test, self-concept fit only predicted cognitive fluency, $F(1, 377) = 10.19$, $p = .002$, and engagement, $t(374) = 3.82$, $p < .001$; goal fit predicted both motivational fluency, $F(1, 377) = 29.36$, $p < .001$ and interpersonal fluency, $F(1, 377) = 19.53$, $p < .001$ as well as engagement, $t(374) = 8.44$, $p < .001$; and social fit only predicted cognitive fluency, $F(1, 377) = 13.24$, $p < .001$; finally both motivational fluency, $t(374) = 6.37$, $p < .001$, and interpersonal fluency, $t(374) = 4.18$, $p < .001$, predicted engagement and cognitive fluency did not ($p = .12$). All these results match those that I obtained when I included only Latina/o/x participants in my final sample.

between self-concept and goal fit, as well as goal and social fit. Contrary to predictions, self-concept and social fit showed a stronger correlation than I expected. Thus, Study 2 suggests that self-concept and social fit may be more related constructs than they were theorized to be, although in Study 1 I did find that participants responded to questions regarding self-concept fit and social fit in distinguishable ways. In terms of the applied uses of the S'FICE instrument, this similarity suggests that I should explore whether an intervention designed to increase self-concept fit would also increase social fit.

The next hypothesis, Model Hypothesis 2, tested the prediction that self-concept fit, goal fit, and social fit would all have unique relationships to engagement. Therefore, in the experimental test I expected participants in the all components fit condition to have higher engagement scores than all other participants (Model Hypothesis 2a) and participants in the singular fit conditions (only self-concept fit, only goal fit, and only social fit, respectively) to have higher engagement scores than participants in the all components low fit condition (Model Hypotheses 2b, 2c, and 2d, respectively). However, only Model Hypothesis 2a received partial support as participants in the all components fit condition demonstrated higher engagement than participants in the only goal fit condition. The correlational test of Model Hypothesis 2 provided even less support as none of the types of fit showed a significant relationship to engagement when accounting for each other. Thus, it appeared as if the three types of fit may not have unique relationships with engagement. This suggested that it may be possible for a student to experience higher engagement with high levels of fit in only one or two types of fit rather than all three, although the experimental test suggested that perhaps there may exist a difference between students who are high in all types of fit compared to those who are only high in one or low in all.

Model Hypothesis 3 predicted that each type of fit would be associated with its respective type of fluency. In the experimental tests of this model, I only found support for Model Hypothesis 3c concerning the relationship between social fit and interpersonal fluency. I found that all components fit participants showed greater interpersonal fluency than all other participants except for those in the only social fit condition. The correlational test of these sub-hypotheses revealed more support. Model Hypothesis 3a received full support with self-concept fit showing a significant and positive association with cognitive fluency. Model Hypothesis 3b received partial support, because although goal fit showed a significant and positive association with motivational fluency, goal fit also showed a significant and positive association with interpersonal fluency. This was an interesting finding, considering that goal fit tested whether participants felt like their personal goals aligned with their ideal career goals and interpersonal fluency measured how easy participants anticipated it would be for them to form interpersonal relationships in their ideal career. In the context of goals in college, it could be conjectured that these two constructs are related in the case that students who expected to have personal goals that matched their ideal career goals expected to find other employees with similar personal goals and use this as common grounds for friendship. Finally, contradicting the findings of the experimental test, Model Hypothesis 3c received no support in the correlational test. Social fit was not significantly associated with interpersonal fluency and rather showed a positive and significant association to cognitive fluency. This finding relates to the correlational findings of Model Hypothesis 1 where I found a larger than expected correlation between self-concept fit and social fit scores. These results appear to suggest that participants who predict feeling like they will be able to be themselves in their ideal career (have high self-concept fit) and

those who predict feeling like they will belong among others in their ideal career (high social fit) are both likely to experience (or rather, predict experiencing) an ease in concentrating on ideal career tasks (have high cognitive fluency). Although this is not what I theoretically expected given the S'FICE model, it is compelling to think that students who do not anticipate feeling a need to change their identity to fit in their ideal career or be accepted by fellow employees, expect to be calmer and more focused on their work.

For Model Hypothesis 4, I expected that fit scores would predict engagement via their respective type of fluency. The results of the analyses for Model Hypotheses 4a and 4b did not provide support for these hypotheses, but the results for Model Hypothesis 4c (social fit associated with engagement via interpersonal fluency) showed support. Participants in the all components fit condition showed a stronger indirect relationship with engagement via interpersonal fluency compared to participants in all the other conditions except for those in the only social fit condition. The correlational tests also showed no support for Model Hypothesis 4a, because self-concept fit did not show an indirect relationship with engagement via cognitive fluency. This seemed to be due to a disconnect between cognitive fluency and engagement, because self-concept fit was positively and significantly associated with both cognitive fluency as well as engagement, but cognitive fluency was not associated with engagement. The lack of a relationship between cognitive fluency and engagement is counterintuitive because I hypothesized that if students predicted that it would be easy to concentrate on their ideal career tasks, they would predict that they would be more engaged. As predicted, on the other hand, support was found for Model Hypothesis 4b, whereby goal fit was significantly and positively associated with engagement via motivational fluency. Thus, these results provided support for the idea that students who expected to feel like their

personal goals aligned with their ideal career goals (have high goal fit) expected to feel more engagement in their work as a function of expecting to feel a sense of ease in the pursuit of their goals (have high motivational fluency). Contrary to my predictions, this analysis also revealed that the relationship of goal fit on engagement via interpersonal fluency was significant and positive. However, as support for Model Hypothesis 4b, this analysis showed that the relationship between goal fit and engagement via motivational fluency was stronger than the relationship between goal fit and engagement via interpersonal fluency. Finally, contradicting the findings of the experimental test, the correlational test of Model Hypothesis 4c found no support for social fit having a relationship with engagement via interpersonal fluency. First, social fit did not have a relationship with engagement, which is concerning and suggests that students who anticipated feeling like they belonged in their ideal career might not necessarily predict that they would engage in their ideal career work. Secondly, social fit was not related to interpersonal fluency, which is curious, because it suggests that students who anticipate feeling like they would belong in their ideal career may not necessarily anticipate feeling like their social interactions in their career would be smooth. Finally, social fit showed a positive and significant relationship with cognitive fluency, which in turn was not related to engagement. Thus, the findings on social fit are rather complicated because they suggest a relationship between belonging to one's ideal career and feeling a sense of ease about one's tasks in one's ideal career (cognitive fluency), but not a relationship to an ease of interactions or work engagement, as was predicted.

It must be briefly noted again that the results of the experimental analyses cannot be discussed without acknowledging the manipulation check analysis which indicated that students in the all components fit condition rated their results of fit as more accurate than did

other participants. This failure of the experimental manipulation raises some interesting possibilities. Our sample consisted of Latina/o/x students who are part of the UR student population and thus were expected to experience perceptions and thoughts that may contribute to lower academic performance compared to their non-UR peers. However, these students indicated that they were less likely to believe feedback saying they were a poor fit to their ideal career than feedback saying they were an excellent fit to their ideal career. This could indicate resilience in these students (Herrman et al., 2011); these students may still maintain a belief in their ability and their fit to their ideal career despite experiencing adversity in college. On the other hand, an unwillingness to acknowledge their lack of fit to their ideal career could also stem from a need to distort reality in efforts to protect themselves from harmful thoughts about their abilities (Sherman & Cohen, 2006). It is possible that students who were asked to engage in self-affirming exercises would be more comfortable accepting that they were a poor fit to their ideal career, because they would not interpret such information as a negative reflection of them as a person.

Despite this failure of the manipulation in the experimental analyses, the correlational analyses could not be used to infer causality, and thus it was important to examine the results of both the experimental and correlational model.

Taking both sets of results into account, I argue that these results indicate overall support for the relationship of goal fit on engagement via motivational fluency. These results also suggest a need to explore the similarities and differences between self-concept fit and social fit. Both self-concept and social fit showed associations with cognitive fluency, but only self-concept fit showed a direct relationship with engagement. Therefore, these results indicate that social fit and cognitive fluency may share significant amounts of variance but

are both poor predictors of engagement, in comparison to self-concept and goal fit. Thus, only self-concept and goal fit appear to play a role in predicting engagement, despite the similarity of self-concept fit and social fit relating to cognitive fluency. However, whereas self-concept fit only has a direct relationship with engagement, goal fit has both a direct relationship with engagement and an indirect relationship with engagement through both motivational fluency (as theorized) and interpersonal fluency (unexpected). These relationships are further discussed in the General Discussion.

Given the results of the correlational and experimental tests, I wished to reassess the S'FICE instrument before conducting a further evaluation of the model. Although the results from Study 1 confirmed that the S'FICE instrument was sufficiently valid to be used in an experimental test of the S'FICE model in the context in which I used it, I wished to conduct a second round of instrument validation before using the instrument in the college context for which it was designed (rather than the ideal career context) to more closely approach the goal of validating this instrument to be used as a screening tool for UR college students.

IX. Section 8: Study 3 - Second round of S'FICE instrument validation

Study 1 revealed only partial support for two of the three Instrument Hypotheses. It revealed that Version 1 of the S'FICE instrument had five items that failed to distinguish among students' different fit levels and four items that underfit (did worse than) the model. As mentioned above, I decided that I wished to further improve the S'FICE instrument due to the failure to provide support for all Instrument Hypotheses with Version 1 of the S'FICE instrument.

A. Stage 1: Construct mapping

A second phase of construct mapping involves examining the construct itself and theorizing whether the results of Stage 4 (i.e., the results of Study 1) give reason to revise the theoretical definition of the construct itself. Therefore, at this stage, I re-examined how self-concept fit, goal fit, and social fit were theoretically defined and confirmed that these definitions were reflected in the items constructed for each dimension. For instance, self-concept fit was defined as the ability to feel like your true self in college, so I checked the self-concept fit items to ensure that they measured this concept.

After confirming that the theoretical definitions of the dimensions were reflected in the items for that dimension, I looked at the statistical information for all the items. As mentioned in Study 1, Instrument Hypothesis 2 was supported, implying that participants' responses matched a three-dimensional model better than a unidimensional model. Thus, overall, examination confirmed that self-concept, goal, and social fit were distinct enough dimensions.

Since Instrument Hypothesis 3 (the items will all fit the model) was only mostly supported (4 items underfit the model), I re-examined these items to determine if they suggested a need for construct revision. From this examination, I concluded that the dimension of social fit required some theoretical revision. As a reminder, social fit refers to the extent to which individuals feel like they belonged in a context and/or are surrounded by similar others. Thus, the items measuring social fit in the S'FICE instrument either dealt with belonging or similarity to others in college. However, most of the social fit items misfit the data, with one of the items measuring similarity showing significant underfit. Therefore, it seemed that the presence of items measuring different aspects of social fit may have been problematic. Given the statistical problems with the social fit items, I concluded that a

revision of the dimension of social fit was necessary. To confirm this statistics-based decision, I referred to the SAFE model (Schmader & Sedikides, 2018. In their discussion of social fit, Schmader and Sedikides (2018) emphasized belonging to an environment over feeling similar to others in an environment. Given this statistical and theoretical justification, I adjusted the construct map so that social fit referred only to feeling as if one belonged among one's peers in college. This concluded Stage 1 of the second round of instrument development. I concluded that whereas self-concept and goal fit needed no theoretical revision, the definition of social fit needed to be simplified to encompass only feelings of belonging.

B. Stage 2: Item design

Stage 2 of Study 3 required me to look at all the items in the S'FICE instrument to determine whether they needed to be changed in any way. Although only social fit required redefining in Stage 1, all items of the S'FICE instrument were evaluated at this stage. This is because item design is separate from construct development. Whereas in Stage 1 I needed to determine if the broad theoretical definitions of the dimensions needed to be revised, in Stage 2, I dove into each specific item and evaluated how well it fit the model and whether theoretically-speaking, it measured one of the dimensions defined in Stage 1.

1. Revisiting S'FICE items

I first highlighted all the items that showed poor fit, distinguishing between those that showed underfit (the more problematic type of poor fit) and overfit (indicative of a potentially excellent item). I focused on the 4 items that indicated underfit, and after carefully considering their meaning and their fit to the respective construct map, I determined that

there was sufficient empirical and theoretical evidence to remove them. The four underfitting items that were removed and the theoretical reasons for removing them are indicated below:

1. **sc_2 The transition to college was very difficult for me**: This item was intended to measure self-concept fit. Although students who experience less fit between who they are and who they feel like they can be in college are likely to agree with this item, there are other reasons that students could experience difficulty in transitioning to college (e.g., financial, adjusting to living on one's own, etc.)
2. **sc_13 I am nervous about going to TA's office hours and asking them questions**: This item was also intended to measure self-concept fit. However, students' relationships with TAs appeared to vastly differ, with some feeling less anxiety about approaching them versus professors and others feeling comparable levels of anxiety. Whereas anxiety in asking questions from professors was tied to students' comfort in being themselves in college, anxiety in approaching TAs appeared not to be as strong an indicator of this factor.
3. **social_1 When I am in classes for my major, I see a lot of people who are very similar to me (in terms of things like my race, gender, financial background, etc.)**: This item was intended to measure social fit. However, this item was created to measure similarity to others in college. In Stage 1 of Round 2, I decided to adjust the construct map such that similarity would not be included under social fit. Thus, this item measuring similarity did not fit into the S'FICE instrument anymore.
4. **social_7 At least some of my closest friends are in college with me**: This item was intended to measure social fit. However, upon closer reflection of the construct map on social fit, I determined that this item measured things other than belonging to

college. There were personal factors that may have affected students' responses to this question (e.g., how outgoing participants are, extraversion levels, etc.), causing participant responses to vary wildly.

Next, I looked at items that showed significant misfit but neither underfit nor overfit the model. Thus, these items were statistically not as concerning as items that underfit the model, but they were also not as good as items that showed overfit to the model and items that did not misfit the model. Before eliminating these items based solely on their statistical misfit, I also compared them to the construct map for a theoretical review:

1. **sc_8 I feel out of depth in my major**: This item, intended to measure self-concept fit, showed misfit. Referencing the construct map on self-concept fit, I theorized that students may have construed "out of depth" in more ways than one, leading to them thinking about factors other than the extent to which they can be themselves in college.
2. **sc_10 My family is just as involved in my college education as they are in other aspects of my life**: This item was meant to measure self-concept fit by estimating students' family's comfort with their college education. However, this item appeared to be construed in different ways by different students, leading me to theorize that students' family's involvement in their college education depended on more factors than their self-concept fit.
3. **goal_3 I feel like many professors and/or TAs in my major went to college for the same reasons as I did**: This item was intended to measure goal fit. However, upon closer reflection, I theorized that it measured how well students thoughts that

their goals matched their professors' and TAs' goals, rather than whether they felt like they could pursue their personal goals in college

4. **goal_9 I have seriously considered switching my major**: Although this item was intended to measure goal fit, the statistical misfit and comparison to the goal fit construct map led me to theorize that students may be thinking of factors other than the fit of their personal goals and college goals when considering dropping out of their major.
5. **social_4 I feel like I need to prove to the professors and/or TAs in my major that I'm JUST AS good as my classmates**: This item was intended to measure social fit. It showed misfit. Furthermore, I determined that it had very little to do with feeling belonging among peers and more to do with feeling similar to peers.
6. **social_8 At least some of my closest friends are in my major with me**: This item (intended to measure social fit) did not underfit as the identical item that asked about friends in students' colleges. However, it did show misfit. Further, I determined that although having friends does measure belonging it may also measure personality traits associated with having friends.
7. **social_11 I feel like the professors and/or TAs can't relate to the struggles I experience in college**: This item was intended to measure social fit. However, I determined that it measured similarity to professors and TAs more so than similarity to peers in college.

Finally, I made the decision to eliminate an item that did not show misfit:

1. **(goal_7r) The resources available to me in college are completely useless in helping me reach my goals:** Although this item did not show misfit, it did fail to

support Instrument Hypothesis 1, as participant thetas were not in ascending order for each step of the Likert scale. On deeper reflection, I also concluded that this item did not match the definition of goal fit according to the construct map. Goal fit was defined as participants feeling like the goals they must pursue in college align with their personal goals. I realized that the perceived usefulness of resources (measured by goal_7r) had very little to do with goal fit. Participants were perfectly capable of feeling like they could pursue their personal goals in college without benefiting from the resources offered by the college. To augment this theoretical argument, I referred to notes I made during cognitive interviews for Study 1. In answering goal_7r participants did show a tendency to respond in a way that did not exactly align with their responses to other goal fit items. At the time, this behavior was not significant enough to flag this item as problematic, but in conjunction with it failing Instrument Hypothesis 1 and considering its poor fit to the construct map, the evidence suggested that goal_7r should be eliminated from the S'FICE instrument in order for the S'FICE instrument to truly measure only self-concept, goal, and social fit.

2. Cognitive interviews on the new set of S'FICE items

I conducted a second round of cognitive interviews with the new set of items. Nine participants who identified as at least one of the underrepresented groups (Black, Latina/o/x, first-generation, female in STEM) participated in a 30-minute session and received $10 Amazon gift cards in exchange for their time. Participants were recruited by the UCSB Registrar and were all undergraduate students at the University of California, Santa Barbara.

Each interview was conducted over Zoom. During each interview, I shared my screen and displayed each item at the top of a PowerPoint slide with the response scale (Strongly

Disagree, Disagree, Agree, Strongly Agree) displayed below. I walked participants through what a cognitive interview meant and asked them to talk through their process of responding to each item and the reasons why they chose their selected scale point for that item. I recorded participants' confusion at items, disagreements between what an item meant, and thought patterns they displayed that did not match what I intended them to be thinking about.

Based on the cognitive interviews, two additional items were removed:

1. **(sc_7) I am basically the same person in college as I am in the place I am most comfortable in:** Many interviewees found this item confusing and could not provide an answer to it until I explained the item. Once it was explained to them, they mentioned that their response to this question was the same as their response to sc_3 "I think being a student is a very big part of who I am". This item (sc_3) was in comparison a much easier item for the students to understand. Given the redundancy of sc_7 with sc_3 and the difficulty students showed in interpreting this item, it was removed.
2. **(social_12) I feel like my family background and upbringing affect my social interactions in college:** The way students responded to this varied greatly and their responses depended more on their relationships with their family rather than how they felt they belonged in college.

In addition, the wording of several items that the interviewees found confusing or ambiguous was adjusted. These adjustments are described below:

1. **sc_1 My family and/or I always assumed I would go to college**: The "and" was changed to "and/or" to accommodate students with different relationships with their family.

2. **sc_2 When I'm in college, I'm more aware of things like my race, gender, financial background, etc.**: Students reported trouble understanding the previous version of this item due to its length and complexity. This version seemed easier to understand.
3. **sc_7 I feel like I am my true self (or one of my true selves) when I am in college**: Several students did not agree with the idea of having a single true self. Therefore, the possibility of having multiple true selves was added to the item. Further, I changed it from a reverse-scored item to a positively worded item to ease understanding.
4. **sc_8 Within the last few weeks, I have felt nervous about going to professors' office hours and asking them questions**: Students discussed a change in their feelings about talking to professors over time. They mentioned having felt nervous in earlier years and having since overcome these nerves. Thus "last few weeks" was added to differentiate these students from those who still felt nervous about approaching professors.
5. **goal_1 The goals typically associated with my major match my own goals for being in college**: Students found the term "emphasized" to be confusing and interpreted in multiple ways. Switching "emphasized" to "typically associated" helped all students interpret the question in comparable ways.
6. **goal_6 I plan to pursue one of the careers that a typically successful student in my major would pursue**: Students mentioned there being several different career avenues that typically successful students in their major would pursue. Thus, I changed the wording to accommodate these multiple pathways.

7. **social_1 I know at least a few people in college who I can relate to, or who can relate to me**: I changed this item from reverse-scored wording to positive wording to ease participants' understanding of what this item was asking.
8. **social_2r I feel out of place when I sit in classes for my major (in person) and look around at the other students**: I added "(in person)" because many students described having different thoughts in online lecture settings compared to in-person lecture settings.
9. **social_3 I don't think people in college would understand the types of personal issues I'm facing**: I changed this from students reporting whether they would share their personal issues with others for fear of others not understanding these issues. Many students reported not being willing to share their personal problems with others and typically avoiding such interactions. Thus, I changed it to ask students whether they think others would understand their issues.
10. **social_4 I know at least a few people in college who like me for who I am**: In the interviews, students reported that due to remote learning, they were not able to make too many friends at UCSB. However, they also mentioned that the few friends they made were very close to them and that they felt belonging to these smaller friend groups. The intention of the social fit items was to measure students' feelings of belonging among others in college. By this definition, students who reported having only few friends but feeling belonging among them also showed high fit. Thus, in order for these students to be properly measured by the social_4 item, I changed the word "many" to the phrase "at least a few". The intention of this change was to

differentiate between students who felt like they had at least a few friends and those who did not feel close to anyone.

11. **social_5 I change a lot of things about myself when I interact with other students in college**: "Major" was changed to "college" because many students had more interactions with students outside their major.
12. **social_6 When I think about the other students in my major (friends or otherwise), I feel accepted by them**: In this item "accepted by them" was changed from "belong among them". Students had different interpretations for what "belong among them" meant, and interpreted acceptance in more similar ways.

3. Summary of changes in Stage 2

To summarize, 14 items from the original S'FICE instrument were deleted due to a combination of theoretical, quantitative, and qualitative evidence. A further 12 items were revised to adjust for more complex responses, to increase clarity, or to accommodate for the changed circumstances in the educational context due to COVID-19. The final instrument consisted of 20 items, of which 8 were self-concept fit items, 6 were goal fit items, and 6 were social fit items.

C. Stage 3: Outcome space

The outcome space of an instrument relates to how each item is scored. In the case of the S'FICE instrument, each item is answered on a Likert scale and thus how it is scored is predetermined. However, Instrument Hypothesis 1 of Study 1 tested whether the appropriate Likert scale was selected for the S'FICE instrument. As the results revealed, the data collected on 27 items supported the chosen Likert scale with the average participant thetas

falling in ascending order into the categories of “Strongly Disagree”, “Disagree”, “Agree”, and “Strongly Agree”.

Four of the seven items that did not reveal this pattern were removed from Version 2 of the S’FICE instrument. The wording of the remaining three items was adjusted.

In summary, I determined that the outcome space of the S’FICE instrument did not require modification as I had already modified the few items that did not align with this outcome space.

D. Stage 4: Measurement model

The next stage involved choosing the measurement model and using it to test whether the data collected from Version 2 of the S’FICE instrument matched the theoretical S’FICE model. Therefore, a second round of data was collected and analyzed using the multidimensional Rasch rating-scale model.

1. Method

a. Participants. As a reminder, the suggested sample size for RSM is 10-20 participants per parameter. Since Version 2 of the S’FICE instrument had 20 items, this required a sample size between 200-400 participants. A total of 322 participants were recruited via Prolific Academic. Participants received $1.27 in payment for the study, which was estimated to take less than 10 minutes.

After excluding participants who failed the attention checks and/or did not answer all the questions in the study, a final sample of 308 participants was obtained. Of these participants, 68 were Black, 62 were Latina/o/x, 71 were women in STEM, 35 were first-generation, and 72 were non-underrepresented students. The mean age of the sample was 21 (*SD* = 2.83) and 79.55% of the sample was female (17.53% was male and 2.92% was other).

In comparison to the sample in Study 1, this sample had a similar mean age. In terms of percentage of representation, Black participants were similarly represented (22% compared to 20% in Part A), Latina/o/x participants were equally represented (20% versus 20%), women in STEM were similarly represented (23% versus 21% in Part A), first-generation students were slightly less represented (11% compared to 19% in Part A), and non-UR students were similarly represented (23% compared to 20% in Part A).

b. Procedure. The entire study was conducted online and approved by the UCSB ethics committee (under IRB protocol – 196-21-0438).

Participants were informed that the purpose of the study was to test a "scale" that had been developed to measure students' college experiences. After indicating informed consent, participants were instructed to answer the questions thinking about the major that they were currently in or the major they wanted to get into (if they were not in one yet) and to think about their STEM major (or minor) if they were in multiple majors and/or minors.

Participants were then presented with Version 2 of the S'FICE instrument (see Appendix M). On each page, participants viewed 5-6 items. The S'FICE instrument items were presented in random order. Participants also responded to three attention check items that directed them to select a particular response (e.g., Please select "Strongly Disagree" for this question). These questions were randomly presented among the S'FICE items.

Participants then responded to demographics questions about their major, race/ethnicity, parents' education, age, and whether they were transfer students, freshmen, and/or international students (see Appendix E).

2. Results

First, I report the descriptive statistics for Version 2 of the S'FICE instrument.

a. Descriptive statistics. After reverse-scoring negatively worded items, I calculated the means and standard deviations for self-concept fit, goal fit, and social fit items. These descriptive statistics are given in Tables 18-20.

Table 18 displays the self-concept fit scores for participants. As a reminder, higher values indicate greater self-concept fit and participants respond to each item on a scale from 1-4. As indicated by Table 18, self-concept scores appear consistent across all demographic groups.

Table 18

Self-concept fit scores for each demographic group

Demographic group	Means and standard deviations of self-concept fit scores	
	M	*SD*
Black	2.71	0.2
Latina/o/x	2.76	0.2
Females in STEM	2.74	0.17
First-generation	2.78	0.18
Non-UR	2.73	0.19

Table 19 displays the descriptive statistics for goal fit scores of participants. These means and standard deviations were based on scores ranging from 1, indicating extremely low goal fit to 4, indicating extremely high goal fit.

Table 19

Goal fit scores split by demographic group

Demographic group	Means and standard deviations of goal fit scores	
	M	*SD*
Black	2.92	0.42
Latina/o/x	3.06	0.33
Females in STEM	2.84	0.38
First-generation	2.88	0.43
Non-UR	2.9	0.37

Given that the mean scores ranged more widely for goal fit compared to self-concept fit, I conducted a one-way ANOVA to measure whether the goal fit scores varied by demographics group. The results indicated that there was a significant difference, $F(4, 303) = 3.08$, $p = .02$. A Tukey's HSD revealed that this difference was driven by a significant difference in goal fit scores between Latina/o/x participants and females in STEM majors ($p = .01$). None of the other pairs were significantly different from each other.

Finally, Table 20 displays the social fit scores for participants. Once again, these means and standard deviations were based on scores ranging from 1, indicating extremely

low social fit to 4, indicating extremely high social fit. Social fit scores appeared comparable across all demographic groups.

Table 20

Social fit scores split by demographic group

Demographic group	Means and standard deviations of social fit scores	
	M	*SD*
Black	2.62	0.17
Latina/o/x	2.63	0.15
Females in STEM	2.64	0.16
First-generation	2.63	0.18
Non-UR	2.66	0.15

As Tables 18-20 indicate, self-concept, goal, and social fit scores were similar across all UR and non-UR groups, suggesting, as with Version 1 of the S'FICE instrument, that Version 2 of the S'FICE instrument measured self-concept, goal, and social fit similarly across all sampled demographic groups.

b. Test of Instrument Hypotheses. Before reporting the results of the multidimensional RSM, I have laid out the Instrument Hypotheses that were again tested in Study 3, Stage 4:

(1) Instrument Hypothesis 1: Participants of increasing ability will choose increasingly higher Likert scale steps for each item

(2) Instrument Hypothesis 2: The data will fit a three-dimensional model better than a unidimensional model

(3) Instrument Hypothesis 3: Each item will fit the statistical model defined based on the theoretical S'FICE model

i. Instrument Hypothesis 1: Testing the distinctiveness of categories. I again investigated whether the four response categories (Strongly Disagree, Disagree, Agree, and Strongly Agree) were sufficiently distinct for each S'FICE item and that participants selected the categories that matched their "ability" in each type of fit (that is, participants with extremely low levels of fit would choose strongly disagree; participants with somewhat low levels of fit would choose disagree; participants with somewhat high levels of fit would choose agree; and participants with extremely high levels of fit would choose strongly agree).

As in Study 1, I grouped participants' self-concept, goal, and social fit theta estimates (indicative of participant ability) by their responses to each self-concept, goal, and social fit item and computed the mean self-concept, goal, and social fit theta for each response category of each item. To support Instrument Hypothesis 1, each item should have showed the average thetas for the response categories to be in ascending order. Five out of 20 items failed to show a gradual increase in theta across the response categories (see Table 21). The five items with non-ascending thetas are highlighted with an asterisk.

Table 21

Theta averages (of respective fit type) for each response category of each item

Item name	Strongly Disagree	Disagree	Agree	Strongly Agree
sc_1*	0.5	-0.21	0.06	-0.11
sc_2r	-0.28	-0.13	0.18	0.33
sc_3	-0.6	-0.47	-0.07	0.36
sc_4*	-0.26	-0.56	0.01	0.58

sc_5	-1.52	-0.78	-0.17	0.57
sc_6r	-0.54	-0.26	0.31	0.95
sc_7	-1.09	-0.54	-0.01	0.68
sc_8r	-0.55	-0.23	0.27	0.91
goal_1*	0.64	-0.04	NA	NA[6]
goal_2*	-1.18	-0.44	0.62	-0.04
goal_3	-0.71	-0.52	-0.29	0.6
goal_4	-1.33	-0.88	-0.33	0.74
goal_5	-1.22	-0.74	-0.14	0.92
goal_6	-1.03	-0.76	0	0.93
social_1*	-1.61	-0.32	0.57	-0.11
social_2r	-1.31	-0.66	0.11	1.18
social_3r	-0.97	-0.54	0.12	0.97
social_4	-1.3	-0.78	-0.32	0.66
social_5r	-1.28	-0.61	0.22	0.87
social_6	-1.79	-0.85	0.09	1.03

As Table 21 indicates, five of the 20 items did not show ascending patterns of participant thetas across categories. This is a lower number than what I found in Study 1 (where seven items showed this pattern), but is still an equivalent number of items, because Version 2 of the S'FICE instrument had a lower number of items. Thus, responses to Version 2 of the S'FICE still failed to fully support Instrument Hypothesis 1.

[6] It should be noted that no participants selected "Agree" or "Strongly Agree" for goal_1. The reasons that this was not a concern are discussed in Appendix N.

ii. Instrument Hypothesis 2: Testing whether the data fits a three-dimensional model the best. The next step in testing the validity of Version 2 of the S'FICE instrument was to see if the dimensional structure specified by the S'FICE model was the best fit for the data collected. I again compared the three-dimensional model (dimensions: self-concept fit, goal fit, and social fit) to a unidimensional model that assumed that all the items measured one overarching construct of "fit to college"[7]. I once again obtained Akaike's Information Criterion (AIC; Akaike, 1981), G^2 values, and number of parameters to determine whether the multidimensional model fit the data significantly better than the unidimensional model. These values are indicated in Table 22.

Table 22

AIC, G^2 values, and the number of parameters for the three-dimensional and unidimensional models of Version 2 of the S'FICE instrument

Model type	AIC	G^2	Number of parameters
Unidimensional	13341.65	13295.65	23
Three-dimensional	13322.95	13266.95	28

The AIC for the three-dimensional model was lower than the AIC for the unidimensional model, suggesting that the former is a better fit than the latter. To confirm

[7] In Study 1, I also calculated a consecutive model (Briggs & Wilson, 2003). The intention of reporting this consecutive model was to demonstrate the difference between a three-dimensional model and the consecutive model where each dimension is calculated separately. Comparing a three-dimensional model to a consecutive model is not a central aspect to instrument validation, which focuses on how a three-dimensional model compares to a unidimensional model. I therefore do not report a consecutive model calculation for Study 3.

this observation, a chi-square test of fitness was conducted based on the G^2 values of each model. The difference in G^2 scores was 28.7. At 5 degrees of freedom and $\alpha = .001$, the critical chi-square value was 20.52. Since the difference between the G^2 scores of the two models exceeded this value, the models can be judged to be significantly different from each other. Thus, the three-dimensional model, once again, fit the data significantly better than the unidimensional model.

iii. Instrument Hypothesis 3: Examining the item fit statistics. I then examined the item fit statistics of Version 2 of the S'FICE instrument. The item fit statistics for each item (the infit statistic, t value associated with each infit statistic, and p values) are reported in Table 23. Further, the outfit statistics associated with each item were checked to confirm that they aligned with the information given by the infit statistics (Wu & Adams, 2013).

Table 23

The infit values, t statistics, and p values for the items of Version 2 of the S'FICE instrument

Item	Fit indices ($\alpha = .05$)		
	Weighted mean square (infit)	Infit t statistic	Infit p value
sc_1*	0.61	-5.81	<0.001
sc_2r	1.17	2.27	0.02
sc_3**	1.37	4.24	<0.001
sc_4	0.92	-1.03	0.3
sc_5	0.79	-2.82	<0.001
sc_6r	1.21	2.78	0.01
sc_7	0.96	-0.54	0.59

sc_8r**	1.48	5.8	<0.001
goal_1	0.95	-0.7	0.49
goal_2	0.79	-3.03	<0.001
goal_3	1.3	3.55	<0.001
goal_4	0.79	-2.87	<0.001
goal_5	0.83	-2.32	0.02
goal_6	0.9	-1.32	0.19
social_1	1.08	1	0.32
social_2r	1.01	0.13	0.9
social_3r	1.2	2.51	0.01
social_4	1.19	2.27	0.02
social_5r	1.02	0.24	0.81
social_6*	0.67	-4.75	<0.001

Note: In this table, sc indicates self-concept fit items, goal indicates goal fit items, and social indicates social fit items. Items with an "r" at the end indicate reverse-scored items.

Wilson's (2005) rule of identifying items that indicated both a significant p value and a weighted mean square either less than .75 or greater than 1.33 was used to identify misfitting items. A single asterisk indicates items that showed significant overfit (2 items) and two asterisks indicate items that show underfit (2 items):

1. sc_3 I think being a student is a very big part of who I am
2. sc_8r Within the last few weeks, I have felt nervous about going to professors' office hours and asking them questions

Thus, in Version 1 of the S'FICE instrument, 11.76% of items in the instrument showed underfit, whereas in Version 2 of the S'FICE instrument, 10% of items showed underfit.

Furthermore, if I were to use a significant *p* value as sufficient basis of deciding misfit of an item, 88.24% of items in Version 1 of the S'FICE instrument misfit the model (30 items), whereas only 65% of items in Version 2 of the S'FICE instrument misfit the model (13 items). Therefore, although the differences are small, Version 2 of the S'FICE instrument shows improvement in terms of item fit.

c. Computation of discrepant indices for Version 2 of the S'FICE instrument. Given this positive outcome, I also calculated discrepancy scores based on participants' responses to the self-concept fit, goal fit, and social fit items of Version 2 of the S'FICE instrument. The intention of this calculation was to determine whether it would be best to interpret students' scores on the three types of fit separately or as an average of the three scores.

Calculating participants' DIs revealed that 141 participants out of 308 participants had a DI score that exceeded .5 (indicating that a participant's average theta score misrepresents their individual theta scores; Briggs & Wilson, 2003). In Study 3, the percentage of students with higher DI scores was quite large: 45.78% (larger than Briggs and Wilson's study, and larger than Study 1). This indicates that students' three S'FICE scores (for self-concept, goal, and social fit) should be interpreted separately rather than combining them into one average.

3. Discussion

Version 2 of the S'FICE instrument was developed in the course of Study 3. The new instrument has fewer items. All of these items are from the original S'FICE instrument, although the wording of a few of them was changed.

Testing the Instrument Hypotheses on this version revealed mixed results. Instrument Hypothesis 1 was supported roughly to the same extent by both Study 1 and Study 3. In both cases, a small percentage of items showed data where participant thetas were not organized

in ascending order across the categories. Instrument Hypothesis 2 received similarly positive support in both studies. With both Version 1 and Version 2 of the S'FICE instrument, a three-dimensional model was found to fit significantly better than a unidimensional model. Finally, Instrument Hypothesis 3 received slightly higher support from Study 3 compared to Part A. A somewhat smaller percentage of items showed underfit in Version 2 of the S'FICE instrument compared to Version 1, and an even smaller percentage of items showed all types of misfit in Version 2 compared to Version 1.

Thus, Study 3 concludes that Version 2 of the S'FICE instrument performs just as well in most ways and slightly better in one way when compared to Version 1 of the S'FICE instrument.

The largest difference between the two instruments arises in the discrepant indices' calculation, since the average theta score of more participants in Version 2 (45.78%) was misrepresentative of how they responded to the individual sub-instruments measuring self-concept, goal, and social fit compared to Version 1 (26.8%). Since DI calculations indicate only how an instrument should be used versus whether an instrument is valid, this finding is distinct from results for Instrument Hypothesis 2, where I found that the data best fit a multidimensional model that distinguished between self-concept, goal, and social fit. Because of this distinction, I argue that this finding adds further strength to the construct map of the S'FICE model. This finding provides further evidence that self-concept fit, goal fit, and social fit are distinct dimensions of the general concept of fit to college and that students' responses on items measuring the three types of fit need to be observed separately rather than as an average.

A significant benefit of Version 2 of the S'FICE instrument compared to Version 1, is its shorter nature. Whereas Version 1 has 34 items, Version 2 has only 20 items. Thus, it took participants much less time to take Version 2 of the S'FICE instrument than Version 1. I intended the S'FICE instrument to be used as a screening tool that would enable colleges to determine the specific types of fit their students might lack and direct them to interventions designed to address these specific gaps in fit to college. Given this intention, a shorter version of the instrument would likely be more useful as it would be easier to administer to students and students would be more likely to respond to all the items. Therefore, Version 2 of the S'FICE model was employed in Study 4.

X. Section 9: Study 4 - The S'FICE model as a predictor of UR academic outcomes and wellbeing

Study 4 was a correlational and longitudinal test of the S'FICE model. The intention of Study 4 was to gather correlational data to test all the Model Hypotheses regarding the S'FICE model and to compare the predictive ability of the S'FICE instrument to other instruments that have been previously used to predict UR students' academic performance.

In Part I of Study 4, participants responded to Version 2 of the S'FICE instrument; cognitive, motivational, and interpersonal fluency instruments; two engagement instruments; and several previously published instruments designed to measure constructs used to predict academic performance: stereotype threat, ambient belonging, cultural mismatch, and belonging uncertainty. In Part II of Study 4, participants' GPA scores were accessed as a measure of their academic performance and participants responded to an instrument measuring their psychological wellbeing.

The Model Hypotheses tested in Study 4 appear below. They are similar to the hypotheses tested in the correlational test of Study 2, since no variables were manipulated in Study 4:

Model Hypothesis 1: self-concept, goal, and social fit will be positively and moderately correlated (correlations ranging between .1 - .3; Cohen, 1988) to one another

Model Hypothesis 2: self-concept fit, goal fit, and social fit will each be uniquely associated with engagement

Model Hypothesis 2a: the interaction between all three types of fit will be significantly associated with engagement

Model Hypothesis 2b: self-concept fit will be significantly associated with engagement after accounting for the variance of goal and social fit

Model Hypothesis 2c: goal fit will be significantly associated with engagement after accounting for the variance of self-concept and social fit

Model Hypothesis 2d: social fit will be significantly associated with engagement after accounting for the variance of self-concept and goal fit

Model Hypothesis 3: fit will be associated with fluency

Model Hypothesis 3a: higher levels of self-concept fit will be associated with higher levels of cognitive fluency

Model Hypothesis 3b: higher levels of goal fit will be associated with higher levels of motivational fluency

Model Hypothesis 3c: higher levels of social fit will be associated with higher levels of interpersonal fluency

Model Hypothesis 4: fit will be associated with engagement via fluency

Model Hypothesis 4a: higher levels of self-concept fit will be associated with greater engagement via higher levels of cognitive fluency

Model Hypothesis 4b: higher levels of goal fit will be associated with greater engagement via higher levels of motivational fluency

Model Hypothesis 4c: higher levels of social fit will be associated with greater engagement via higher levels of interpersonal fluency

Model Hypothesis 5: engagement will positively and strongly correlate (correlations exceeding .3; Cohen, 1988) with academic performance

Model Hypothesis 6: fit will be associated with academic performance via fluency and engagement

Model Hypothesis 6a: higher levels of self-concept fit will be associated with greater academic performance via higher levels of cognitive fluency and greater engagement

Model Hypothesis 6b: higher levels of goal fit will be associated with greater academic performance via higher levels of motivational fluency and greater engagement

Model Hypothesis 6c: higher levels of social fit will be associated with greater academic performance via higher levels of interpersonal fluency and greater engagement

Model Hypothesis 7 (Exploratory): engagement will positively and strongly correlate (correlations exceeding .3; Cohen, 1988) with wellbeing

Model Hypothesis 8 (Exploratory): fit will be associated with wellbeing via fluency and engagement

Model Hypothesis 8a (Exploratory): higher levels of self-concept fit will be associated with greater wellbeing via higher levels of cognitive fluency and greater engagement

Model Hypothesis 8b (Exploratory): higher levels of goal fit will be associated with greater wellbeing via higher levels of motivational fluency and greater engagement

Model Hypothesis 8c (Exploratory): higher levels of social fit will be associated with greater wellbeing via higher levels of interpersonal fluency and greater engagement

A. Method

In order to test these Model Hypotheses, I conducted a two-part longitudinal study. Participants were first recruited in the Fall Quarter of 2021 to participate in Part I of the study. In Part II of the study, I obtained the GPAs of participants from Fall Quarter 2021 and re-contacted participants in the Winter Quarter of 2022.

1. Participants

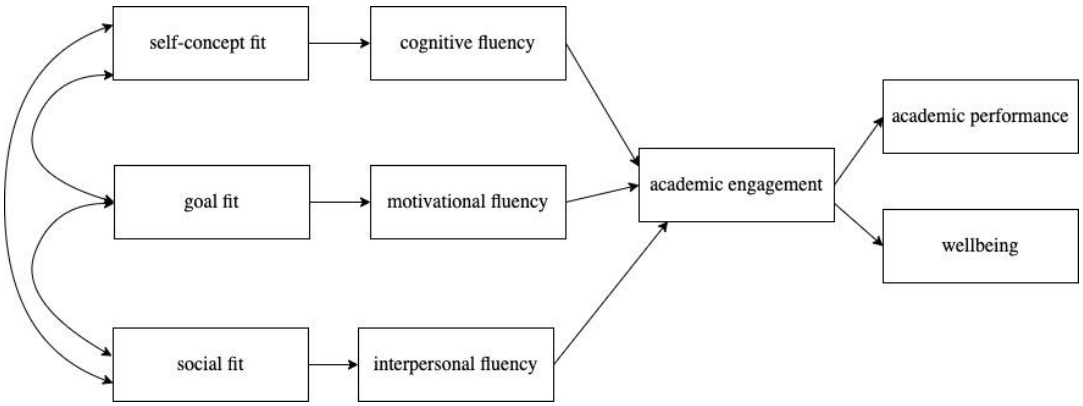
As in Study 2, I wished to eliminate external variables that may cause variation in the data and thus limited the sample to Latina/o/x undergraduate students. Furthermore, since I wanted to test the predictive value of fit to college on fluency and engagement, I recruited participants who had been at UCSB for at least one year.

As I intended to use Structural Equation Modeling (SEM) to test the hypotheses, SEM standards were employed to determine the sample size. According to current SEM standards (Jackson, 2003; Kline, 2010) 20 participants are suggested per parameter in the model. The SEM model used to analyze the data for Study 4 had 11 parameters (see Figure

17). This rule required a final sample size of 220 participants. However, based on previous longitudinal research, participant attrition tends to vary between 20-30% (Bellon et al., 2010; Winefield et al., 1990). Thus, in order to ensure a final sample of 220 participants, the recommended sample size for Part 1 was 286.

Figure 17

The structural equation model that was proposed to test the S'FICE model



Once again, the UCSB registrar emailed a sample of 3000 participants who fit this description on my behalf. However, to ensure that my sample consisted only of non-freshmen participants who identified only as Latina/o/x, participants took a pre-screening survey before the study. A total sample of 602 participants responded to the pre-screening survey (see Measures for more details). Of these 602 participants, 310 participants were excluded because they did not identify as only Latina/o/x (for instance, they may have identified as Latina/o/x and White) and/or they indicated being in their first year of college. These 310 participants did not advance to Study 4 Part I and were thanked for their time. A further 24 participants were excluded for having insufficient data[8] . Last, a group of 31

[8] Only participants with less than 30% of responses were excluded from the sample. This decision was made because recruiting enough participants for Study 4 proved very difficult and since I anticipated experiencing a further dip in participation in Part II of the study. Therefore, I did not want to exclude too many participants.

participants failed at least one attention check. Although in Study 2 all participants who failed at least one attention check were excluded, I adopted a more lenient exclusion rule for Study 4, given that the initial eligible sample was already smaller than desirable (n = 268). To assess excluding only a subset of participants who failed the attention checks, I conducted a one-way ANOVA analysis comparing the time taken to complete the Part I survey between participants who failed zero, one, two, or three attention check questions. This ANOVA indicated that there was no significant difference between the time taken by participants who failed none, only one, only two, and all three attention check questions, F (3, 258) = .14, p = .94. Thus, I only excluded the participants who failed two or more attention checks, bringing my sample size to n = 262.

As predicted, attrition was exacerbated by the need to access to GPAs and collection of wellbeing data. Although participants gave consent to using their GPA data in Part I, this consent had to be re-obtained separately from their survey responses to comply with the Family Educational Right and Privacy Act (FERPA) regulations (U.S. Department of Education, 2021). Several students did not respond to the email inviting them to provide consent to access their GPA records. Many participants also failed to respond for Part II when re-contacted for the wellbeing assessment. In an attempt to maintain as large a sample size as possible, I included any participant for whom I was able to assess GPA (participants who provided consent to access GPAs) or well-being (participants who responded to the well-being survey) data, or both, during Part II.

This final sample consisted of n = 212 Latina/o/x individuals of which 70% were female (24% were male and 6% were gender non-conforming) with a mean age of 20.22 (SD = 1.43).

Participants received $5 for completing Part I of the study and $5 for completing Part II.

2. Procedure at Part I

In Fall Quarter 2021, participants were contacted by the UCSB Registrar about a two-part study for which they would receive $10. All participants who clicked on the link were directed to a pre-screening form that asked them to report their race/ethnicity, gender, age, major, educational status of their parent/s, and whether they were first years, transfer students, or international students (see Appendix E).

Participants who identified as only Latina/o/x and not as first year students were directed to an information page that informed them that they would be participating in a study in which they would answer questions about their college experiences. After providing informed consent, participants provided their email addresses which were later used to pay them and to contact them afterward for Part II of the study in Winter Quarter 2022.

Participants then responded to several instruments intended to measure constructs intended to predict UR academic performance, including the S'FICE instrument.

a. Predictor variables. All predictor variables were the same as those used in Study 2 except that they were not adjusted to refer to a future situation, and asked students to answer questions about their current circumstances.

i. The S'FICE instrument. First, participants took Version 2 of the S'FICE instrument (see Appendix M). The S'FICE instrument consisted of 8 self-concept fit items, 6 goal fit items, and 6 social fit items, e.g., "I am happy with how coursework in my major is taught". Participants rated each of the 20 items on a 4-point scale ranging from 1 (Strongly

Disagree) to 4 (Strongly Agree). The order in which the items were presented was randomized. Participants saw 5-6 items on each page.

ii. The fluency instrument. Next, participants responded to the fluency instrument, consisting of the cognitive, motivational, and interpersonal fluency sub-scales (adapted from Aday & Schmader, 2018; see Appendix B). Each subscale consisted of 5 items, e.g., "My concentration levels have been ____". Participants were asked to rate their agreement to each item on a 7-point Likert scale that ranged among several different answer choices. For this item, the scale ranged from 1 (Low) to 7 (High), such that participants would fill in the blank with "Low" if they felt as if their concentration levels had been extremely low (and vice versa). The order in which items were presented was randomized across all sub-scales and participants saw five questions on each page.

iii. Engagement measure I: UWES. The first engagement measure participants responded to was the Utrecht Work Engagement Scale for Students (UWES-S; Schaufeli et al., 2002; see Appendix O; Cronbach's $\alpha = .85$). This instrument consisted of 18 items, e.g., When I study, I feel like I am bursting with energy. Participants were asked to rate each item on a 5-point scale ranging from 1 (Never) to 5 (Always). The order in which all items were presented was randomized and participants only saw five items on each page.

iv. Engagement measure II: Self-regulation learning. The second engagement measure was adapted from Zimmerman and colleagues (1992; see Appendix P; Cronbach's $\alpha = .84$). This instrument consisted of 11 items in which students were asked to indicate how confident they were that they could successfully do 11 behaviors, e.g., finish homework assignments by deadlines. Each item was rated on a 5-point scale ranging from 1 (No

confidence at all) to 5 (Complete confidence). The order in which all items were presented was randomized and participants only saw five items on each page.

b. Satisfaction with engagement measures. Students were also asked whether they were satisfied with the extent of their academic engagement. Specifically, they were asked, "Are you happy with how engaged you are in your academic work?" and they rated their satisfaction on a 5-point Likert scale ranging from 1 (Not at all) to 5 (Extremely)[9]. They also rated the extent to which they felt happy about being on campus at UCSB and how happy they felt about being at UCSB (the wording for these questions respectively were, "How happy do you feel when you are on campus at UCSB" and "How happy are you to be at UCSB"[10]. Students responded to both questions on a 5-point Likert scale ranging from Not at all to Extremely.

c. Other measures designed to predict students' academic performance. Next, students were asked to respond to instruments designed to measure other constructs previously found to be associated with UR academic underperformance; stereotype threat (see Appendix Q; Stereotype Vulnerability Scale; Woodcock et al., 2012), ambient belonging (see Appendix Q; Ambient Belonging scale; Cheryan et al., 2009), belonging uncertainty (see Appendix Q; Belonging Uncertainty Scale; Walton & Cohen, 2007), and cultural mismatch (participants were asked to indicate their goals for joining college using a goals

[9] This item showed a significant and strong correlation with the weighted mean that was calculated between the two engagement measures, UWES and self-regulation learning, $r = .63$, $t(207) = 11.58$, $p < .001$. Because this question was a single measure of engagement, in comparison to the UWES and self-regulation learning instruments that both had over 10 items, the predictive ability of this single measure is not tested in this dissertation.

[10] These two single items also showed a strong correlation with the weighted mean that was calculated between UWES and self-regulation learning. How happy are you to be at UCSB was significantly and positively related to engagement, $r = .35$, $t(207) = 5.37$, $p < .001$. How happy do you feel when you are on campus at UCSB was also significantly and positively related to engagement, $r = .42$, $t(207) = 6.70$, $p < .001$. Therefore, these questions were also not used in the analyses of the S'FICE model.

checklist that has been previously used in studies to predict cultural mismatch in students; see Appendix Q; Stephens, Townsend, Markus, & Phillips, 2012). Each instrument is designed to give each participant a single score that would predict participants' academic performance. These instruments were presented in randomized order.

i. Stereotype Vulnerability Scale. Participants then answered the Stereotype Vulnerability Scale (Woodcock et al., 2012) consisting of eight items intended to measure the extent to which students perceive themselves as stereotyped. An example of an item is, "Professors expect you to do poorly" (see Appendix Q). Participants responded to each item on a 5-point Likert scale ranging from 1 (Always) to 5 (Never). The order of the items was randomized, and participants saw all eight items on one page.

ii. Ambient Belonging Scale. The Ambient Belonging Scale (Cheryan et al., 2009; see Appendix Q) consisted of two items:

1. How much do you feel like you belong in your major/anticipated major?
2. How similar do you feel to the people in your major/anticipated major?

Participants responded to each item on a 7-point Likert scale ranging from 1 (Not at all) to 7 (Extremely). The order of the items was randomized, and participants saw both items on the same page.

iii. Belonging Uncertainty Scale. The Belonging Uncertainty Scale (Walton & Cohen, 2007) consisted of three items, e.g., "When something good happens, I feel that I really belong at [participants' college]" (see Appendix Q). Participants responded to each item on a 7-point Likert scale ranging from 1 (Strongly Disagree) to 7 (Strongly Agree). The order of the items was randomized and participants saw all three items on the same page.

iv. Cultural mismatch checklist. Next, participants responded to a 12-item checklist created to measure cultural mismatch (see Appendix Q). Participants were given the following instructions: "Please choose your motives for coming to college from the list below. You may choose as many as you want". This list consisted of equal numbers of reasons that were centered in individualism, e.g., Expand my knowledge of the world, and collectivism, e.g., Bring honor to my family. The options were presented in random order. Finally, participants were partially debriefed (since I wanted to collect data from them in Part II) and thanked for their time. In the debriefing form, they were told that the Part I survey collected data on their experiences as UCSB students (see Appendix R).

3. Procedure at Part II

In the Winter Quarter 2022, the students who participated in Part I were contacted about participating in the Part II survey. The email contained a link to the survey. A reminder to participate in the survey was sent out to participants who had not taken the survey each week. Thus, participants received a reminder to take part in Part II of Study 4 about six times if they did not take the survey within the first few weeks.

Upon clicking the link, students were directed to an informed consent form. After indicating consent, students were directed to respond to the Psychological Wellbeing Scale (Ryff, 1989; see Appendix S).

a. Psychological Wellbeing Scale. This instrument was chosen as it is a widely used theoretically founded instrument measuring wellbeing through sub-scales of Autonomy, Environmental Mastery, Personal Growth, Positive Relations with Others, Purpose in Life, and Self-Acceptance and shows moderate to large internal consistency and test-retest reliability when administered to college students (see Appendix S; Ahmet, 2008; Pineda-Roa,

Castro-Muñoz, & Chaparro-Clavijo, 2018; Ryff, 1989; Ryff & Keyes, 1995; Seifert, 2005; Cronbach's α = .85). Each item was rated on a 7-point Likert scale ranging from 1 Strongly Disagree to 7 Strongly Agree, (e.g., "In general, I feel I am in charge of the situation in which I live"). The order of items was randomized, and participants saw six or seven items on each page.

Participants were then directed to a debriefing (see Appendix T) after which they were thanked for their time. Participants were later emailed $5 for taking part in the study.

B. Results

The intention of Study 4 was to test the following Model Hypotheses:

(1) Model Hypothesis 1: self-concept, goal, and social fit will be positively and moderately correlated (correlations ranging between .1 - .3; Cohen, 1988) to one another

(2) Model Hypothesis 2: self-concept fit, goal fit, and social fit will each be uniquely associated with engagement

a. Model Hypothesis 2a: the interaction between all three types of fit will be significantly associated with engagement
b. Model Hypothesis 2b: self-concept fit will be significantly associated with engagement after accounting for the variance of goal and social fit
c. Model Hypothesis 2c: goal fit will be significantly associated with engagement after accounting for the variance of self-concept and social fit
d. Model Hypothesis 2d: social fit will be significantly associated with engagement after accounting for the variance of self-concept and goal fit

(3) Model Hypothesis 3: fit will be associated with fluency

a) Model Hypothesis 3a: higher levels of self-concept fit will be associated with higher levels of cognitive fluency
b) Model Hypothesis 3b: higher levels of goal fit will be associated with higher levels of motivational fluency
c) Model Hypothesis 3c: higher levels of social fit will be associated with higher levels of interpersonal fluency

(4) Model Hypothesis 4: fit will be associated with engagement via fluency

a) Model Hypothesis 4a: higher levels of self-concept fit will be associated with greater engagement via higher levels of cognitive fluency
b) Model Hypothesis 4b: higher levels of goal fit will be associated with greater engagement via higher levels of motivational fluency
c) Model Hypothesis 4c: higher levels of social fit will be associated with greater engagement via higher levels of interpersonal fluency

(5) Model Hypothesis 5: engagement will positively and strongly correlate (correlations exceeding .3; Cohen, 1988) with academic performance

(6) Model Hypothesis 6: fit will be associated with academic performance via fluency and engagement

a) Model Hypothesis 6a: higher levels of self-concept fit will be associated with greater academic performance via higher levels of cognitive fluency and greater engagement
b) Model Hypothesis 6b: higher levels of goal fit will be associated with greater academic performance via higher levels of motivational fluency and greater engagement

c) Model Hypothesis 6c: higher levels of social fit will be associated with greater academic performance via higher levels of interpersonal fluency and greater engagement

(7) Model Hypothesis 7 (Exploratory): engagement will positively and strongly correlate (correlations exceeding .3; Cohen, 1988) with wellbeing

(8) Model Hypothesis 8 (Exploratory): fit will be associated with wellbeing via fluency and engagement

a) Model Hypothesis 8a (Exploratory): higher levels of self-concept fit will be associated with greater wellbeing via higher levels of cognitive fluency and greater engagement
b) Model Hypothesis 8b (Exploratory): higher levels of goal fit will be associated with greater wellbeing via higher levels of motivational fluency and greater engagement
c) Model Hypothesis 8c (Exploratory): higher levels of social fit will be associated with greater wellbeing via higher levels of interpersonal fluency and greater engagement

See Appendix U on the test of Model Hypotheses 1-4 with the full sample of participants, including those who were excluded from the main analyses.

1. Testing Model Hypothesis 1

To test Model Hypothesis 1, I assessed the strength of the correlations among self-concept, goal, and social fit, expecting to find a moderate correlational relationship between each pair of them. Cohen (1988) set the widely accepted standard that a correlation between .1 to .3 can be considered a moderate correlation. Thus, I expected the correlation

coefficients between each of the three types of fit to fall within this range. However, contrary to predictions, all correlational relationships were higher than .3. Correlation coefficients higher than .3 are widely treated as strong correlations, thus my results indicated strong relationships between self-concept, goal, and social fit. These correlations appear in Table 24. This strength in correlations indicates that the three types of fit may not function as separate of each other as hypothesized. For instance, the S'FICE model hypothesizes that only self-concept fit will be related to cognitive fluency. However, the strong correlations between self-concept fit to goal and social fit suggest that goal and social fit may also be related to cognitive fluency.

Table 24

Correlations between self-concept, goal, and social fit for all participants

Variable	*M*	*SD*	1	2	3
1. self-concept fit	2.66	.31	-		
2. goal fit	2.95	.31	.49***	-	
3. social fit	2.71	.35	.53***	.36***	-

Note: ***$p < .001$

2. Modeling combined serial and parallel multiple mediator models to test Model Hypotheses 2-8

To test the remaining Model Hypotheses, I modelled six combined serial and parallel multiple mediator models. I created these models using the PROCESS package (Hayes, 2012) in SPSS. I modelled combined serial and parallel multiple mediator models, each of which had one type of fit (e.g., self-concept fit) associated with one dependent variable (GPA or wellbeing) mediated by all three fluencies (cognitive, motivational, and interpersonal

fluency), as well as engagement. The three fluencies were entered as parallel multiple mediators and engagement was entered as a serial mediator that the three fluencies might affect. The six models were as follows:

1. self-concept fit associated with GPA via the three fluencies
2. self-concept fit associated with wellbeing via the three fluencies
3. goal fit associated with GPA via the three fluencies
4. goal fit associated with wellbeing via the three fluencies
5. social fit associated with GPA via the three fluencies
6. social fit associated with wellbeing via the three fluencies

These models were used to provide further insight into the tests of Model Hypotheses 2, 3, and 5 - 8.

3. Testing Model Hypothesis 2

To test the sub-hypotheses of Model Hypothesis 2, I first conducted a multiple linear regression model where I input self-concept, goal, and social fit as predictors and engagement as the dependent variable. I then augmented these results with the outcomes of the set of combined serial and parallel multiple mediator models with GPA as the outcome and wellbeing as the outcome.

a. Testing Model Hypothesis 2a. I examined the results of the multiple linear regression model to determine whether the interaction of all three types of fit was significantly associated with engagement. Contrary to my prediction, the interaction of the three types of fit was not significantly associated with engagement, t (201) = .85, p = .4.

b. **Testing Model Hypothesis 2b.** The results of the multiple linear regression model revealed findings that contradicted the expectations set by Model Hypothesis 2b. When

accounting for goal fit and social fit, self-concept fit was not significantly associated with engagement, t (201) = 1.99, p = .05. However, the combined serial and parallel multiple mediator model with self-concept fit as the only predictor variable and GPA as the dependent variable provided results that supported the hypothesis, showing that self-concept fit was significantly associated with engagement, b = .33, t (191) = 2.83, p = .01. The combined serial and parallel multiple mediator model with self-concept fit as the only predictor variable and wellbeing as the dependent variable also supported this hypothesis, b = .39, t (176) = 3.48, p = .001. These results indicate that self-concept fit does relate to engagement, but only when goal and social fit are not entered into the model. This is probably due to the large correlations between the three types of fit.

c. **Testing Model Hypothesis 2c.** The results of the multiple linear regression model revealed findings that contradicted the expectations set by Model Hypothesis 2c. When accounting for self-concept fit and social fit, goal fit was not significantly associated with engagement, t (201) = .85, p = .4. However, the combined serial and parallel multiple mediator model with goal fit as the only predictor variable and GPA as the dependent variable provided results that supported the hypothesis, showing that goal fit was significantly associated with engagement, b = .37, t (191) = 4.81, p < .001. The combined serial and parallel multiple mediator model with goal fit as the only predictor variable and wellbeing as the dependent variable also supported this hypothesis, b = .35, t (176) = 4.34, p < .001. These results indicate that goal fit does relate to engagement, but only when self-concept and social fit are not entered into the model. This is probably due to the large correlations between the three types of fit.

d. **Testing Model Hypothesis 2d.** Finally, the results of the multiple linear regression model revealed findings that contradicted the expectations set by Model Hypothesis 2d. When accounting for goal fit and self-concept fit, social fit was not significantly associated with engagement, t (201) = .85, p = .4. The combined serial and parallel multiple mediator model with social fit as the only predictor variable and GPA as the dependent variable also contradicted the predictions, showing that social fit was not significantly associated with engagement, b = .12, t (191) = 1.38, p = .17. The combined serial and parallel multiple mediator model with social fit as the only predictor variable and wellbeing as the dependent variable also contradicted this hypothesis, b = .14, t (176) = 1.50, p = .14. These results indicate that social fit does not seem to be directly related to engagement. Social fit may still be indirectly related to engagement via interpersonal fluency.

4. Modeling a prospective path model to test Model Hypotheses 3 - 8

To test the remaining Model Hypotheses, I wished to augment the results of the combined serial and parallel multiple mediator model. To do this, I modelled a prospective path model. In this model, I measured how self-concept, goal, and social fit, cognitive, motivational, and interpersonal fluency, and academic engagement collected at Part I were associated with academic performance and psychological wellbeing collected at Part II.

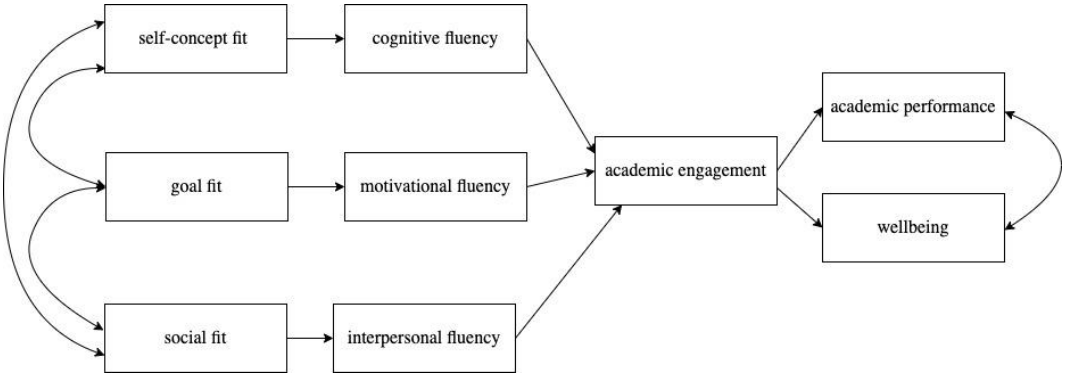
Using the SPSS package, AMOS (Arbuckle, 2014), I ran this prospective path model (see Figure 18). In this model, I defined the original pathways that made up the S'FICE model indicating that:

1. self-concept fit was associated with cognitive fluency
2. goal fit was associated with motivational fluency
3. social fit was associated with interpersonal fluency

4. each of the three fluencies was associated with engagement separately
5. engagement was associated with wellbeing and GPA, separately

Figure 18

The prospective path model run in AMOS to test the S'FICE model



The fit of this original model did not meet current standards for good model fit (Hooper et al., 2008). In order to be of good fit, a model is expected to have:

1. A Chi-square statistic that is not significant at $\alpha = .05$ (Barrett, 2007)
2. A root mean square error of approximation (RMSEA) that is less than .06 (Hu & Bentler, 1999)
3. A normed-fit index (NFI) that exceeds .95 (Hu & Bentler, 1999)
4. A comparative fit index (CFI) that also exceeds .95 (Hu & Bentler, 1999)
5. The lowest value for the Akaike Information Criterion (AIC; Akaike, 1974). This final criterion depends on other models being computed and their respective AICs being compared.

The prospective path model based on the original theoretical S'FICE model failed the first four model fit criteria (the AIC could not be evaluated based on a single model). This model showed significant misfit [$\chi^2(24) = 225.37$, $p < .001$, RMSEA = .20, NFI = .67, and

CFI = .69]. The misfit of this model indicated that there were paths between variables that were not accounted for. These paths needed to be added for the data to fit the model better. The AMOS package is capable of calculating paths that would improve model fit and suggests these as possible modifications that might improve the model. These suggested modifications are called modification indices. However, in order to calculate the modification indices as well as to run significance tests for the indirect relationships (e.g., the indirect relationship of self-concept fit and wellbeing via cognitive fluency and engagement), the data used in AMOS must not have any missing values.

As I had included any participants that had GPA data and/or wellbeing data from Part II, there were missing values in the data. Thus, to calculate the modification indices and significance of indirect pathways, I separately analyzed the data from participants whose GPA was available (n = 196) and the data from participants who provided wellbeing data (n = 181).

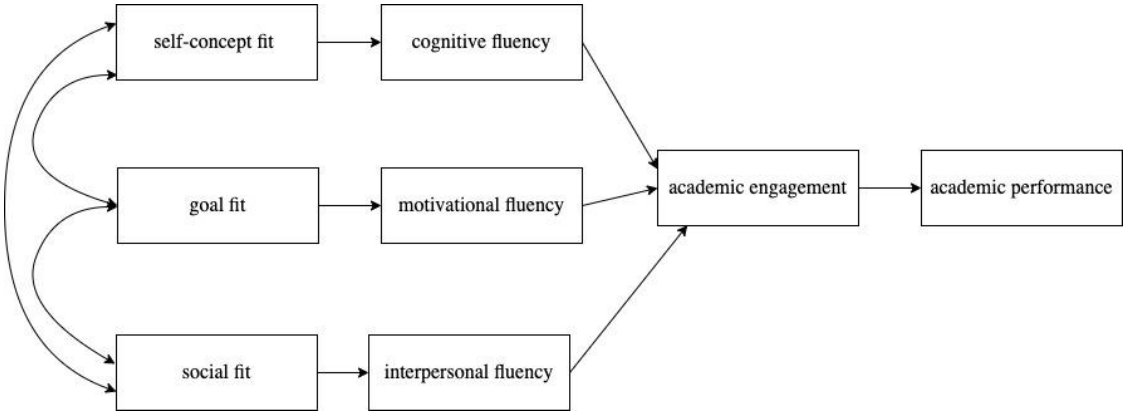
These separate analyses did not allow for the relationship between GPA and wellbeing to be further analyzed. However, these two variables did not appear to have a relationship, because the correlation between them was small and not significant, r = .08, $t(171) = 1.05$, p = .29.

a. Prospective path model with only GPA as the dependent variable. I first ran the prospective path model on the data from participants with available GPAs (see Figure 19; this model will be referred to as the Only GPA model). The model fit results indicated that this model had poor fit. The Chi-square test was significant, $\chi^2(15) = 86.16$, $p < .001$; RMSEA was greater than .05 (RMSEA = .12; and neither the NFI nor CFI exceeded .95 (NFI = .85, CFI = .87). However, this Only GPA model had an AIC (AIC = 144.16) lower than the

Original model (AIC = 285.37), indicating that the Only GPA model had a somewhat better fit than the Original model.

Figure 19

The Only GPA model



Several modification indices (estimates of how much the initial Chi-square test would improve if this modification were to be implemented) emerged in this analysis. See Table 25 for a summary of the proposed changes and their associated improvement of the Chi-square test.

Table 25

Modification indices proposed to improve model fit of the Only GPA model

Proposed relationship	Improvement in Chi-square test
goal fit - engagement	16.84
self-concept fit - motivational fluency	13.91
social fit - cognitive fluency	12.18
self-concept fit - interpersonal fluency	6.83
self-concept fit - cognitive fluency	4.13

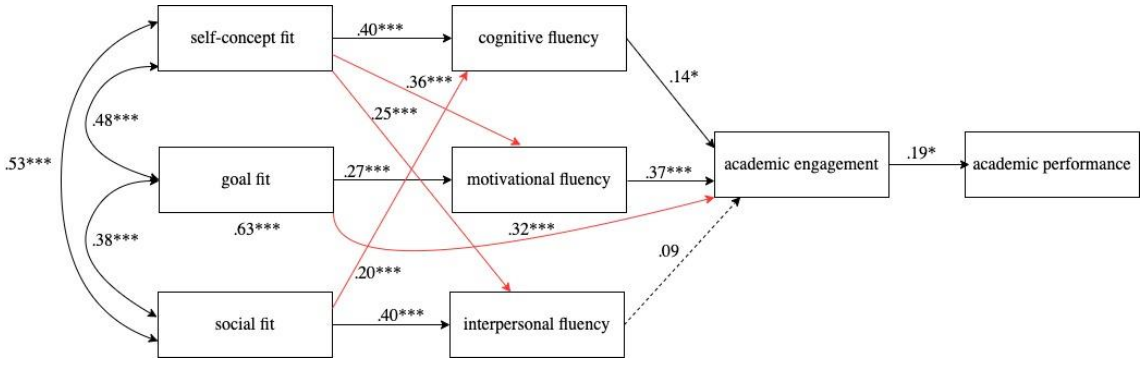
Note: These modification indices suggest pathways that should be added to the current S'FICE model to improve model fit. These indices are ranked by the extent to which they improve the Chi-square test, and thus, model fit.

I then added the path recommended by the largest modification index and checked to see if this modification resulted in statistics indicating good model fit. If it did not, I additionally added the path recommended by the next largest modification index, and so forth. When the following four paths were added, the Only GPA model reflected good model fit (see Figure 20):

1. goal fit associated with engagement
2. self-concept fit associated with motivational fluency
3. social fit associated with cognitive fluency
4. self-concept fit associated with interpersonal fluency

Figure 20

The Only GPA model with implemented modification indices



Note. The pathways between constructs that were theorized by the S'FICE model are indicated with black lines and the pathways added through the analysis of the modification indices are indicated with red lines. Significant relationships are indicated with unbroken lines and non-significant relationships are indicated with dotted lines. * $p < .05$, *** $p < .001$

The fit of this augmented Only GPA model was good:

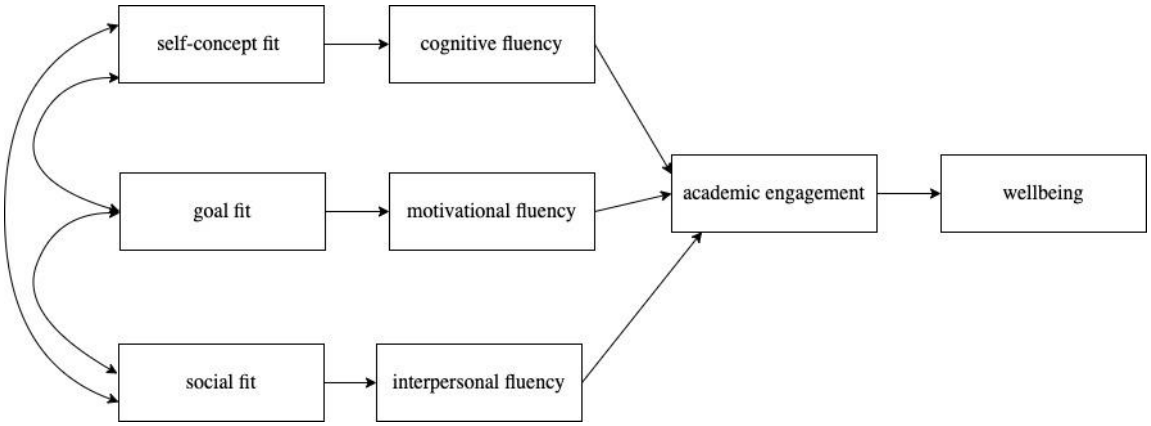
1. The Chi-square test was not significant, $\chi^2(11) = 8.25$, $p = .69$
2. The RMSEA was less than .06 (RMSEA < .001)
3. The NFI exceeded .95 (NFI = .99)
4. The CFI exceeded .95 (CFI = 1)
5. The AIC value for the Only GPA model with modification indices was much lower (AIC = 74.25) than the AIC value for the Only GPA model with no modification indices and the original model.

Given this good model fit, the Only GPA model with modification indices was employed to test the Model Hypotheses 3 - 6.

b. Prospective path model with only wellbeing as the dependent variable. I next created a prospective path model of good fit for the data from participants providing wellbeing as the dependent variable (see Figure 21; this model will be referred to as the Only Wellbeing model).

Figure 21

The Only Wellbeing model



The model fit results indicated that this model had poor fit. The Chi-square test was significant, $\chi^2(15) = 110.54$, $p < .001$. The NFI and CFI did not exceed .95 (NFI = .81, CFI = .83). Finally, the RMSEA was not less than .05 (RMSEA = .19). However, the Only Wellbeing model had a lower AIC (AIC = 168.54) than the Original model (AIC = 285.37), indicating a somewhat better fit in the Only Wellbeing model compared to the Original model.

I followed an identical process in implementing modification indices in the Only Wellbeing model, as I did with the Only GPA model. See Table 26 for the suggested modification indices and their estimated improvement in the Chi-square test.

Table 26

Modification indices proposed to improve model fit of the Only Wellbeing model

Proposed relationship	Improvement in Chi-square test
social fit – wellbeing	19.06
self-concept fit - motivational fluency	14.4
goal fit – engagement	12.05
social fit - cognitive fluency	9.77
engagement - wellbeing	7.59
motivational fluency - wellbeing	4.38
self-concept fit - interpersonal fluency	4.26

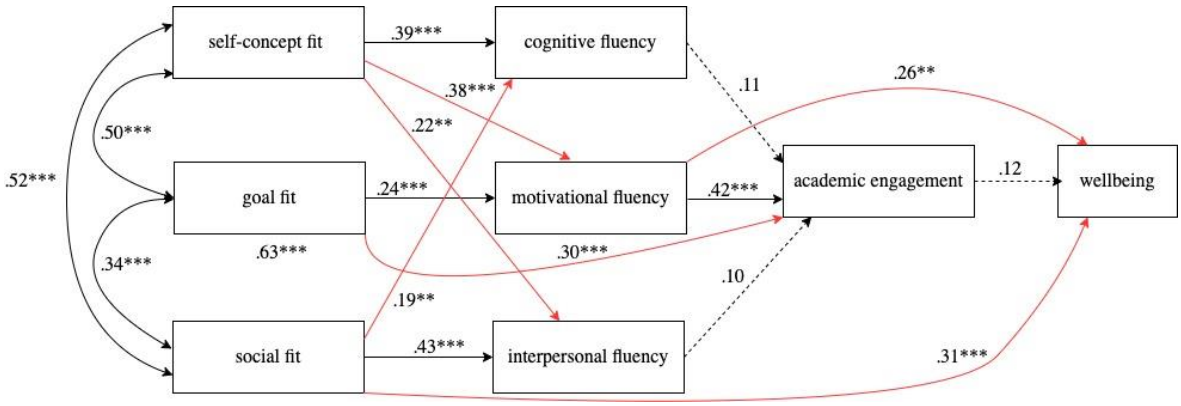
I then added the path recommended by the largest modification index and checked to see if that modification resulted in statistics indicating good model fit. If it did not, I additionally added the path recommended by the next largest modification index, and so

forth. When the following four paths were added, the Only Wellbeing model reflected good model fit (see Figure 22):

1. social fit associated with wellbeing
2. self-concept fit associated with motivational fluency
3. goal fit associated with engagement
4. social fit associated with cognitive fluency
5. motivational fluency associated with wellbeing
6. self-concept fit associated with interpersonal fluency

Figure 22

The Only Wellbeing model with modification indices



Note. The pathways between constructs that were theorized by the S'FICE model are indicated with black lines and the pathways added through the analysis of the modification indices are indicated with red lines. Significant relationships are indicated with unbroken lines and non-significant relationships are indicated with dotted lines. * $p < .05$, ** $p < .01$, *** $p < .001$

The model fit for this model was good:

1. The Chi-square test was not significant, $\chi^2(9) = 10.98$, $p = .28$

2. The RMSEA was less than .06 (RMSEA = .04)
3. The NFI exceeded .95 (NFI = .98)
4. The CFI exceeded .95 (CFI = 1)
5. The AIC value for the Only Wellbeing model with modification indices was much lower than the AIC value for the Only Wellbeing model with no modification indices and the original model (AIC = 80.98 in comparison to the original model's AIC of 285.37)

These changes reflect the fact that the Only Wellbeing data also suggested that self-concept and social fit relate to fluencies other than their theorized type of fluency. They also indicated direct relationships of types of fit and fluencies to engagement and wellbeing that circumvented the theorized indirect pathways to engagement and wellbeing. Thus, the Only Wellbeing model with modification indices was used to test the Model Hypotheses.

5. Testing Model Hypothesis 3

I examined the output of the Only GPA model with modification indices and the combined serial and parallel multiple mediator models (which I will refer to as the combined mediator models) to determine whether the expected fit scores were associated with their respective fluency scores. The Only Wellbeing model with modification indices was also consulted to augment the findings from the Only GPA model with modification indices.

a. Testing Model Hypothesis 3a. The results of the prospective path model, Only GPA, provided support for Model Hypothesis 3a, as self-concept fit was significantly associated with cognitive fluency, $b = 1.16$, $p < .001$. This finding was true of the Only Wellbeing model as well. The combined mediator model of self-concept fit predicting GPA also confirmed the predictions of Model Hypothesis 3a, revealing that self-concept fit was

significantly related to cognitive fluency, $t(194) = 7.37$, $p < .001$. However, contrary to my predictions, self-concept fit was also significantly related to motivational fluency, $t(194) = 7.43$, $p < .001$, and interpersonal fluency, $t(194) = 6.80$, $p < .001$. The combined mediator model of self-concept fit predicting wellbeing, also confirmed these findings, by showing significant relationships between self-concept fit and cognitive fluency, $t(179) = 6.54$, $p < .001$, motivational fluency, $t(179) = 7.70$, $p < .001$, and interpersonal fluency, $t(179) = 6.34$, $p < .001$[11]. These findings once again point to the large correlations between the three types of fit and therefore the overlapping relationships between the three types of fit and the three types of fluency. These results thus suggest that there is a more complicated relationship between self-concept fit and fluency, whereby self-concept fit may affect all three types of fluency.

b. Testing Model Hypothesis 3b. The Only GPA prospective path model also provided support for the prediction of Model Hypothesis 3b, as goal fit was significantly associated with motivational fluency, $b = .59$, $p < .001$. This was also the case in the Only Wellbeing model. The combined mediator model of goal fit predicting GPA also confirmed the predictions of Model Hypothesis 3b, with goal fit being significantly related to motivational fluency, $t(194) = 5.68$, $p < .001$. However, contrary to my predictions, goal fit was also significantly related to cognitive fluency, $t(194) = 3.38$, $p = .001$, and interpersonal fluency, $t(194) = 2.90$, $p = .004$. The combined mediator model of goal fit predicting wellbeing, also confirmed these findings, by showing significant relationships between goal fit and cognitive fluency, $t(179) = 2.92$, $p = .004$, motivational fluency, $t(179) = 5.15$, $p <$

[11] This finding was also found in the Only GPA and Only Wellbeing prospective path models.

.001, and interpersonal fluency, $t(179) = 2.36$, $p = .02$. These findings mirror the findings on self-concept fit, indicating that the large correlations between the three types of fit may have led to overlapping relationships between the three types of fit and the three types of fluency. These results thus suggest that there is a more complicated relationship between goal fit and fluency, whereby goal fit may affect all three types of fluency. However, both prospective path models did not find this relationship. This discrepancy may be due to the better fit that both prospective path models showed with the data, in comparison to the combined mediator models. These results suggest that although goal fit may have a more complicated relationship with fluency, the strongest relationship that emerges between goal fit and fluency is that with motivational fluency.

c. Testing Model Hypothesis 3c. Finally, the Only GPA prospective path model provided support for the prediction of Model Hypothesis 3c as well, showing that social fit was significantly associated with interpersonal fluency, $b = .90$, $p < .001$. This finding was also true of the Only Wellbeing model. The combined mediator model of social fit predicting GPA also confirmed the predictions of Model Hypothesis 3c, with social fit being significantly related to interpersonal fluency, $t(194) = 8.69$, $p < .001$. However, contrary to my predictions, social fit was also significantly related to motivational fluency, $t(194) = 4.32$, $p < .001$, and cognitive fluency, $t(194) = 6.15$, $p < .001$. The combined mediator model of social fit predicting wellbeing, also confirmed these findings, by showing significant relationships between social fit and cognitive fluency, $t(179) = 5.25$, $p < .001$, motivational fluency, $t(179) = 4.12$, $p < .001$, and interpersonal fluency, $t(179) = 8.76$, $p < .001$. These findings once again point to the large correlations between the three types of fit and therefore the overlapping relationships between the three types of fit and the three types of fluency.

These results thus suggest that there is a more complicated relationship between social fit and fluency, whereby social fit may affect all three types of fluency. Once again, however, the prospective path models did not confirm this finding. Instead, both models indicated that social fit had a significant relationship with both cognitive and interpersonal fluency, but not motivational fluency. These results suggest that although social fit may relate to all three types of fluency, it may a stronger relationship with cognitive and interpersonal fluency.

6. Testing Model Hypothesis 4

To test the predictions of Model Hypothesis 4, I examined the only GPA with modification indices model and I conducted three separate parallel multiple mediator models with self-concept fit, goal fit, and social fit as the single predictor in each model, predicting engagement via cognitive fluency, motivational fluency, and interpersonal fluency. Although each type of fit was expected to be associated with engagement via a specific type of fluency (e.g., self-concept fit with engagement via cognitive fluency), these three models allowed me to test whether these specific indirect relationships would emerge in a broader test of the model. I also examined the results of the Only Wellbeing model to augment the results of the Only GPA model.

a. Testing Model Hypothesis 4a. To test Model Hypothesis 4a, I first examined the two-tailed significance tests on the standardized indirect relationships in the Only GPA model with modification indices. Supporting my predictions, the results revealed that there was a significant indirect relationship from self-concept fit to engagement, $\beta = .21$, $p = .01$[12]. However, this result did not allow me to tease apart the relationship of self-concept to

[12] The results of the Only Wellbeing model were identical to the Only GPA model.

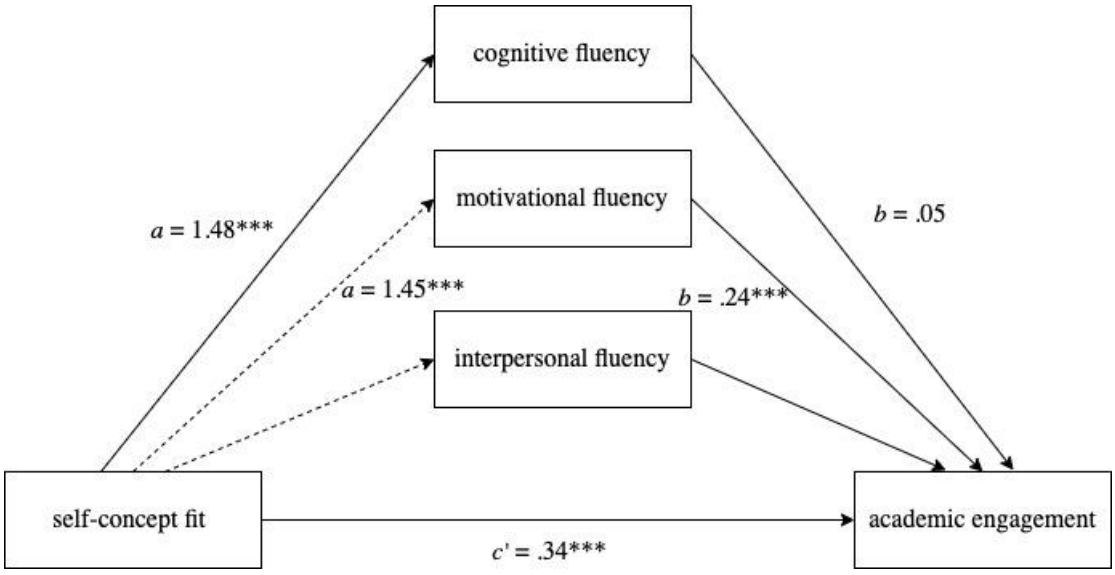
engagement via the multiple mediators that I plotted in the prospective model, because all these pathways were entered and calculated simultaneously in the prospective path model. In the prospective Only GPA model with modification indices, self-concept fit had multiple indirect pathways to engagement: via cognitive fluency, motivational fluency, and via interpersonal fluency (see Figure 20). Self-concept fit was significantly related to each of these types of fluency: cognitive fluency [*Beta* = .40, $p < .001$], motivational fluency [*Beta* = .36, $p < .001$], and interpersonal fluency [*Beta* = .25, $p < .001$]. Thus, the significance of the indirect relationship from self-concept fit to engagement indicated that collectively, self-concept fit was indirectly associated with engagement via cognitive, motivational, and interpersonal fluency. The direct pathways between the three types of fluency and engagement shed some more light on this relationship. Of the three types of fluency, only cognitive fluency [*Beta* = .14, $p = .04$] and motivational fluency [*Beta* = .37, $p < .001$] had significant direct relationships with engagement. Therefore, it is possible that the indirect relationship of self-concept fit to engagement was mainly driven by the mediators, cognitive fluency and motivational fluency. Although the indirect pathways of self-concept fit to engagement via motivational and interpersonal fluency were not predicted, the fact that self-concept fit did predict engagement via fluency is an interesting finding that does support the prediction to an extent.

Next, I examined the parallel multiple mediator model where self-concept fit was entered as the predictor variable. There was a significant total relationship between self-concept fit and engagement [$b = .80$, $t\ (207) = 8.31$, $p < .001$] and a significant direct relationship between self-concept fit and engagement when accounting for cognitive, motivational, and interpersonal fluency [$b = .34$, $t\ (207) = 3.36$, $p = .001$]. This finding

supported my prediction, as I expected there to be a relationship between self-concept fit and engagement after accounting for the variance in engagement explained by the three fluencies. Contradicting my predictions, however, the indirect effect of self-concept fit on engagement via cognitive fluency was not significant, 95% *CI* [-.04, .20], but the indirect effect of self-concept fit on engagement via motivational fluency was significant, 95% *CI* [.20, .51] (see Figure 23). Thus, both the prospective path models and the parallel multiple mediator model supported Model Hypothesis 4a although both types of models suggested that self-concept fit may be related to engagement through fluencies that were not expected on the basis of the S'FICE model.

Figure 23

Multiple parallel mediator model with self-concept fit as the predictor, engagement as the dependent variable, and cognitive, motivational, and interpersonal fluency as mediators



Note. Predicted relationships are indicated by unbroken lines and relationships that were not expected to be significant are indicated by dotted lines. Because the intention of this analysis was to measure the mediated relationship between self-concept fit on engagement via

fluency, I reported only the significant paths that correspond to this relationship. Of the indicated lines, *a* refers to the relationship of self-concept fit regressed on cognitive fluency and motivational fluency, respectively, *b* refers to cognitive fluency and motivational fluency respectively regressed on engagement while accounting for self-concept fit, and *c'* refers to self-concept fit regressed on engagement accounting for the three types of fluency. Indicated numbers refer to the coefficients for each relationship. ***$p < .001$.

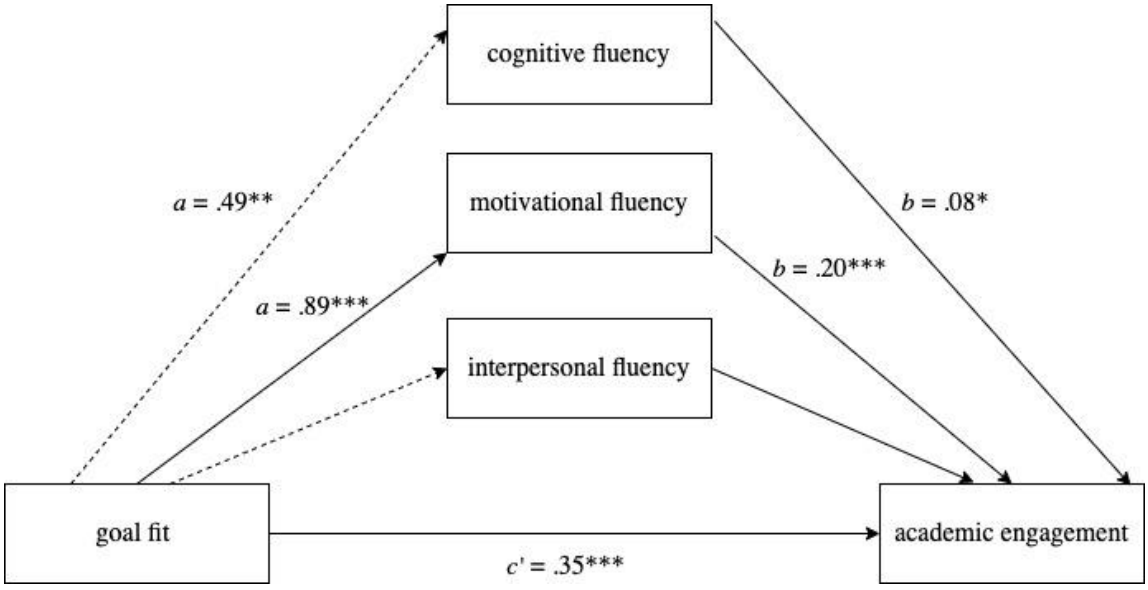
b. Testing Model Hypothesis 4b. To test Model Hypothesis 4b, I first examined the two-tailed significance tests on the standardized indirect relationships in the Only GPA and Only Wellbeing models with modification indices. Supporting my predictions, the results revealed that there was a significant indirect relationship from goal fit to engagement, $\boldsymbol{\beta} = .10$, $p = .01$. Further supporting my predictions, this indirect path between goal fit and engagement was only through one mediator, motivational fluency. Although this finding provided complete support for Model Hypothesis 4b, there was an additional pathway that the modification indices recommended for both prospective path models: a significant direct pathway between goal fit and engagement, $\boldsymbol{\beta} = .32$, $p < .001$. Thus, although Model Hypothesis 4b received complete support in terms of the indirect relationship between goal fit and engagement mediated by motivational fluency, the Only GPA and Only Wellbeing models also indicated that there is a direct pathway between goal fit and engagement, the variance of which was not captured by the indirect pathway via motivational fluency. Therefore, goal fit had both a direct relationship with engagement as well as an indirect relationship with engagement through the mediator of motivational fluency.

Next, I examined the parallel multiple mediator model where goal fit was entered as the predictor variable. As predicted, there was a significant direct relationship between goal

fit and engagement when accounting for cognitive, motivational, and interpersonal fluency [*b* = .35, *t* (207) = 5.45, *p* < .001]. Further supporting my prediction, the indirect effect of goal fit on engagement via motivational fluency was significant, 95% *CI* [.09, .29] (see Figure 24). However, contradicting my prediction, the indirect effect of goal fit to engagement via cognitive fluency was also significant, 95% *CI* [.001, .10]. Thus, both the parallel multiple mediator model and prospective path model provided considerable support for Model Hypothesis 4b, although they indicated that goal fit may have other ways of relating to engagement as well.

Figure 24

Multiple parallel mediator model with goal fit as the predictor, engagement as the dependent variable, and cognitive, motivational, and interpersonal fluency as mediators



Note. Predicted relationships are indicated by unbroken lines and relationships that were not expected to be significant are indicated by dotted lines. Of the indicated lines, *a* refers to the relationship of goal fit regressed on cognitive and motivational fluency respectively, *b* refers

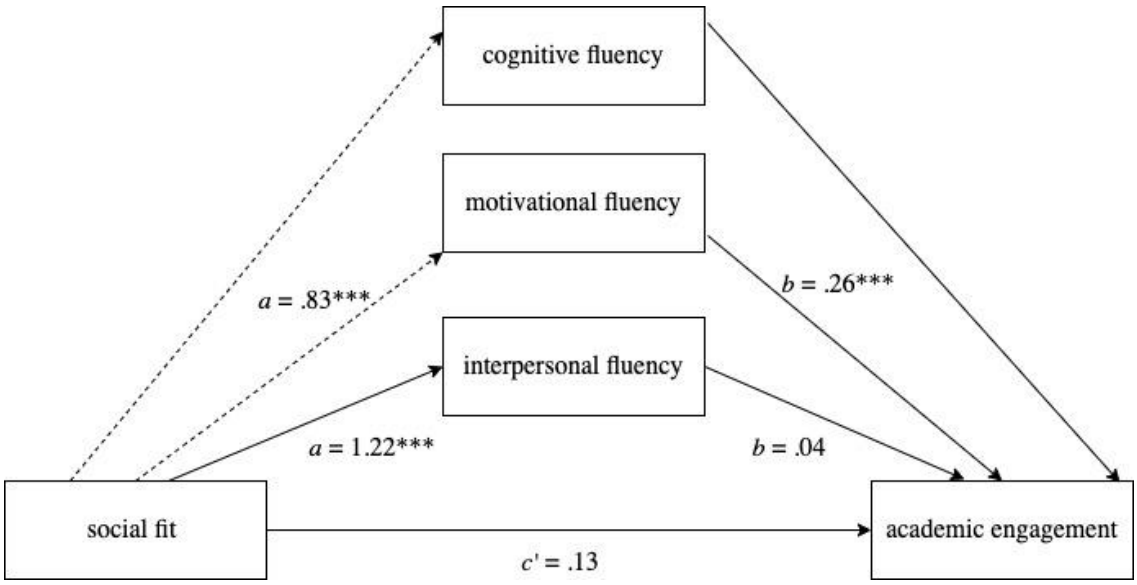
to cognitive and motivational fluency respectively regressed on engagement while accounting for goal fit, and *c'* refers to goal fit regressed on engagement accounting for the three types of fluency. Indicated numbers refer to the coefficients for each relationship. *p < .05, **p < .01, ***p < .001.

c. Testing Model Hypothesis 4c. To test Model Hypothesis 4c, I first examined the two-tailed significance tests on the standardized indirect relationships in the Only GPA and Only Wellbeing models with modification indices. Supporting my predictions, the results revealed that there was a significant indirect relationship from social fit to engagement, $\boldsymbol{\beta}$ = .07, p = .01. However, as with testing Model Hypothesis 4a, this result did not allow me to tease apart the multiple indirect relationships that had been plotted between social fit and engagement. Social fit had indirect pathways to engagement via cognitive fluency and interpersonal fluency. Social fit showed significant direct relationships with both cognitive fluency, $\boldsymbol{\beta}$ = .21, p < .001, and interpersonal fluency, $\boldsymbol{\beta}$ = .40, p < .001. However, only cognitive fluency had a significant direct relationship with engagement, $\boldsymbol{\beta}$ = .14, p = .04. Therefore, although the output of the Only GPA model suggested that there was a significant indirect relationship between social fit and engagement when accounting for both the mediators (cognitive and interpersonal fluency), this indirect relationship seems to be primarily driven by the indirect path from social fit to engagement via the mediator of cognitive fluency. The indirect path via cognitive fluency was unexpected and contradicted my prediction that social fit would only be associated with engagement through interpersonal fluency. However, the fact that social fit was significantly associated with engagement via fluency (even if it was primarily via cognitive fluency) still supports my prediction that there would be a mediated relationship from social fit to engagement via fluency.

Next, I examined the parallel multiple mediator model where social fit was entered as the predictor variable. There was a significant total relationship between social fit and engagement [b = .46, t (207) = 5.69, p < .001], but the direct relationship between social fit and engagement when accounting for cognitive, motivational, and interpersonal fluency was not significant [b = .13, t (207) = 1.66, p = .10]. Further contradicting my predictions, the indirect effect of social fit on engagement via interpersonal fluency was not significant, 95% *CI* [-.04, .14]. However, the indirect relationship of social fit to engagement through motivational fluency was significant, 95% *CI* [.11, .34] (see Figure 25).

Figure 25

Multiple parallel mediator model with social fit as the predictor, engagement as the dependent variable, and cognitive, motivational, and interpersonal fluency as mediators



Note. Predicted relationships are indicated by unbroken lines and relationships that were not expected to be significant are indicated by dotted lines. Of the indicated lines, *a* refers to the relationship of social fit regressed on motivational and interpersonal fluency respectively, *b* refers to motivational and interpersonal fluency respectively regressed on engagement while

accounting for social fit, and *c'* refers to social fit regressed on engagement accounting for the three types of fluency. Indicated numbers refer to the coefficients for each relationship.

***$p < .001$

7. Testing Model Hypothesis 5

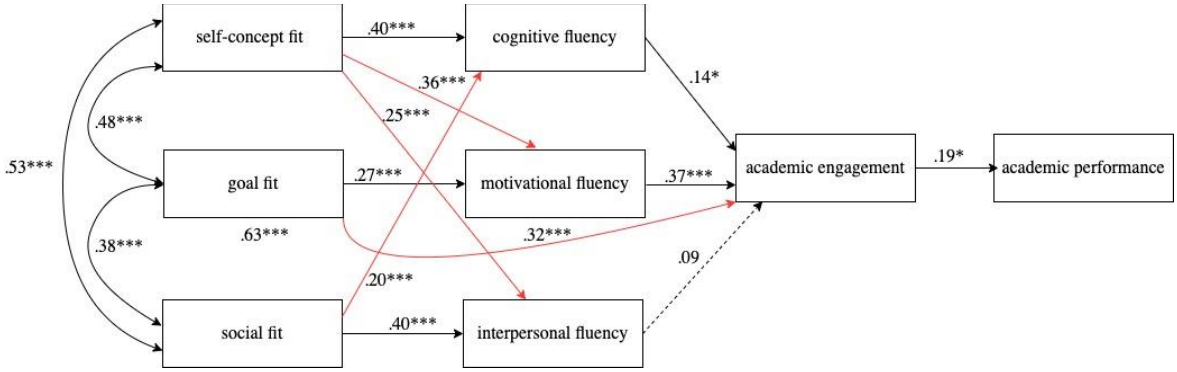
To test Model Hypothesis 5, I conducted a correlation analysis between engagement and GPA. As predicted, the correlation between engagement and GPA was significant, however, contrary to predictions, the correlation was smaller than .3 (Cohen, 1988), $r = .19$, $t(194) = 2.67$, $p = .008$. I also examined the strength of association between engagement and GPA in the Only GPA prospective path model and found evidence in support of Model Hypothesis 5, with engagement and GPA being significantly associated with each other, $\boldsymbol{\beta} = .19$, $p = .007$. The significance of the relationship between engagement and GPA supports Model Hypothesis 5 and is vital to the S'FICE model, because if engagement did not relate to GPA then there would be a disconnect in the predictive abilities of the S'FICE model. Thus, it is very important that there be a significant relationship between engagement and GPA. However, the fact that this significant correlation is rather small is somewhat concerning, since it suggests that not a lot of the variance in GPA is predicted by engagement.

8. Testing Model Hypothesis 6

To test the sub-hypotheses of Model Hypothesis 6, I examined the Only GPA prospective path model (see Figure 20) and each of the combined mediator models that had GPA as the dependent variable.

Figure 20

The Only GPA model with implemented modification indices



Note. The pathways between constructs that were theorized by the S'FICE model are indicated with black lines and the pathways added through the analysis of the modification indices are indicated with red lines. Significant relationships are indicated with unbroken lines and non-significant relationships are indicated with dotted lines. * $p < .05$, *** $p < .001$

a. Testing Model Hypothesis 6a. To test this sub-hypothesis, I examined the two-tailed significance tests of the standardized indirect effects for the different paths that connected self-concept fit to GPA. As predicted, there was a significant indirect path between self-concept fit and GPA, $\boldsymbol{\beta} = .04$, $p = .02$. However, this indirect effect applied to the multiple indirect paths between self-concept fit and GPA. Specifically, this referred to the pathways of self-concept to GPA via cognitive, motivational, and interpersonal fluency separately, which all then affected engagement, which then affected GPA. Again, self-concept fit had significant direct relationships with cognitive fluency [$\boldsymbol{\beta} = .40$, $p < .001$], motivational fluency [$\boldsymbol{\beta} = .36$, $p < .001$], and interpersonal fluency [$\boldsymbol{\beta} = .25$, $p < .001$]. Cognitive fluency [$\boldsymbol{\beta} = .14$, $p = .04$] and motivational fluency [$\boldsymbol{\beta} = .37$, $p < .001$] in turn, had significant direct relationships with engagement. Engagement had a significant direct relationship with GPA [$\boldsymbol{\beta} = .19$, $p = .007$]. Therefore, the indirect relationship between self-concept fit and GPA was mostly driven by the relationships of self-concept fit to cognitive

and motivational fluency, which in turn were related to engagement, which was related to GPA. Although finding an indirect relationship between self-concept fit and GPA via motivational fluency contradicted Model Hypothesis 6a, these results do provide some support for this hypothesis, showing that self-concept fit did have an indirect relationship with GPA via the mediators of cognitive fluency and engagement. These results add a layer of complexity, showing that self-concept fit relates to GPA in two ways, via the mediators of cognitive and motivational fluency.

Next, I looked at the combined serial and parallel mediation model with self-concept fit as the predictor and GPA as the dependent variable. Contrary to my predictions, the total effect of self-concept fit on GPA was not significant, $b = .19$, $t\ (194) = 1.39$, $p = .17$. Furthermore, the direct effect of self-concept fit on GPA after accounting for the variance of the mediators was also not significant, $b = .04$, $t\ (194) = .21$, $p = .83$. The only indirect relationship that was close to being significant was that between self-concept fit and GPA via the mediators of motivational fluency and engagement, 95% *CI* [.00, .21]. Therefore, this combined mediator model contradicted the findings of the Only GPA prospective path model, by showing that there were no significant relationships between self-concept fit and GPA. This may be due to the better fit of the Only GPA model to the data, which led to different results in the two models. Thus, the Only GPA prospective model provides interesting results in support of Model Hypothesis 6a, showing that self-concept fit does indirectly predict GPA via cognitive fluency, but also via motivational fluency.

b. Testing Model Hypothesis 6b. To test this sub-hypothesis, I examined the two-tailed significance tests of the standardized indirect effects for the different paths that connected goal fit to GPA. As predicted, there was a significant indirect path between goal fit

and GPA, β = .08, p = .02. This indirect effect applied to only one indirect pathway, which aligned with my predictions: the pathway from goal fit to GPA via motivational fluency and engagement. Goal fit had a significant direct relationship with motivational fluency [β = .27, p < .001]. Motivational fluency had a significant direct relationship with engagement [β = .37, p < .001], and engagement, in turn, had a significant direct relationship with GPA [β = .19, p = .007]. Thus, this finding supported my predictions. However, the Only GPA model also called for a direct relationship between goal fit and GPA in order to improve model fit to the data. This direct relationship was also significant, β = .32, p < .001. Thus, the Only GPA model provided strong support for Model Hypothesis 6b, showing that there was an indirect relationship between goal fit and GPA via the mediators, motivational fluency and engagement. These results also indicated that goal fit had a direct relationship with engagement, in addition to the indirect relationship via motivational fluency, indicating that added variance in engagement was captured directly by goal fit that could not be explained by the indirect relationship via motivational fluency. Despite this complexity, these results provided strong support for the argument that goal fit was related to GPA via engagement.

Next, I looked at the combined serial and parallel mediation model with goal fit as the predictor and GPA as the dependent variable. Contrary to my predictions, the total effect of goal fit on GPA was only trending toward significance, b = .19, t (194) = 1.94, p = .05. Furthermore, the direct effect of goal fit on GPA after accounting for the variance of the mediators was not significant, b = .09, t (194) = .69, p = .49. No indirect relationships were significant, including the indirect relationship via motivational fluency and engagement, 95% *CI* [-.01, .11]. Thus, the results of the combined mediator model contradicted the predictions of Model Hypothesis 6b and the results of the Only GPA model. Once again, I argue that the

difference in results was due to the better fit of the Only GPA model to the data. Therefore, the Only GPA model provided full support for Model Hypothesis 6b, showing that there was an indirect relationship between goal fit and GPA via engagement (and to an extent, via motivational fluency).

c. Testing Model Hypothesis 6c. To test this sub-hypothesis, I examined the two-tailed significance tests of the standardized indirect effects for the different paths that connected social fit to GPA. As predicted, there was a significant indirect path between social fit and GPA, $\beta = .01$, $p = .03$. However, this indirect effect applied to the multiple indirect paths between social fit and GPA. Specifically, this referred to the pathways of social fit to GPA via cognitive fluency and engagement as well as the indirect pathway between social fit and GPA via interpersonal fluency and engagement. Social fit had significant direct relationships with both cognitive fluency [$\beta = .21$, $p < .001$] and interpersonal fluency [$\beta = .40$, $p < .001$], but only cognitive fluency had a significant direct relationship with engagement [$\beta = .14$, $p = .04$]. Engagement, as discussed above, had a significant direct relationship with GPA, $\beta = .19$, $p = .007$. Thus, although the indirect relationship of social fit to GPA involved interpersonal fluency and engagement, the pathway probably most responsible for this indirect relationship was that from social fit to cognitive fluency to engagement to GPA. Therefore, the Only GPA model provided very little support for Model Hypothesis 6c, implying that rather than relating to academic performance only through interpersonal fluency, social fit related to academic performance mostly through cognitive fluency and engagement.

Next, I looked at the combined serial and parallel mediation model with social fit as the predictor and GPA as the dependent variable. Contrary to my predictions, the total effect

of social fit on GPA was not significant, b = .02, t (194) = .18, p = .86. Further contradicting my predictions, the direct effect of social fit on GPA after accounting for the variance of the mediators was not significant, b = -.07, t (194) = -.46, p = .65. However, there was one significant indirect effect. The indirect effect of social fit on GPA via interpersonal fluency and engagement was significant, 95% *CI* [.003, .14]. These indirect effects were driven by the significant association of engagement with GPA, b = .29, t (192) = 2.29, p = .02, because there was no total or direct significant relationship between social fit and GPA. Thus, the results of the combined mediator model provide complete support for Model Hypothesis 6c, because social fit was found to indirectly relate to GPA via the mediators of interpersonal fluency and engagement. Once again, the Only GPA model and the combined mediator model provided contrasting results, with the Only GPA model showing a significant indirect relationship between social fit and academic performance via interpersonal fluency but mostly cognitive fluency, and the combined mediator model showing only the predicted relationship of social fit to academic performance via interpersonal fluency and engagement.

d. Summary of the results of the S'FICE model predicting academic performance. The analyses for Model Hypotheses 5 and 6 showed that engagement and academic performance are related constructs and that self-concept, goal, and social fit relate to academic performance through the mediators of fluency and engagement. The Only GPA prospective path model revealed the most support for the sub-hypotheses of Model Hypothesis 6 with the exception of Model Hypothesis 6c. I will summarize the results of the Only GPA model with regard to Model Hypotheses 6a and 6b and use both the results of the Only GPA model and the combined mediator model with social fit as the predictor in summarizing the results for Model Hypothesis 6c.

Self-concept fit showed a significant indirect relationship to academic performance via the mediators, fluency and engagement. However, instead of self-concept fit relating to engagement only via cognitive fluency, it also related to engagement via motivational and interpersonal fluency. Interpersonal fluency was not significantly related to engagement, so self-concept fit related to engagement only through the mediators, cognitive and motivational fluency. Engagement then showed a significant direct relationship with academic performance. Thus, the expected indirect relationship of self-concept fit to academic performance through the mediators, cognitive fluency and engagement received support, but an unexpected relationship of self-concept fit to academic performance through motivational fluency and engagement also received support. This suggests that academic performance may be influenced by self-concept fit both via an increased ease in concentrating on tasks (cognitive fluency) and an increased ease in achieving goals (motivational fluency).

Goal fit showed the predicted indirect relationship to academic performance through the mediator of motivational fluency. Thus, Model Hypothesis 6b received complete support. However, the Only GPA model also indicated that there was a direct relationship between goal fit and engagement that was not sufficiently captured by the indirect relationship of goal fit to engagement through motivational fluency.

The combined mediator model provided full support for Model Hypothesis 6c, showing that social fit had an indirect relationship to academic performance through interpersonal fluency and engagement. The Only GPA model provided partial support for Model Hypothesis 6c, indicating that social fit was indirectly related to academic performance through both cognitive and interpersonal fluency as well as engagement. However, the Only GPA model also suggested that the indirect relationship between social fit

and engagement through interpersonal fluency may not be as strong as the indirect relationship between cognitive fluency. Thus, these results indicate that social fit does indirectly relate to academic performance via fluency and engagement, but the specific type of fluency may be both cognitive and interpersonal fluency, instead of only interpersonal fluency.

9. Testing Model Hypothesis 7

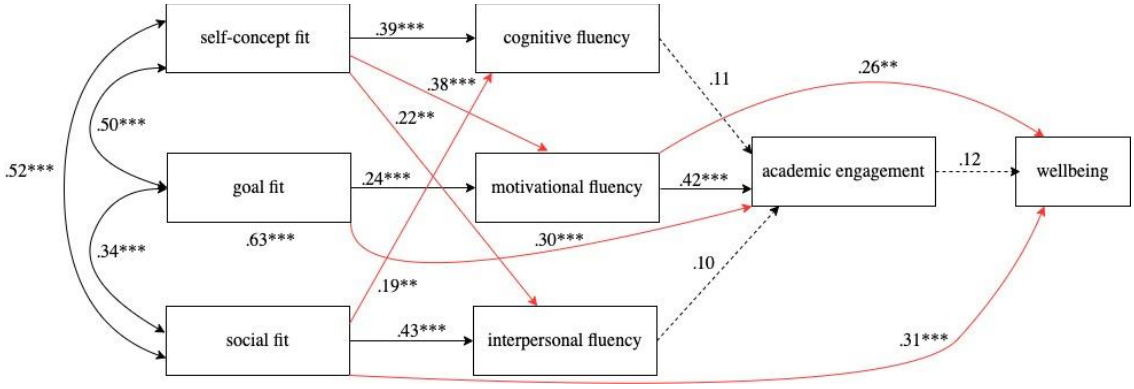
To test Model Hypothesis 7, I conducted a correlation analysis between engagement and wellbeing. As predicted, the correlation between engagement and wellbeing exceeded .3 and indicated a significant, positive relationship between the two variables (Cohen, 1988), $r = .4$, $t\,(179) = 5.78$, $p < .001$. However, when I examined the Only Wellbeing model with modification indices, the results showed – contrary to my prediction – that the association between engagement and wellbeing was not significant, $b = .13$, $p = .17$.

10. Testing Model Hypothesis 8

To test the sub-hypotheses of Model Hypothesis 8, I examined the Only Wellbeing model with modification indices (see Figure 22), as well as the combined mediation models with wellbeing as the dependent variable.

Figure 22

The Only Wellbeing model with modification indices



Note. The pathways between constructs that were theorized by the S'FICE model are indicated with black lines and the pathways added through the analysis of the modification indices are indicated with red lines. Significant relationships are indicated with unbroken lines and non-significant relationships are indicated with dotted lines. * $p < .05$, ** $p < .01$, *** $p < .001$

a. Testing Model Hypothesis 8a. To test this sub-hypothesis, I examined the two-tailed significance tests of the standardized indirect effects for the different paths that connected self-concept fit to wellbeing. Supporting my predictions, there was a significant indirect effect of self-concept fit on wellbeing, $\boldsymbol{\beta} = .13$, $p = .01$. Although this indirect pathway was through cognitive fluency and engagement, as hypothesized, there were other pathways that also contributed to this relationship (see Figure 22). These separate indirect pathways could not be teased apart given that they were entered simultaneously to the Only Wellbeing prospective path model. Just as with the Only GPA model, self-concept fit showed significant direct relationships to cognitive fluency [$\boldsymbol{\beta} = .39$, $p < .001$] as hypothesized, but also to motivational fluency [$\boldsymbol{\beta} = .38$, $p < .001$] and interpersonal fluency [$\boldsymbol{\beta} = .22$, $p = .002$]. However, neither cognitive fluency nor interpersonal fluency significantly and directly related to engagement. Motivational fluency was directly related to engagement [$\boldsymbol{\beta} = .42$, $p <$

.001]. However, engagement was not significantly and directly related to wellbeing. Motivational fluency, on the other hand, had a significant direct relationship with wellbeing [$\boldsymbol{\beta}$ = .26, p = .002]. Thus, although self-concept fit showed an indirect relationship to wellbeing, this indirect relationship was driven by the direct relationship between self-concept fit and the motivational fluency and the direct relationship between motivational fluency and wellbeing. Thus, this analysis provided partial support for Model Hypothesis 8a, since the indirect pathway from self-concept fit to wellbeing was via an unexpected mediator (motivational fluency instead of cognitive fluency and engagement).

Next, I looked at the combined serial and parallel mediation model with self-concept fit as the predictor and wellbeing as the dependent variable. Supporting my predictions, the total effect of self-concept fit on wellbeing was significant, b = .53, t (179) = 3.77, p < .001. However, the direct effect of self-concept fit on wellbeing after accounting for the variance of the mediators was not significant, b = -.006, t (179) = -.04, p = .97. The only significant indirect results were between self-concept fit to wellbeing via motivational fluency (but not engagement) 95% *CI* [.02, .42] and between self-concept fit to wellbeing via interpersonal fluency (again, not via engagement) 95% *CI* [.03, .35]. Thus, the findings of the combined mediator model and the Only Wellbeing prospective path model were somewhat similar, suggesting that engagement was not a mediator between self-concept fit and wellbeing. Furthermore, both models highlighted motivational fluency as a potential mediator between self-concept fit and wellbeing. This contradicts Model Hypothesis 8a, because I expected cognitive fluency and engagement to mediate the relationship between self-concept fit and wellbeing. However, I did find at least one type of fluency to mediate the relationship between self-concept fit and wellbeing, which did match my predictions.

b. Testing Model Hypothesis 8b. To test this sub-hypothesis, I examined the two-tailed significance tests of the standardized indirect effects for the different paths that connected goal fit to wellbeing. Supporting my predictions, there was a significant indirect effect of goal fit on wellbeing, $\beta = .11$, $p = .02$ (see Figure 22). Further supporting my predictions, goal fit was indirectly related to wellbeing only via motivational fluency. Goal fit had a significant direct relationship with motivational fluency, $\beta = .24$, $p < .001$. However, instead of motivational fluency having a significant indirect relationship with wellbeing through the mediator of engagement, motivational fluency had a significant direct relationship with wellbeing, $\beta = .42$, $p < .001$. Thus, in support of the predictions of Model Hypothesis 8b, I found support for goal fit predicting wellbeing through motivational fluency, but I did not find support for engagement being a mediator in this relationship.

Next, I looked at the combined serial and parallel mediation model with goal fit as the predictor and wellbeing as the dependent variable. Supporting my predictions, the total effect of goal fit on wellbeing was significant, $b = .24$, $t\ (179) = 2.24$, $p = .03$. However, the direct effect of goal fit on wellbeing after accounting for the variance of the mediators was not significant, $b = -.08$, $t\ (179) = -.71$, $p = .48$. The only significant indirect results were between goal fit to wellbeing via motivational fluency (but not engagement) 95% *CI* [.02, .26] and between goal fit to wellbeing via interpersonal fluency (again, not via engagement) 95% *CI* [.01, .16]. Thus, both the combined mediator model and the Only Wellbeing prospective path model indicated that motivational fluency mediated the relationship between goal fit and wellbeing, as predicted by Model Hypothesis 8b, but engagement did not mediate the relationship between fluency and wellbeing.

c. Testing Model Hypothesis 8c. To test this sub-hypothesis, I examined the two-tailed significance tests of the standardized indirect effects for the different paths that connected social fit to wellbeing. Contrary to my predictions, the indirect path from social fit to wellbeing was not significant, $\beta = .01$, $p = .27$. A potential explanation for this lay in the significant direct relationship between social fit and wellbeing, $\beta = .31$, $p < .001$ (see Figure 22). Contrary to my predictions, social fit was not indirectly related to wellbeing, but rather had a direct effect on wellbeing.

Next, I looked at the combined serial and parallel mediation model with social fit as the predictor and wellbeing as the dependent variable. Supporting my predictions, the total effect of social fit on wellbeing was significant, $b = .59$, $t\ (179) = 5.67$, $p < .001$. Further supporting my predictions, the direct effect of social fit on wellbeing after accounting for the variance of the mediators was also significant, $b = .36$, $t\ (179) = 3.07$, $p = .003$. One indirect effect was significant, but it was contrary to my predictions. The indirect effect of social fit on wellbeing via motivational fluency was significant, 95% [.01, .24]. Thus, the Only Wellbeing model provided a new perspective on social fit by showing that it may have a direct relationship on wellbeing. The combined mediator model indicated that social fit had an indirect relationship on wellbeing through motivational fluency, but also showed social fit to have a direct relationship with wellbeing after accounting for the variance of fluency, supporting the findings of the Only Wellbeing model. In neither of the analyses, did engagement emerge as a mediator.

d. Summary of the results of the S'FICE model predicting wellbeing. Although correlational analyses indicated that engagement and wellbeing were strongly and positively correlated, this relationship appeared to diminish when other variables were added to the

predictive model. The results for the sub-hypotheses of Model Hypothesis 8 indicated that engagement did not mediate the relationship between fit and wellbeing. Both the Only Wellbeing prospective path model and the combined serial and parallel multiple mediator models confirmed this finding. This suggests that although there may be a strong relationship between engagement and wellbeing, this relationship is overshadowed by stronger relationships between, for instance, motivational fluency and wellbeing.

The results of the Only Wellbeing prospective path model revealed similar relationships between self-concept and goal fit to wellbeing. Both these types of fit appeared to indirectly relate to wellbeing via motivational fluency. Motivational fluency, on the other hand, had a significant direct relationship with wellbeing. Although motivational fluency was the only type of fluency to have a significant direct relationship with engagement (in contrast to cognitive and interpersonal fluency), engagement did not have a significant direct relationship with wellbeing in this model. Thus, the mediator between self-concept and goal fit to wellbeing was motivational fluency.

The results for social fit were even more interesting. Social fit was found to not have an indirect relationship to wellbeing in the Only Wellbeing model. Rather, this model revealed that there was a significant direct relationship between social fit and wellbeing. This finding calls for the biggest change in the S'FICE model, because it suggests that social fit (or feeling belonging amongst peers) directly influences students' wellbeing rather than influencing wellbeing through fluency and/or engagement.

11. Testing the predictive ability of the S'FICE instrument in comparison to previously used instruments

I collected participants' responses on stereotype threat vulnerability, belonging uncertainty, ambient belonging, and cultural mismatch, which had been used in previous research to predict students' academic performance. To assess how well the constructs central to the S'FICE model performed compared to these constructs in predicting academic performance, I conducted a series of correlational and regression tests.

Before conducting the correlational tests, I examined the reliability estimates for each instrument to determine whether these instruments had comparable reliabilities so that they could be correlated to each other. Table 27 indicates the Cronbach's alpha estimates for each item. The reliability of the cultural mismatch instrument could not be calculated, because this was a checklist that was then converted into a difference score.

Table 27

Cronbach's α scores for self-concept, goal, and social fit items as well as other instruments used to measure stereotype vulnerability, ambient belonging, and belonging uncertainty

Instrument	Cronbach's α
Self-concept fit	.52
Goal fit	.77
Social fit	.66
Stereotype vulnerability	.85
Ambient belonging	.74
Belonging uncertainty	.50

As Table 27 indicates, there were some differences between the Cronbach's α scores of the different instruments, but all instruments remained within .35 points of each other. The

general rule for Cronbach's α is that scores above .7 are good (Statistics Solutions, 2022). In that case, goal fit, stereotype vulnerability, and ambient belonging are good, whereas the rest of the sub-scales and instruments show poor reliability. However, as previously mentioned, Cronbach's α relies heavily on the number of items (Nunnally, 1978) and was also a somewhat incorrect measure of reliability given how it is calculated (Sijtsma, 2009). The stereotype vulnerability instrument had eight items, which was more than each sub-scale of the S'FICE instrument (five items each) as well as ambient belonging (two items) and belonging uncertainty (three items). Given these discrepancies and the issues related to Cronbach's α, I determined that these instruments had close enough reliability for them to be compared to one another.

After standardizing the scores for each instrument, I conducted a correlational analysis (see Table 28) on these variables as well as both GPA (the theorized dependent variable) and wellbeing (the exploratory variable). Participants' goal fit scores had the highest correlation coefficients with GPA, (r = .16, p = .03). Although none of the variables had particularly high correlation coefficients with GPA, goal fit had the only significant correlation with GPA. The next highest correlation coefficients were with cultural mismatch (r = .13, p = .08) and self-concept fit (r = .11, p = .11), but GPA was not significantly correlated with either. This finding is promising, as it shows that the goal fit sub-component of the S'FICE instrument was the only variable to show a significant correlation with academic performance.

Table 28

Correlations between self-concept, goal, and social fit, stereotype threat vulnerability, belonging uncertainty, ambient belonging, cultural mismatch, GPA, and wellbeing

	Variable	*M*	*SD*	1	2	3	4	5	6	7	8
1.	self-concept fit	2.71	.36	-							
2.	goal fit	3.01	.49	.49***	-						
3.	social fit	2.86	.46	.53***	.36***	-					
4.	stereotype threat	2.23	.82	- .34***	-.24**	- .36***	-				
5.	belonging uncertainty	4.05	1.28	- .33***	- .26***	- .45***	.26** *	-			
6.	ambient belonging	4.38	1.32	.45***	.46***	.50***	- .38** *	- .36***	-		
7.	cultural mismatch	6.22	1.57	.04	.10	.01	-.10	-.15*	.11	-	
8.	GPA	3.22	.73	.11	.16*	.01	-.09	-.05	.10	.13	-
9.	Wellbeing	3.91	.63	.32***	.21**	.44***	-.20*	- .41***	.24 **	.04	.08

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

On the other hand, several variables had particularly strong correlations with wellbeing. The variable with the highest correlation with wellbeing was the social fit component of the S'FICE instrument ($r = .44$, $p < .001$), with belonging uncertainty having

the second strongest correlation (r = -.41, p < .001), and self-concept fit having the third strongest correlation coefficient (r = .32, p < .001). This finding is also promising, as it shows that the social fit sub-component of the S'FICE instrument had the strongest correlation with wellbeing and the self-concept sub-component of the S'FICE model was the third strongest correlation with wellbeing.

Using these correlation coefficients, I conducted a series of linear regression tests. First, I ran a simple linear regression in which GPA was predicted by goal fit (which had the highest correlation with it). This regression was significant, β = .16, F(1, 197) = 5.05, p = .03, and goal fit alone predicted 2.5% of the variance in GPA. Next, I added cultural mismatch, which had the second highest correlation coefficient with GPA (r = .13, p = .08) although its correlation with GPA was not significant. The intention of adding cultural mismatch to the model was to see if cultural mismatch would add any predictive validity to the model with only goal fit as the predictor. When cultural mismatch was added to the model 4.8% of the variance in wellbeing was explained, an insignificant increase. Furthermore, cultural mismatch did not show a significant relationship to wellbeing in this model, β = .10, t(194) = 1.88, p = .06. In this model, goal fit now only trended in significance, β = .10, t(194) = 1.98, p = .05. Thus, even though the model with both goal fit and cultural mismatch entered as predictors was significant, F(1, 194) = 3.28, p = .02, cultural mismatch did not add unique variance to predicting GPA beyond what was predicted by goal fit. I then added ambient belonging, belonging uncertainty, and stereotype threat vulnerability (all of which had correlation coefficients lower than goal fit and cultural mismatch) to the model, in addition to goal fit and cultural mismatch. None of the other

variables significantly predicted GPA and this model was not significant, $F(31, 163) = 1.27$, $p = .17$.

Thus, in terms of academic performance, the goal fit component of the S'FICE instrument appeared to strongly predict GPA and the other previously developed instruments did not seem to predict any unique variance in GPA beyond what was predicted by goal fit.

Next, I ran a series of exploratory linear regression tests on wellbeing. Once again, the first predictor I entered was the one which had the largest correlation coefficient with wellbeing: social fit. This model was significant, $\boldsymbol{\beta} = .44$, $F(1, 182) = 44.55$, $p < .001$. Social fit explained 19.66% of variance in wellbeing. Next, I entered belonging uncertainty into the model (the construct with the second largest correlation coefficient with wellbeing). The model with both social fit and belonging uncertainty was also significant, $F(3, 178) = 20.39$, $p < .001$ and explained 25.58% of the variance in wellbeing, a significant increase. In this model, both variables had significant associations with wellbeing. Social fit was positively related to wellbeing, $\boldsymbol{\beta} = .32$, $t(178) = 4.45$, $p < .001$, and belonging uncertainty was negatively related to wellbeing, $\boldsymbol{\beta} = -.27$, $t(178) = -3.7$, $p < .001$. In support of the S'FICE instrument, it is important to note that social fit had a somewhat higher absolute beta coefficient ($\boldsymbol{\beta} = .32$) compared to belonging uncertainty ($\boldsymbol{\beta} = .27$), indicating that even in this model, social fit had a stronger effect on wellbeing than belonging uncertainty.

The construct with the next largest correlation with wellbeing was self-concept fit. However, when self-concept fit was entered into the linear regression model, it did not show a significant association with wellbeing, $\boldsymbol{\beta} = .07$, $t(178) = .94$, $p = .35$. Furthermore, the amount of variance explained by this model ($R^2 = 27.61\%$) was not significantly different from the variance explained by the previous model ($R^2 = 25.58\%$). Thus, self-concept fit did

not appear to add to the predictive value of social fit and belonging uncertainty. To test the rest of the variables, I entered stereotype threat vulnerability, cultural mismatch, and ambient belonging to a model also containing social fit and belonging uncertainty. Although this model was significant, $F(31, 148) = 2.9$, $p < .001$, only social fit and belonging uncertainty emerged as significant predictors.

C. Discussion

In Study 4, students' experiences relating to the S'FICE model were tested within the context of their current college environment. Study 4 consisted of two parts, with Part I taking place at the beginning of the Fall Quarter of 2021 and Part II taking place at the end of the Fall Quarter of 2021, and through the Winter Quarter of 2022. Thus, I was able to observe how students' fit, fluency, and engagement to their college at the beginning of Fall predicted their academic performance and wellbeing at the end of Fall and in the Winter.

Model Hypothesis 1 predicted that self-concept, goal, and social fit would be moderately correlated with each other. In partial support of my prediction, I found that self-concept, goal, and social fit were all significantly correlated with each other but that they were all strongly, rather than moderately, correlated with each other. This finding contradicts the expectation in the S'FICE model that all three types of fit are only slightly related to each other and suggests that perhaps students who experience high levels of one type of fit are more likely to experience higher levels of the other types of fit.

Model Hypothesis 2 predicted that all types of fit would uniquely predict engagement. However, the multiple linear regression tests revealed that none of the types of fit, nor their interaction, significantly predicted engagement. This was probably due to the large correlations among the different types of fit. Analyses assessing the relationship

between each type of fit and engagement while accounting for all three types of fluency revealed more interesting results. Both self-concept fit and goal fit showed a significant association with engagement when they were entered as the only predictor variable with the three types of fluency as mediators. However, social fit did not have a significant association with engagement. This finding suggests that some modifications may be needed in the assumptions of the S'FICE model. Although feeling as if one can be oneself in college (self-concept fit) and feeling as if one can pursue one's personal goals in college (goal fit) were associated with high engagement with one's academic activities, as the model assumes, feeling as if one belongs among others in college was not associated with such engagement.

Model Hypothesis 3 predicted significant relationships between self-concept fit and cognitive fluency, goal fit and motivational fluency, and social fit and interpersonal fluency. Both the prospective path model and the combined serial and parallel multiple mediator model confirmed these relationships, thus providing support for these assumptions of the S'FICE model that each type of fit is significantly associated with its respective type of fluency. However, the results also indicated that self-concept, goal, and social fit are related to other types of fluency in addition to their theorized type of fluency. Thus, the results for Model Hypothesis 3 push for the acknowledgment that the relationships between individual types of fit and fluency may be more complicated than previously thought.

Model Hypothesis 4 predicted that each type of fit had a significant indirect association with engagement. The parallel multiple mediator models and prospective path models both revealed some support for Model Hypothesis 4 but differed somewhat in their results. Both types of models found that self-concept fit showed an indirect relationship to engagement through both cognitive and motivational fluency. However, whereas the

prospective path models showed that goal fit only related to engagement through motivational fluency and through its direct relationship to engagement, the parallel multiple mediator models showed that goal fit also related to engagement through cognitive fluency. The largest distinction was found regarding social fit. The parallel multiple mediator models found that social fit related to engagement through motivational fluency, but the prospective path models showed that social fit related to engagement through cognitive fluency. It seems likely that these differing findings arose because the prospective path models took into account relationships that the parallel multiple mediator models did not, and also ignored certain relationships that the parallel multiple mediator models took into account. In the prospective path models, the correlations between all three different types of fit were accounted for, whereas in the parallel multiple mediator models only one type of fit was entered as a predictor. Furthermore, in the prospective path models, the paths from goal fit to cognitive and interpersonal fluency and the path from social fit to motivational fluency were not calculated, whereas in the parallel multiple mediator models, all possible paths between the three types of fit and fluency were calculated. Similarly, in the prospective path models, the direct paths between self-concept and social fit to engagement were not calculated, whereas in the parallel multiple mediator models, each direct path from each type of fit to engagement was calculated. Lastly, whereas the parallel multiple mediator models are restricted to fit, fluency, and engagement, the prospective path models encompassed all variables including the dependent variable of wellbeing or GPA. Thus, the prospective path models fit the data better. However, both models showed that self-concept fit, goal fit, and social fit all had significant indirect relationships with engagement. Although these pathways were more complex than predicted by the S'FICE model (for instance, self-concept fit was

indirectly related to engagement via each of the three types of fluency), these results were still consistent with the hypothesis that the three fits are related to engagement via fluency. Importantly, goal fit was significantly related to engagement both directly, and indirectly via motivational fluency. This suggests that goal fit has a particularly strong connection to engagement.

Model Hypothesis 5 predicted that there would be a strong correlation between engagement and academic performance. The results partially supported this hypothesis, as a significant correlation was found between engagement and performance, although the correlation was smaller than expected. Thus, although I confirmed the prediction that engagement was related to academic performance, the relationship between them was not as strong as I expected.

Model Hypothesis 6 assessed whether each of the types of fit separately and indirectly predicted academic performance. None of the combined serial and multiple parallel mediator models supported the sub-hypotheses of Model Hypothesis 6, but both prospective path models provided support for them. As mentioned above, the better success of the prospective path models may be due largely to their greater fit to the data, compared to the combined serial and parallel multiple mediator models. The prospective path models also provided evidence as to why the combined serial and multiple parallel mediator models did not support the sub-hypotheses. First, self-concept fit was found to significantly predict academic performance only when its indirect paths to academic performance via motivational and interpersonal fluency, in addition to the theorized cognitive fluency, were taken into account. Thus, self-concept fit was associated with engagement (and therefore academic performance) via its association with all three kinds of fluency, not just cognitive

fluency, although this indirect relationship relied mostly on the significant direct relationships between cognitive and motivational fluency to engagement (interpersonal fluency was not significantly related to engagement). Second, goal fit was found to have a significant relationship with academic performance only when two indirect links were taken into account. Goal fit was significantly associated with academic performance via motivational fluency and engagement (as theorized) and via an indirect path that linked it directly to engagement (bypassing motivational fluency). Third, social fit was found to be significantly associated with academic performance once its indirect path to academic performance via cognitive fluency was taken into account in addition to the theorized indirect path via interpersonal fluency. Thus, the discrepancy between the combined serial and multiple parallel mediator models and the prospective path model stems from the specific new pathways that the latter implemented in order to account for pathways that were not theorized by the S'FICE model. Whereas the prospective path model implemented specific new pathways and did not calculate others (e.g., the direct relationship between self-concept fit and engagement), the combined serial and parallel multiple mediator model calculated every single possible pathway and did not take into account the correlation between self-concept, goal, and social fit. These results indicated that although in general the three types of fit are associated with academic performance via the three types of fluency and engagement, both self-concept and social fit seem to have connections with additional types of fluency that were not expected by the S'FICE model. In addition, goal fit had a strong connection to academic performance, both via motivational fluency and engagement, and only via engagement.

Model Hypothesis 7 predicted a significant and strong correlation between engagement and wellbeing. Although the correlational analysis confirmed this positive and significant relationship, these results were not supported by the prospective path model with wellbeing as the dependent variable. This may be because when wellbeing and engagement are the only variables being tested, they have a strong relationship, which is then weakened in a more complex model by the presence of other variables that may have stronger separate ties to engagement (e.g., motivational fluency) and wellbeing (e.g., social fit). Further support for this explanation emerged in the analyses for Model Hypothesis 8.

Model Hypothesis 8 tested the full model hypothesis regarding wellbeing as the dependent variable. Although the combined serial and parallel mediator model did not support the sub-hypothesis that self-concept fit was indirectly associated with wellbeing via cognitive fluency and engagement, the prospective path model confirmed this prediction. However, self-concept fit was not uniquely related to wellbeing via cognitive fluency and engagement, as the hypothesis suggested. Instead, the model indicated that self-concept fit had a significant indirect effect on wellbeing only when the indirect pathways of self-concept fit to wellbeing via cognitive, motivational, and interpersonal fluency were taken into account, but that this indirect relationship was mostly driven by the relationship between self-concept fit and motivational fluency (because cognitive and interpersonal fluency were not related to wellbeing). Thus, the prospective path model suggested that the relationship between self-concept fit and wellbeing was somewhat more complicated than hypothesized by the S'FICE model. The sub-hypothesis that goal fit indirectly predicted wellbeing similarly received no support from the combined serial and parallel mediator model but did receive support from the more complex prospective path model. In this case, however, the

prospective path model indicated relatively close support for the S'FICE model's predictions, with goal fit related to wellbeing via motivational fluency, which had a direct relationship with wellbeing. The sub-hypothesis regarding the indirect effect of social fit on wellbeing also received mixed support from the two models. In this case, the combined serial and parallel mediator model supported the hypothesis that social fit was indirectly related to wellbeing, although it indicated that the only significant indirect relationship was via motivational fluency and engagement, which contradicted the expectations of the S'FICE model. The results of the prospective path model also contradicted the expectations of the S'FICE model, showing that the indirect relationship of social fit to wellbeing was not significant. However, this model also made clear that the indirect effect of social fit to wellbeing was overshadowed by the direct relationship between social fit and wellbeing. Thus, contrary to my expectations, social fit actually directly predicted wellbeing, rather than indirectly predicting it via interpersonal fluency and engagement.

Thus, the prospective path models were able to confirm many of the Model Hypotheses, while adding to the complexity of the initially theorized S'FICE model. Most notably, all three types of fit indirectly predicted academic performance, although only goal fit predicted academic performance via the predicted path of motivational fluency and engagement. Self-concept fit and social fit both predicted academic performance via types of fluency that they were not expected to be related to. Goal fit was also found to have a strong direct relationship on engagement that was not captured by its indirect relationship to engagement through motivational fluency. In terms of wellbeing, all three types of fit were found to predict wellbeing. As with academic performance, only goal fit predicted wellbeing somewhat along its theorized path through the mediator of motivational fluency. However,

engagement was not found to mediate the relationship between fluency and wellbeing. Rather, motivational fluency directly predicted wellbeing and both self-concept fit and goal fit indirectly predicted wellbeing via the mediator of motivational fluency. Another surprising finding was that social fit was found to directly predict wellbeing and thus did not have a significant indirect relationship with wellbeing.

Comparisons of the predictive ability of constructs measured in the S'FICE instrument to other instruments previously used to predict academic performance were also informative regarding the usefulness of the S'FICE model. The comparison on academic performance revealed that the goal fit component of the S'FICE instrument had the strongest correlation and the strongest predictive relationship with academic performance, and no other construct (including those designed to assess various forms of goal fit, such as cultural mismatch) significantly increased the variance in academic performance explained. This analysis did indicate that other measures may be stronger at predicting academic performance than self-concept fit and social fit. This contradicts the assumption that the entire S'FICE instrument may be better than other instruments at predicting academic performance. However, it is promising that goal fit as measured in the S'FICE instrument predicted academic performance most strongly.

Exploratory analyses of S'FICE instrument's ability to predict wellbeing compared to other instruments revealed similarly promising results. Social fit had both the strongest correlation coefficient and strongest predictive association with wellbeing. However, adding belonging uncertainty to social fit significantly improved my ability to predict well-being, although social fit remained the stronger predictor of wellbeing in this situation. Once again,

this analysis showed that although not all three kinds of fit predicted wellbeing better than any other instrument, social fit was the best predictor of wellbeing among other instruments.

Overall, then, Study 4 provided support for several of the Model Hypotheses while also indicating some potential changes to how the S'FICE model was initially conceptualized. The results of Study 4 suggest that self-concept and social fit may affect multiple kinds of fluencies more broadly than originally conceptualized, while goal fit seems to affect only motivational fluency, consistent with the original model. In terms of predicting academic performance, Study 4 indicated that self-concept fit affected both cognitive and motivational fluency and social fit affected cognitive fluency. Engagement also emerged as a mediator in predicting academic performance for all three types of fit, since both cognitive and motivational fluency affected engagement. In terms of predicting wellbeing, both self-concept and goal fit affected motivational fluency, which in turn directly affected wellbeing (bypassing engagement), whereas social fit directly affected wellbeing (bypassing both fluency and engagement). Therefore, in predicting wellbeing, I found that engagement was not a mediator for any of the three types of fit. Thus, engagement may not be an essential aspect of the pathway from fit to wellbeing, since motivational fluency and social fit showed direct relationships with wellbeing that bypassed engagement. In general, Study 4 provided interesting support for a more complex S'FICE model that could help better predict the academic performance and wellbeing of UR students.

XI. Section 10: General Discussion

Despite increasing enrollment, UR students still underperform in college relative to their peers. Although several theories have been proposed to explain this academic gap, these theories remain theoretically independent from one another. The S'FICE model was

developed in order to form a more comprehensive understanding of UR students' academic performance in college. Based on the SAFE model (Schmader & Sedikides, 2018), the S'FICE model (see Figure 2) originally predicted that self-concept fit (feeling like you can be yourself in college), goal fit (feeling like you can pursue personally important goals in college), and social fit (feeling belonging among your peers) would be distinct but related constructs that related to only their respective type of fluency, cognitive (an ease in concentrating on tasks), motivational (an ease in pursuing goals), and interpersonal (an ease in forming friendships), respectively. All these types of fluencies, in turn, were predicted to relate to engagement and thus to academic performance.

The main goal of this series of studies was to validate the S'FICE model. Using correlational evidence from Study 2 and 3, I showed that self-concept, goal, and social fit significantly predicted both academic performance and (an exploratory dependent variable) wellbeing. In Study 2, conditions were experimentally manipulated so that participants experienced different levels of self-concept, goal, and social fit with regards to their ideal career, and their expectations of engagement in that career were assessed. In Study 4, participants first responded to the S'FICE instrument, fluency measures, and engagement measures regarding their academic environment, and I accessed their GPA scores one month afterwards to measure academic performance. As an extension of the S'FICE model, I also assessed participants' well-being approximately two months later. Whereas Study 2 provided an experimental test of the assumptions of the S'FICE model, Study 4 provided correlational and longitudinal evidence for the model.

In order to measure students' fit to college in testing the S'FICE model, I also developed and validated the S'FICE instrument in the course of two studies (Study 1 and Study 3).

A. Measuring S'FICE constructs: The S'FICE instrument

After following the current guidelines for scale development (AERA et al., 2014), I developed an original S'FICE instrument of 34 items, 13 of which assessed self-concept fit, 9 of which assessed goal fit and 12 of which assessed social fit in an academic environment. Instrument validation analyses showed that this scale produced responses that best fit a model that differentiated among self-concept, goal, and social fit, as the S'FICE model suggested. However, I also found that about 20% of items failed to elicit responses that appropriately distinguished participants who had overall lower levels of fit from those who had generally higher levels of fit, and about 12% of items showed worse than average ability to measure participants' fit to college. Thus, after Version 1 of the S'FICE instrument was used in Study 2 to empirically test the assumptions for the S'FICE model regarding fit, fluency, and engagement, I engaged in a second round of construct development, modifying or removing problematic items.

This resulted in Version 2 of the S'FICE instrument that was significantly shorter than the previous version (20 items compared to 34) with 8 items assessing self-concept fit, 6 items assessing goal fit, and 6 items assessing social fit in an academic environment. Instrument validation analyses showed that Version 2 of the instrument again appropriately differentiated among the constructs of self-concept, goal, and social fit in college. Fewer items failed to correctly diagnose overall fit to college, and fewer items showed worse fit

than average to the model. Thus, Version 2 of the S'FICE instrument showed better evidence of validly measuring self-concept, goal, and social fit in the academic environment.

The main advantage of the second iteration of the S'FICE instrument was its shorter length: fewer items meant that students' levels of self-concept, goal, and social fit could be measured with this instrument in a shorter span of time. My goal in developing the S'FICE instrument was to create an instrument that could be easily administered by colleges to measure the fit of their UR students to their college environment. This measure, provided that it predicted their academic performance (according to the assumptions of the S'FICE model), could then be used to direct UR students to interventions specifically designed to improve the particular fit they were found lacking in (for instance, a student with high social fit but low goal fit may require different help than vice-versa. In order for the S'FICE instrument to be used in this manner, it was important to create a short, easy to use instrument. I considered Version 2 of the S'FICE instrument, given its support of the Instrument Hypotheses and its relative brevity, to be ideally suited for this purpose.

B. Testing the assumptions of the S'FICE model

The correlational evidence gathered in Study 2 and 3 indicated that the original S'FICE model proved too narrow of an interpretation of the psychological mechanisms at work, as these studies showed evidence of more complicated pathways between fit, fluency, engagement, academic performance, and wellbeing. However, the core framework proved fruitful as I was able to show that self-concept, goal, and social fit predicted both academic performance and wellbeing.

1. The nature and relationships of the three types of fit

Central to the S'FICE model is the assumption (Model Hypothesis 1) that self-concept, goal, and social fit are moderately inter-related but ultimately distinct concepts. Study 2 found moderate correlations between self-concept/goal and goal/social fit, but a strong correlation between self-concept and social fit (the correlation coefficient exceeded .3). Study 4 then found that all three types of fit had significantly larger correlations with each other than expected[13]. I argue that finding these strong correlations between self-concept, goal, and social fit scores indicate that the assumptions of the S'FICE model may need to be adjusted, and that self-concept, goal, and social fit are more related than previously anticipated. UR college students who feel that they can be themselves in college (i.e., have high self-concept fit) are also probably more likely to feel like they can pursue their personal goals in college (i.e., have high goal fit) and are probably more likely to feel belonging among others in college with them (i.e., have high social fit).

This does not, however, suggest that these three different types of fit should be treated as interchangeable or that students' S'FICE fit scores should be interpreted via averages. As the final test of the S'FICE instrument revealed in both Study 1 and Study 3, students' average S'FICE scores were often not indicative of their individual self-concept, goal, and social fit scores. Furthermore, when testing the Model Hypotheses of the S'FICE instrument, self-concept, goal, and social fit behaved very differently from one another in predicting both academic performance and wellbeing. Thus, both evidence from the test of the S'FICE

[13] Although these findings may suggest that Version 2 of the S'FICE instrument does not measure self-concept, goal, and social fit as accurately as Version 1 of the S'FICE instrument, I argue otherwise. The multidimensional Rasch model analysis on Version 2 of the S'FICE instrument showed that this version of the instrument supported the Instrument Hypotheses somewhat better than Version 1 of the S'FICE instrument. Furthermore, Version 2 of the S'FICE instrument fully supported Instrument Hypothesis 2, showing that participants responded to self-concept, goal, and social fit items as separate constructs (thus allowing for a three-dimensional model to fit the data better than a unidimensional model).

instrument and from the test of the S'FICE model indicate that these three types of fit need to be treated as unique from one another due to their distinct downstream academic effects, despite their large correlations. Therefore, although interventions designed to increase self-concept fit, for example, may inadvertently also increase goal fit and/or social fit, students' fit to the college environment should always be measured by referring to their individual self-concept, goal, and social fit scores, rather than their average S'FICE score.

2. The relationships between fit and engagement

Also central to the S'FICE model is the assumption (Model Hypothesis 2) that each type of fit has a unique relationship with engagement when the other types of fit were controlled for. This assumption also means that people who experience higher levels of all three types of fit show higher engagement than those who experience higher levels of just one type of fit. The experimental results of Study 2 showed some support for this hypothesis, as participants who were manipulated to feel that they had higher levels of self-concept, goal, and social fit showed greater engagement than participants who were manipulated to think that they had higher levels of only one type of fit, goal fit. However, both Study 2 and Study 4 failed to provide correlational support for this hypothesis, as they both indicated that all three types of fit showed huge overlap in the variance that they predicted in engagement. In both cases, this may have been due to the elevated correlations among the three different types of fit. Thus, the S'FICE model assumption that each type of fit has a unique relationship with engagement when accounting for the other types of fit was not supported.

Instead, I found that when each type of fit was considered separately, both self-concept and goal fit had significant relationships with engagement. These findings emerged in a statistical model that considered one type of fit (self-concept fit in the first model and

goal fit in the second model) as the predictor, the three types of fluency as mediators, and engagement as the dependent variable. Thus, I argue that the assumptions of the S'FICE model again should be adjusted. First, feeling as if you can be true to yourself (self-concept fit) and feeling as if you can pursue your personal goals in college (goal fit) appear to be closely tied to feeling engagement with academic work. However, these two types of fit do not have unique enough relationships with engagement that considering either of them alongside the other explained significantly more variance in engagement. Second, feeling belonging among your peers (social fit) does not appear to be tied as closely to feeling engagement with academic work. This may suggest that it is possible for students who do not feel as if they belong socially among their peers to nevertheless feel engaged with academic work. Thus, to the crucial question of what kind of fit predicts academic engagement, self-concept fit and goal fit appear to be more important than social fit.

3. The relationships between fit and fluency

The third central assumption of the S'FICE model is that self-concept fit is related only to cognitive fluency, goal fit only to motivational fluency, and social fit only to interpersonal fluency (Model Hypothesis 3). Although both Study 2 and 3 found self-concept fit to be related to cognitive fluency and goal fit to be related to motivational fluency, both studies also found these relationships not to be unique: self-concept fit was related to all three types of fluency in Study 4, and goal fit was related to both motivational and interpersonal fluency in Study 2 and to all three fluencies in Study 4. Social fit was even more problematic, as it was related to cognitive (rather than interpersonal) fluency in Study 2 and to all fluencies in Study 4.

These findings suggest again that the S'FICE model's assumptions may be too restrictive. Although self-concept, goal, and social fit are distinct types of fit to college, their overlap may affect their associations with fluency in general, rather than the three specific types of fluency assumed by the S'FICE model. Once again, this does not suggest that students' fit to college should be treated as a single construct - as noted above, the three types of fit predicted academic performance and wellbeing in unique ways. Although all three types of fit appear to relate to all three types of fluency, the prospective path models that predicted academic performance and wellbeing using fit, fluency, and engagement, indicated that each type of fit had unique relationships with fluency, engagement, academic performance, and wellbeing, paths that would not have been apparent if all three types of fit had been reduced to a mean score. These results also do not suggest that fluency should be reduced to an average across the three types of fluency. Evidence for this argument arises in testing out the larger model, where motivational fluency, in particular, emerged as having unique connections with fit, engagement, and wellbeing, and interpersonal fluency was found to have no relationships with engagement, academic performance, or wellbeing.

4. The relationship between fit and engagement via fluency

The fourth central assumption to the S'FICE model is that each type of fit is related to engagement via its respective type of fluency (self-concept fit is related to engagement via cognitive fluency; goal fit is related to engagement via motivational fluency; social fit is related to engagement via interpersonal fluency; Model Hypothesis 4). Study 2 found support only for goal fit being indirectly related to engagement through motivational fluency, although it also found goal fit to be indirectly related to engagement through interpersonal fluency.

Study 4 provided more support for the fourth assumption, but once again challenged the restrictive pathways outlined by the S'FICE model. The model predicting academic performance found that each type of fit was significantly indirectly associated with engagement. However, self-concept fit was associated with engagement via both cognitive fluency (as theorized) and motivational fluency (unexpected). Goal fit was associated with engagement only via motivational fluency, as theorized, but also had an unexpected direct relationship with engagement that was not captured by the indirect relationship through motivational fluency. Social fit was associated with engagement only via cognitive fluency. In the case of both self-concept fit and social fit, these variables were directly associated with interpersonal fluency too, but interpersonal fluency was not associated with engagement.

Therefore, these results suggest that although all three types of fit have indirect relationships with engagement, only cognitive and motivational fluency directly affect engagement. Interpersonal fluency does not appear to play a role in affecting engagement. Thus, in terms of what types of fluency are crucial in affecting engagement, cognitive and motivational fluency appear to be more important than interpersonal fluency.

5. The relationship between engagement and academic performance

The fifth central assumption of the S'FICE model was that engagement would have a significant and strong relationship with academic performance (Model Hypothesis 5). Although engagement and academic performance were significantly correlated, the correlation was small, suggesting that there may be other variables that account for the variance in academic performance.

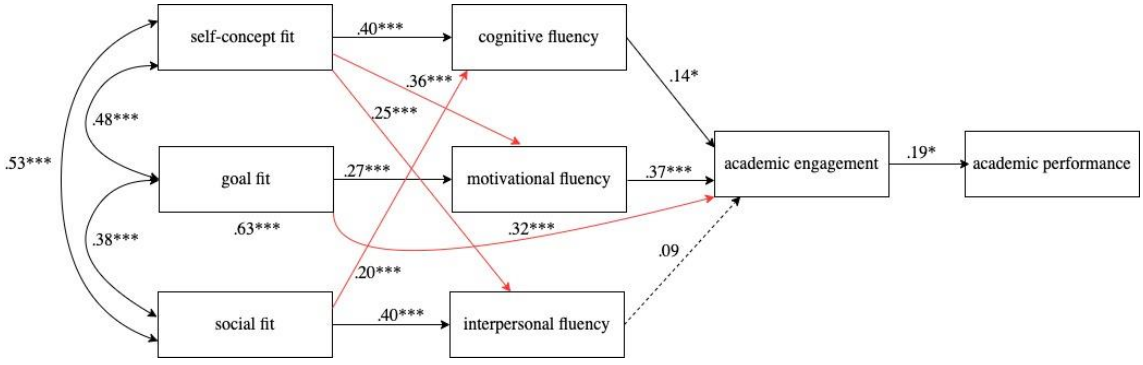
6. The relationship between fit and academic performance via fluency and engagement.

The sixth central assumption of the S'FICE model is that first, each type of fit is related to engagement via its respective type of fluency (as described above) and second, that fit was related to academic performance through those respective fluencies and engagement (Model Hypothesis 6). The first of these assumptions received very little experimental and correlational support from Study 2 or from the parallel multiple mediator analysis in Study 4.

However, the prospective path model predicting academic performance from the three types of fit, fluency, and engagement provided more insight (see Figure 20). Self-concept fit had a significant indirect relationship with engagement, but only once both its indirect pathways were accounted for via cognitive and motivational fluency (it was also related to interpersonal fluency, but interpersonal fluency was not related to engagement). Goal fit related to engagement via its hypothesized motivational fluency, but goal fit was also directly related to engagement. Finally, social fit was significantly indirectly related to engagement but via cognitive fluency (again, social fit was also related to interpersonal fluency, which in turn was not related to engagement).

Figure 20

The Only GPA model with implemented modification indices



Note. The pathways between constructs that were theorized by the S'FICE model are indicated with black lines and the pathways added through the analysis of the modification

indices are indicated with red lines. Significant relationships are indicated with unbroken lines and non-significant relationships are indicated with dotted lines. * $p < .05$, *** $p < .001$

Therefore, the prospective path model provided further modifications of the S'FICE model. These results suggested that not only are self-concept and social fit related to other types of fluency, but that the relationships between all types of fit with engagement are more complex than previously theorized due to these complex inter-relationships. Self-concept fit (feeling like you can be yourself in college) appears to relate to engagement in the broadest manner, given that it is related to engagement through both cognitive and motivational fluency. Perhaps feeling as if you can be yourself influences all aspects of your perception, helping you concentrate better (cognitive fluency) and pursue tasks better (motivational fluency), both of which allow you to engage more in your academic activities. Social fit, or the feeling of belonging among your peers, seems to affect engagement only via being able to concentrate better on tasks (cognitive fluency). Although feeling belonging among your peers is not directly related to feeling academically engaged, it can increase your engagement by improving your ability to concentrate on tasks, which then directly relates to engagement. The effect of feeling a sense of belonging on the ability to concentrate on tasks may seem counterintuitive at first glance, however, this effect may be attributable to the fact that students who experience social belonging may spend less energy searching for or fretting about belongingness, which in turn may leave them more cognitive resources to bring to bear on academic tasks (Schmader & Johns, 2003).

These findings have obvious implications for the sixth assumption, that the different kinds of fit relate to academic performance through their respective fluencies and engagement. As noted, all three types of fit were indirectly related to engagement through a

complex web of the multiple types of fluencies just described. Moreover, the types of fit were only indirectly related to academic performance via engagement and did not have direct relationships with academic performance. In addition, only cognitive and motivational fluency had significant direct relationships with engagement and significant indirect relationships with academic performance. Thus, findings on the sixth assumption suggest that self-concept fit indirectly relates to academic performance via cognitive and motivational fluency which both have direct relationships with engagement that in turn affects academic performance. Goal fit indirectly relates to academic performance via both its indirect relationship to engagement through motivational fluency and its direct relationship with engagement that in turn, again, directly affects academic performance. These relationships suggest that feeling as if you are pursuing your personal goals in college (goal fit) can lead directly to feeling greater engagement with your work, as well as increasing the ease of pursuing goals in college (motivational fluency), which in turn also improves engagement with your work. Finally, findings suggest that social fit has an indirect relationship to academic performance through its direct relationship with motivational fluency which in turn has a direct relationship with engagement that in turn affects academic performance.

Thus, although fit to the college environment does indirectly predict academic performance via fluency, the specific relationships between types of fit and types of fluency need to be expanded and the direct relationship between goal fit and engagement needs to be acknowledged.

7. Predicting academic performance with the S'FICE model: Theoretical conclusions

My studies provided correlational results to confirm that the three types of fit do indeed indirectly predict academic performance. Thus, in testing the original S'FICE model

that predicted academic performance, my studies revealed that, first of all, students who feel like they can be themselves in college (had self-concept fit) are likely to feel an ease in pursuing their goals (motivational fluency) in addition to feeling an ease in concentrating on their tasks (cognitive fluency), both which then lead to them feeling greater engagement in their academic work, and therefore showing greater academic performance. Secondly, students who feel like they can pursue personally important goals (goal fit) are likely to feel an ease in pursuing their goals (motivational fluency) which then leads to greater engagement and improved academic performance, in addition to the direct impact on engagement that goal fit delivers on its own. Third, students who feel belonging in college (social fit) are likely to feel an ease in concentrating on their tasks (cognitive fluency) which in turn leads to increased engagement and academic performance. Thus, my results call for acknowledging the shared variance between self-concept, goal, and social fit, the relationships from self-concept fit to motivational and interpersonal fluency (although the relationship with interpersonal fluency was not related to the indirect relationship to engagement) and social fit to cognitive fluency, as well as the direct relationship from goal fit to engagement.

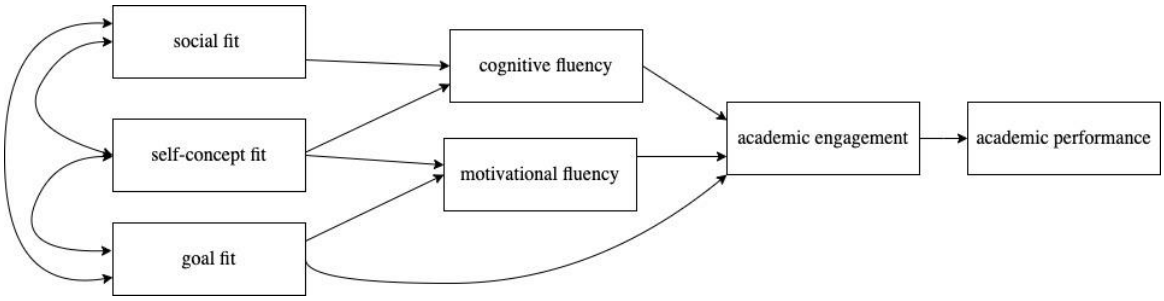
Another major difference in my results compared to the original S'FICE model centered on the relevance of interpersonal fluency in the model predicting academic performance. Although both self-concept fit and social fit showed direct relationships with interpersonal fluency, interpersonal fluency was not related to engagement nor academic performance, suggesting that it may not be a necessary component of the S'FICE model.

A new theoretical model reflecting the pathways that the results of my studies suggest being the most important in terms of predicting academic performance is depicted in Figure 26. As indicated by Figure 26, I theorize that self-concept fit affects both cognitive and

motivational fluency, goal fit affects both motivational fluency and engagement, directly, and that social fit affects cognitive fluency. Both motivational and cognitive fluency, in turn, affect engagement that in turn affects academic performance. Interpersonal fluency is removed from this model. Confirming the validity of this new model would require confirmatory studies.

Figure 26

The new proposed S'FICE model for predicting academic performance



8. The relationship between engagement and wellbeing

In an extension of reasoning about the S'FICE model, I predicted that S'FICE variables would also predict wellbeing, which was entered as an exploratory variable. First, my hypothesis assumed that engagement was significantly and strongly related with wellbeing (Model Hypothesis 6). These variables were strongly and significantly correlated. However, when other variables were accounted for, the relationship between engagement and wellbeing diminished.

9. Relationships among fit, fluency, engagement, and wellbeing

Next, I made some exploratory predictions that fit, fluency and engagement could be used to predict students' wellbeing in addition to their academic performance. My eighth

central assumption (Model Hypothesis 8) was that each type of fit would predict wellbeing through its respective type of fluency and engagement.

The most surprising finding was that engagement was not directly related to wellbeing (see Figure 22). Rather, motivational fluency had a direct effect on wellbeing, bypassing engagement. The other types of fluency, cognitive and interpersonal, had neither direct nor indirect relationships with wellbeing. Thus, only motivational fluency mediated the relationship between fit and wellbeing. This finding suggests that feeling that you can be yourself in college (self-concept fit) and that you can pursue your personal goals in college (goal fit) appear to positively influence wellbeing by increasing students' perceptions of motivational fluency (the ease in pursuing goals), which only then improves their wellbeing. The relationship between motivational fluency and wellbeing may be due to UR students perceiving college as a steppingstone to greater opportunities (Association of Public and Land-Grant Universities, 2016) and therefore being likely of experiencing wellbeing if they felt a sense of ease in pursuing their college related goals.

The second interesting finding was that social fit had a direct effect on wellbeing, bypassing fluency and engagement. Thus, feeling a sense of belonging (higher social fit) is also tied to increased wellbeing, suggesting that UR students could benefit from feeling socially fulfilled in the college context, in addition to perceiving an ease in their ability to pursue goals.

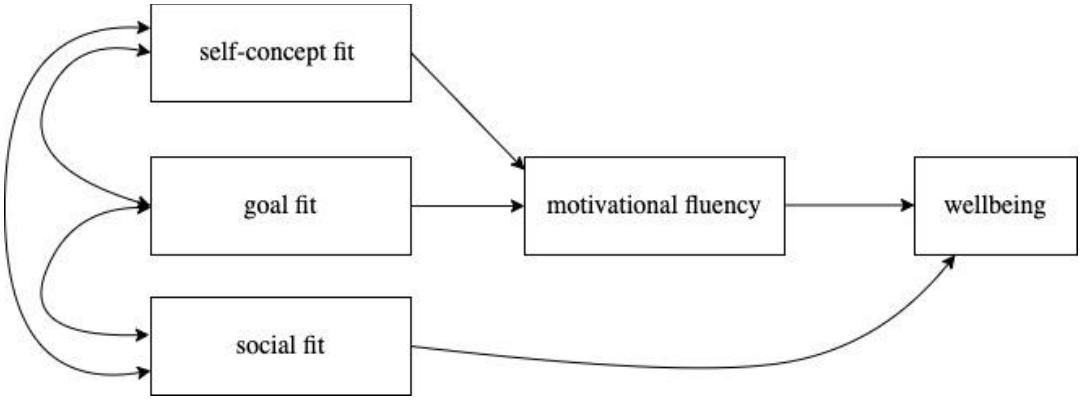
Thus, S'FICE variables seemed to predict wellbeing via different pathways than how they predict academic performance. Students experiencing belonging and an ease in pursuing their goals in college seem particularly more likely to experience wellbeing in college.

10. Predicting wellbeing with the S'FICE model: Theoretical conclusions

Several theoretical implications emerged when using the S'FICE model to predict wellbeing. The three most important changes that emerged in these studies were the direct relationships between motivational fluency and social fit to wellbeing, and the lack of a relationship between engagement and wellbeing. This model also indicated that self-concept fit and social fit related to types of fluency that were not theorized by the original S'FICE model (self-concept fit related to motivational and interpersonal fluency and social fit related to cognitive fluency). However, the only indirect relationships that related to wellbeing were via motivational fluency, which had a direct relationship to wellbeing. Thus, self-concept and goal fit had indirect relationships to wellbeing through motivational fluency and social fit had a direct relationship with wellbeing. These results indicated that students who feel like they can be themselves (have self-concept fit) and students who feel like they can pursue personal goals (have goal fit) in college, both feel a greater ease pursuing goals in college (motivational fluency), which in turn leads to them experiencing greater wellbeing. On the other hand, students who experience belonging in college (have social fit) are more likely to directly experience greater wellbeing in college. The new proposed model for the S'FICE model predicting wellbeing is outlined in Figure 27. This, too, will require confirmatory analyses prior to being introduced as a new model for predicting wellbeing of UR students in college.

Figure 27

The new proposed S'FICE model for predicting wellbeing



11. Note about the correlational evidence for the S'FICE model

It must be noted that the evidence gathered on the S'FICE model in this series of studies is largely correlational. Although I experimentally manipulated self-concept, goal, and social fit in Study 2, the manipulation proved to be largely unsuccessful, because participants who received information that they had high self-concept, goal, and social fit were more likely to rate this information as accurate than were participants who were told that they had low fit in one or all three types of fit.

Therefore, all the evidence that I gathered from Study 2 and 3 in support of the S'FICE model was correlational. Study 4 provided longitudinal support for the S'FICE model, in that I was able to look at the longer-term effects of the S'FICE model on students' academic performance and wellbeing. Thus, despite the lack of a lot of experimental evidence to support the S'FICE model, I was able to gather extensive correlational evidence to provide a base for understanding how the S'FICE model predicted students' academic performance and wellbeing.

C. Comparison of the S'FICE instrument to other measures used to predict academic performance and well being

Each sub-component of the S'FICE instrument was compared to instruments designed to measure stereotype threat vulnerability, cultural mismatch, belonging uncertainty, and ambient belonging to see if the sub-components of the S'FICE instrument predicted academic performance and wellbeing better than the other well-established measurement tools. None of the other instruments were used in previous research to measure wellbeing, but I included this analysis for exploratory purposes.

The goal fit sub-component of the S'FICE instrument showed the strongest correlation with academic performance and the social fit sub-component of the S'FICE instrument showed the strongest correlation with wellbeing. I argue that this indicates the S'FICE instrument to be a viable tool to be used by colleges, because as a singular instrument it can give predictive information about students' academic performance and wellbeing, which would otherwise require the use of at least two other instruments. Thus, the preliminary evidence on the S'FICE instrument suggests that it may provide better prediction of the aspects of goal fit and social fit that lead to academic success and wellbeing. Although the aspects of academic performance assessed by the cultural mismatch approach added to those assessed by goal fit in the S'FICE approach, cultural mismatch was not a significant predictor of academic performance, therefore leaving goal fit to be the sole significant predictor of academic performance. With regards to wellbeing, only belonging uncertainty added to the predictive ability of social fit in the S'FICE model, but social fit was still the strongest predictor of wellbeing. Thus, I argue that my attempt to create an instrument that could encompass previously used instruments in order to broadly capture students' potential for academic performance and tendency to experience wellbeing was largely successful.

D. Using the S'FICE model to develop interventions for academic success and wellbeing: Practical implications

The results of these studies also offer practical implications for the improvement of UR students' academic performance and wellbeing in college and university environments. First, the S'FICE instrument was judged to have sufficient validity in measuring the levels of self-concept, goal, and social fit that UR students are experiencing in the college environment. Therefore, the S'FICE instrument can be used to evaluate the types of fit UR students are most in need of. Second, the S'FICE instrument can also be used to evaluate the success of an intervention at improving students' levels of fit, by having UR students take the S'FICE instrument after attending an intervention.

Moving beyond looking merely at the three types of fit, the findings on the S'FICE model with regards to academic performance suggest that only cognitive and motivational fluency affect engagement and academic performance. This suggests that interventions designed to directly improve these kinds of fluency may have direct positive implications for academic success. In order to identify interventions that could have direct impact on cognitive and motivational fluency, I will restate the definitions for each. Cognitive fluency is the ease with which students can concentrate on tasks. An intervention that may have a direct impact on cognitive fluency could be mindfulness, because mindfulness interventions have been shown to improve participants' ability to focus and direct attention to tasks at hand (Jensen et al., 2012). On the other hand, motivational fluency is the ease with which students can pursue goals in college. Developing a strategic mindset, which is the tendency to contemplate what you can do to pursue your goals, has been shown to improve students' ability to more easily pursue their goals (Chen et al., 2020). Therefore, an intervention that

focused on helping UR students develop a strategic mindset may directly improve their motivational fluency.

Of course, one type of intervention that may well increase these kinds of fluencies are interventions designed to increase students' experience of the three types of fit, all of which appear to be related to cognitive and motivational fluency. For instance, if pairing students with a mentor similar to the student was shown to improve self-concept fit, then this intervention could be used on students found to be lacking in self-concept fit to improve their motivational and cognitive fluency in order to improve their engagement and academic performance. Of these options, interventions focused on goal fit seem particularly important, because of its direct relationships with motivational fluency and engagement. These findings support the work on cultural mismatch, which despite its name focusing on the extent to which students feel like their personal background and values match the values and goals of the college that they attend. Similarly, goal fit refers to the extent to which students feel like the goals that they pursue in college match their personal goals. In further support of this relationship between goal fit and cultural mismatch, the best predictors of academic performance in these studies were a combination of goal fit and cultural mismatch, although goal fit was the only significant predictor of academic performance of the two variables. This suggests again the importance of feeling like your personal goals align with the goals of your institution, which helps ease the pursuit of your goals and improves your engagement, contributing to greater academic performance. An intervention that could directly improve goal fit is the utility-value intervention (Harackiewicz et al., 2016), where students are asked to choose a concept that they had recently learned and to write about why this concept was personally relevant or useful to them. On the other hand, interventions of self-concept and

social fit may also have an impact on these fluencies (cognitive and motivational fluency for self-concept fit and cognitive fluency for social fit). It should be noted that social fit, the experience of feeling belonging among your peers, had the least impact on academic performance. This again suggests that interventions focused on self-concept and goal fit that had stronger relationships with motivational and cognitive fluency might be more efficient ways of closing academic performance gaps than interventions on social fit; an important consideration if resources are limited.

Student wellbeing is arguably a critical goal for colleges and universities even above and beyond its contribution to students' academic success. With that goal in mind, these studies found that only motivational fluency and social fit directly affected wellbeing. Again, the importance of ensuring motivational fluency for UR students is highlighted. Here, the findings suggest that social fit and motivational fluency may play a very important role in ensuring that mental health accompanies the road to academic success that UR students strive for in higher education.

Interpersonal fluency does not seem to be important in predicting either academic performance nor wellbeing, and engagement does not seem important in predicting wellbeing. Therefore, colleges could utilize the fluency instruments to direct resources to interventions targeting cognitive and motivational fluency, as opposed to those targeting the arguably less impactful interpersonal fluency.

E. Limitations

One limitation of this series of studies is that Version 2 of the S'FICE instrument did not fully support the three Instrument Hypotheses. However, the analyses on Version 2 of the S'FICE instrument did mostly support the key expectations of the S'FICE instrument. These

analyses confirmed that self-concept, goal, and social fit were sub-components of the construct of fit to college that needed to be considered separate from each other. They also confirmed that most of the items had scale points that appropriately differentiated students with differing levels of fit to college and that most items fit the model. Thus, despite the lack of complete support for all Instrument Hypotheses, Version 2 of the S'FICE instrument provided sufficient support to show that this instrument validly measured self-concept, goal, and social fit in the college environment.

A related limitation lies in my interpretation of how the three fluency measures behaved. I found that whereas motivational and cognitive fluency were significantly related to engagement, interpersonal fluency was not. However, it is unclear whether this assumption was unsupported due to interpersonal fluency not being as strongly related to engagement as hypothesized, or due to issues with the validity of the fluency instrument, since it was not properly validated by the original authors (A. Aday & T. Schmader, personal communication, November 20, 2018). Addressing this limitation would require conducting a series of validation and measurement development for the fluency items as I did with the S'FICE instrument.

A third limitation is that, although I validated the S'FICE instrument on multiple subgroups of UR students, in Study 2 and 3 I collected data only from Latina/o/x participants. I made this decision in an effort to reduce the number of variables that I had to control for when analyzing my data. Thus, the outcomes of Study 2 and Study 4 can be generalized only to Latina/o/x students. Future research will need to expand this study to other UR student groups to observe whether the S'FICE model operates similarly among these students as well.

Finally, Study 2 and Study 4 were both conducted on UCSB students. Thus, these results may have been affected by the institutional characteristics of UCSB. For instance, UCSB is a large public university with over 20,000 undergraduate students (UC Santa Barbara, 2022). Furthermore, a majority of UCSB students are White (31.3%; Deloitte et al., 2020) with Latina/o/x students holding second place at 23.3% (Deloitte et al., 2020). Thus, it is important to consider whether the S'FICE model would receive similar support in an institution that was significantly different from UCSB. For instance, would the S'FICE model receive similar support in a smaller private university or a community college? How much support would it receive in an institution where the majority of students are UR students or where the studied UR group made up a smaller percentage of the total students than the Latina/o/x students at UCSB? For example, in an institution smaller than UCSB, it is possible that UR students may have relatively fewer opportunities for making meaningful friendships and may therefore have leaned into other sources of wellbeing such as athletic or professional associations, thus negating the finding that social fit has a direct impact on wellbeing. Notably, UCSB's student body under-represents White students (31.3%) relative to the national average (54.3%; Hansen, 2022) and over-represents Latina/o/x students (23.3%) relative to the national average (19.3%; Hansen, 2022). Thus, the final limitation of this series of studies is that they restrict the findings on the S'FICE model to larger universities where the studied UR group made up the second largest group of students.

F. Future Directions

A helpful addition to the current set of studies would be another round of studies on the S'FICE instrument to provide further evidence of validity. Although the second round of validation for the S'FICE instrument was more promising than the first round, there were still

a few items that did not behave in the expected manner. Therefore, a third round of instrument development could help resolve these issues.

In terms of the S'FICE model, experimental tests of the S'FICE pathways would help add validity to the theoretical model. Future studies could manipulate students' sense of self-concept, goal, and social fit and examine whether this would affect their levels of fluency, engagement, academic performance, and wellbeing. However, given that correlational evidence indicates that self-concept, goal, and social fit positively relate to students' academic performance and wellbeing, the idea of experimentally manipulating students' levels of fit becomes a topic of an ethical debate. Given that much research indicates an academic gap between UR students and their peers, it would be unethical to experimentally cause UR students to have experiences that could exacerbate this academic gap. However, if the extent of the experimental impact were to be limited (for instance, if students were asked to take an inconsequential math test immediately after having their levels of fit manipulated but were thoroughly debriefed afterward) it may be possible to experimentally test the S'FICE model in a safe environment with no long-term negative impacts on UR students. Furthermore, it would be possible to conduct an ethical experimental test of the S'FICE model by experimentally manipulating conditions that cause certain students to experience higher levels of self-concept, goal, and/or social fit (rather than lower levels of these types of fit) and then comparing their responses to those of students who did not receive such a manipulation. Future experimental manipulations should also be designed with the findings of Study 2 in mind, given that the manipulation of fit to ideal career failed. It is possible that UR students' fit could be manipulated to greater success if the field was changed to something that did not directly relate to their academic performance. A possible avenue is

manipulating students' perceptions of their creativity, which could be framed as how likely a student is to excel at thinking out of the box and coming up with unique solutions to problems. Thus creativity could be framed as something unique enough that UR students would not have preconceived notions of their ability in this domain, but would also think of creativity as a factor that impacts their academic performance.

The next step in further expanding the reach of the S'FICE model is to test it on other UR students. It is important to note that the S'FICE model, or at least the best predictors of academic performance and wellbeing, may change depending on the UR group of focus, and colleges will need to make note of these changes in trying to cater to all UR students. The S'FICE instrument has already been validated with several UR groups (Black and Latina/o/x students, first-generation students, and female students in STEM) and thus can be used to test the S'FICE model with these other UR groups.

Another future direction involves a more rigorous testing of how more established concepts relate to the S'FICE model. In order to understand how stereotype threat, cultural mismatch, belonging uncertainty, and ambient belonging relate to self-concept, goal, and social fit, it would be important to experimentally manipulate the other constructs (stereotype threat, ambient belonging, cultural mismatch, and belonging uncertainty) and have students take the S'FICE instrument to examine whether the above constructs are associated with the various fits measured by the S'FICE instrument. This would help further clarify the relationships between more established constructs and the S'FICE model.

G. Conclusion

I developed and tested the Student Fit in College Environments (S'FICE) model as a framework for predicting UR college students' academic performance. To allow for the

testing of the S'FICE model, I also developed and validated the S'FICE instrument with multiple UR student groups to measure the self-concept, goal, and social fit constructs that are central to the S'FICE model. Evidence from two studies (one experimental and one longitudinal and correlational) provided consistent correlational evidence in support of the S'FICE model in predicting the academic performance and wellbeing of underrepresented Latina/o/x students, but also suggested changes to the original relationships within the model.

Confirming the predictions of the S'FICE model, each type of psychological fit was found to predict students' engagement and therefore their academic performance. However, specific aspects of fit were not uniquely related to specific types of fluency as the model originally predicted. In fact, UR students' levels of self-concept fit and social fit both predicted their cognitive fluency and their levels of self-concept fit and goal fit both predicted their motivational fluency. Both cognitive and motivational fluency in turn predicted their engagement, which in turn predicted their academic performance. Out of the three types of fit, goal fit had the strongest relationship with academic performance, because it had both an indirect relationship with engagement through motivational fluency as well as a direct relationship with engagement, thus forming two pathways in which it related to academic performance. On the other hand, social fit (feeling a sense of belonging among one's peers) was alone found to have a direct relationship with wellbeing, whereas engagement was not found to mediate the relationship between fit and wellbeing.

I also provided evidence to suggest that sub-components of the S'FICE instrument were the strongest predictors of UR academic performance and wellbeing in comparison to previously used instruments. In deepening our understanding of the psychological mechanisms underlying the complex dynamics of academic engagement and academic

performance, the lens of "goodness of fit" to college environments provides both a more comprehensive theoretical framework, as well as a potentially more accessible avenue for measurement and intervention.

My hope is that my findings of the S'FICE model can be used to close the academic performance gap between UR students and their peers, allowing for UR students to achieve their true academic potential, leading to greater UR diversity and success in both STEM and non-STEM fields.

References

1. Aday, A., & Schmader, T. (2019). Seeking authenticity in diverse contexts: How identities and environments constrain "free" choice. *Social and Personality Psychology Compass, 13*(6), 1-13.
2. American Educational Research Association (AERA), the American Psychological Association (APA), and the National Council on Measurement in Education (NCME) (2014). *Standards for educational and psychological testing*. Washington, D.C.: American Educational Research Association.
3. Andersen, E. B. (1997). The rating scale model. In W. J. van der Linden & R. K. Hambleton (Eds.), *Handbook of modern item response theory* (pp. 67-84). New York: Springer.
4. Andrich, D. (1978). A rating formulation for ordered response categories. *Psychometrika, 43*(4), 561–573. https://doi.org/10.1007/BF02293814
5. Arbuckle, J. L. (2014). Amos (Version 23.0) [Computer Program]. Chicago: IBM SPSS.
6. Armenta, B. E. (2010). Stereotype boost and stereotype threat effects: The moderating role of ethnic identification. *Cultural Diversity and Ethnic Minority Psychology, 16*(1), 94–98.
7. Aron, A., Aron, E. N., & Smollan, D. (1992). Inclusion of other in the self scale and the structure of interpersonal closeness. *Journal of personality and social psychology, 63*(4), 596.
8. Aronson, J., Fried, C. B., & Good, C. (2002). Reducing the effects of stereotype threat on African American college students by shaping theories of intelligence. *Journal of Experimental Social Psychology, 38*(2), 113–125.
9. Ashkenas, J., Park, H., & Pearce, A. (2017, August 24). *Even with affirmative action, Black and Hispanics are more underrepresented at top colleges than 35 years ago.* Retrieved from https://www.nytimes.com/interactive/2017/08/24/us/affirmative-action.html
10. Association of Public and Land-Grant Universities (2016). *How does a college degree improve graduates' employment and earnings potential?* Facts on College Costs. https://www.aplu.org/our-work/5-archived-projects/college-costs-tuition-and-financial-aid/publicuvalues/employment-earnings.html#:~:text=The%20evidence%20that%20a%20college,on%20average%20over%20their%20lifetime.
11. Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review, 84*(2), 191–215.
12. Barnett, L. A. (1991). Characterizing playfulness: Correlates with individual attributes and personality traits. *Play & Culture, 4*, 371-393.

13. Baron, R. M., & Kenny, D. A. (1986). The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology, 51*(6), 1173–1182.

14. Beilock, S. L., Rydell, R. J., & McConnell, A. R. (2007). Stereotype threat and working memory: Mechanisms, alleviation, and spillover. *Journal of Experimental Psychology: General*, *136*(2), 256–276.

15. Bellón, J. A., de Dios Luna, J., Moreno, B., Montón-Franco, C., GildeGómez-Barragan, M. J., Sanchez-Celaya, M., Díaz-Barreiros, M. A., Vicens, C., Motrico, E., Martínez-Cañavate, M. T., Oliván-Blázquez, B., Vázquez-Medrano, A., Sánchez-Artiaga, M. S., March, S., del Mar Muñoz-García, M., Moreno-Peral, P., Nazareth, I., King, M., Torres-González, F. (2010). Psychosocial and sociodemographic predictors of attrition in a longitudinal study of major depression in primary care: The predictD-spain study. *Journal of Epidemiology and Community Health, 64*(10), 874. http://dx.doi.org.proxy.library.ucsb.edu:2048/10.1136/jech.2008.085290

16. Bjorklund-Young, A. (2016, March 10). *Family income and college completion gap.* Retrieved from http://edpolicy.education.jhu.edu/family-income-and-the-college-completion-gap/

17. Blascovich, J., Spencer, S. J., Quinn, D., & Steele, C. (2001). African Americans and high blood pressure: The role of stereotype threat. *Psychological Science*, *12*(3), 225–229. https://doi.org/10.1111/1467-9280.00340

18. Blascovich, J., Spencer, S. J., Quinn, D., & Steele, C. (2001). African Americans and high blood pressure: The role of stereotype threat. *Psychological Science*, *12*(3), 225–229.

19. Bond, T. G., & Fox, C. M. (2015). *Applying the Rasch Model: Fundamental Measurement in the Human Sciences (3rd ed.)*. Mahwah, NJ: L. Erlbaum.

20. Broda, M., Yun, J., Schneider, B., Yeager, D. S., Walton, G. M., & Diemer, M. (2018) Reducing inequality in academic success for incoming college students: A randomized trial of growth mindset and belonging interventions. *Journal of Research on Educational Effectiveness, 11*(3), 317-338.

21. Camera, L. (2015, December 2). *Despite progress, graduation gaps between Whites and minorities persist.* Retrieved from https://www.usnews.com/news/blogs/data-mine/2015/12/02/college-graduation-gaps-between-white-and-minority-students-persist

22. Carver, C. S., & White, T. L. (1994). Behavioral inhibition, behavioral activation, and affective responses to impending reward and punishment: The BIS/BAS Scales. *Journal of Personality and Social Psychology*, *67*(2), 319–333. https://doi.org/10.1037/0022-3514.67.2.319

23. Chaplin, W. F., John, O. P., & Goldberg, L. R. (1988). Conceptions of states and traits: Dimensional attributes with ideals as prototypes. *Journal of Personality and Social Psychology, 54*(4), 541-557.

24. Chen, P., Powers, J. T., Katragadda, K. R., Cohen, G. L., & Dweck, C. S. (2020). A strategic mindset: An orientation toward strategic behavior during goal pursuit. *Proceedings of the National Academy of Sciences of the United States of America, 117*(25), 14066-14072. doi: 10.1073/pnas.2002529117

25. Cheryan, S., Plaut, V. C., Davies, P. G., & Steele, C. M. (2009). Ambient belonging: How stereotypical cues impact gender participation in computer science. *Journal of Personality and Social Psychology*, *97*(6), 1045–1060.

26. Cohen, G. L., Garcia, J. Apfel, N., & Master, A. (2006). Reducing the racial achievement gap: A social-psychological intervention. *Science, 313*, 1307-1308.

27. Cohen, G. L., Garcia, J., Purdie-Vaughns, V., Apfel, N., & Brzustoski, P. (2009). Recursive processes in self-affirmation: Intervening to close the minority achievement gap. *Science*, *324*(5925), 400–403.

28. Crenshaw, K. (1991). Race, gender, and sexual harassment. *s. Cal. l. Rev.*, *65*, 1467.

29. Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests. *Psychometrika, 16(3)*, 297-334.

30. Danaher, K., & Crandall, C. S. (2008). Stereotype threat in applied settings re-examined. *Journal of Applied Social Psychology, 38*(6), 1639–1655. https://doi.org/10.1111/j.1559-1816.2008.00362.x

31. Daniel, R. M., De Stavola, B. L., Cousens, S. N., & Vansteelandt, S. (2015). Causal mediation analysis with multiple mediators. *Biometrics, 71*, 1-14. 10.1111/biom.12248

32. Darlington, R. B., & Hayes, A. F. (2017). *Regression analysis and linear models: Concepts, applications, and implementation.* New York: Guilford Press.

33. Darnon, C., Jury, M., & Aelenei, C. (2018). Who benefits from mastery-approach and performance-approach goals in college? Students' social class as a moderator of the link between goals and grade. *European Journal of Psychology of Education, 33*(4), 713–726. https://doi.org/10.1007/s10212-017-0351-z

34. Deloitte, Datawheel, Hidalgo, C. (2020). *Data USA: University of California-Santa Barbara.* Data USA. https://datausa.io/profile/university/university-of-california-santa-barbara#category_student_expenses

35. Dompnier, B., Darnon, C., Meier, E., Brandner, C., Smeding, A., & Butera, F. (2015). Improving low achievers' academic performance at university by changing the social value of mastery goals. *American Educational Research Journal*, *52*(4), 720-749.

36. Elias, M. J., DeLaney, E. N., Williams, C. D., Hawa, S., Walker, C. J., Lozada, F. T., ... & Dick, D. M. (2021). Cultural Socialization and Ethnic-Racial Identity Mediated by Positive and Negative Conversations about Race: Exploring Differences among Asian American, African American, Latinx, Multiracial, and White Students. *Identity*, 1-16.

37. Elliot, A. J., & Church, M. A. (1997). A hierarchical model of approach and avoidance achievement motivation. *Journal of Personality and Social Psychology, 72*(1), 218–232. https://doi.org/10.1037/0022-3514.72.1.218

38. Elliott, E. S., & Dweck, C. S. (1988). Goals: An approach to motivation and achievement. *Journal of Personality and Social Psychology, 54*(1), 5-12.

39. Faul, F., Erdfelder, E., Lang, A.-G., & Buchner, A. (2007). G*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods, 39*(2), 175–191. https://doi.org/10.3758/BF03193146

40. Fiske, S. T. (2003). The discomfort index: How to spot a really good idea whose time has come. *Psychological Inquiry, 14*(3&4), 203-208.

41. Forbes, C. E., & Leitner, J. B. (2014). Stereotype threat engenders neural attentional bias toward negative feedback to undermine performance. *Biological psychology, 102*, 98-107.

42. Fryberg, S. A., Troop-Gordon, W., D'Arrisso, A., Flores, H., Ponizovskiy, V., Ranney, J. D., … Burack, J. A. (2013). Cultural mismatch and the education of Aboriginal youths: The interplay of cultural identities and teacher ratings. *Developmental Psychology, 49*(1), 72–79.

43. Furrer, C., & Skinner, E. (2003). Sense of relatedness as a factor in children's academic engagement and performance. *Journal of Educational Psychology, 95*(1), 148–162. https://doi.org/10.1037/0022-0663.95.1.148

44. Gloria, A. M., & Kurpius, S. E. R. (1996). The validation of the cultural congruity scale and the university environment scale with Chicano/a students. *Hispanic Journal of Behavioral Sciences, 18*(4), 533-549.

45. Goffman, E. (1959). *The presentation of self in everyday life*. New York, NY: Anchor Books.

46. Good, C., Aronson, J., & Inzlicht, M. (2003). Improving adolescents' standardized test performance: An intervention to reduce the effects of stereotype threat. *Journal of Applied Developmental Psychology, 24*(6), 645–662.

47. Good, C., Rattan, A., Dweck, C. S. (2012). Why do women opt out? Sense of belonging and women's representation in mathematics. *Journal of Personality and Social Psychology, 102*(4), 700–717.

48. Grant, H. & Dweck, C.S. (2003). Clarifying achievement goals and their impact. Journal of Personality and Social Psychology, 85, 541-553.

49. Gutman, L. M. (2006). How student and parent goal orientations and classroom goal structures influence the math achievement of African Americans during the high school transition. *Contemporary Educational Psychology, 31*(1), 44–63. https://doi.org/10.1016/j.cedpsych.2005.01.004

50. Hansen, M. (2022, April 22). *College enrollment and student demographic statistics.* Education Data initiative. https://educationdata.org/college-enrollment-

statistics#:~:text=54.3%25%20of%20college%20students%20are,has%20increased%20191.1%25%20since%201976.

51. Harackiewicz, J. M., Canning, E. A., Tibbetts, Y., Giffen, C. J., Blair, S. S., Rouse, D. I., & Hyde, J. S. (2014). Closing the social class achievement gap for first-generation students in undergraduate biology. *Journal of Educational Psychology, 106*(2), 375–389.
52. Harackiewicz, J. M., Canning, E. A., Tibbetts, Y., Priniski, S. J., & Hyde, J. S. (2016). Closing achievement gaps with a utility-value intervention: Disentangling race and social class. *Journal of Personality and Social Psychology, 111*(5), 745–765.
53. Hayes, A. F. (2012). PROCESS: A versatile computational tool for observed variable mediation, moderation, and conditional process modeling. Retrieved from http://www.afhayes.com/ public/process2012.pdf
54. Hayes, A. F., & Preacher, K. J. (2014). Statistical mediation analysis with a multicategorical independent variable. *British Journal of Mathematical and Statistical Psychology, 67*(3), 451–470. https://doi.org/10.1111/bmsp.12028
55. Herrmann, S. D., & Varnum, M. E. W. (2018). Integrated social class identities improve academic performance, well-being, and workplace satisfaction. *Journal of Cross-Cultural Psychology, 49*(4), 635–663.
56. Hong, W., Bernacki, M. L., & Perera, H. N. (2020, January 9). A Latent Profile Analysis of Undergraduates' Achievement Motivations and Metacognitive Behaviors, and Their Relations to Achievement in Science . Journal of Educational Psychology. Advance online publication. http://dx.doi.org/10.1037/edu0000445
57. Hsu, C.-S. (2013). The predictive effects of goal structure perception on achievement goal orientation, academic performance, and learning strategy: A meta-analysis of journal articles. *Bulletin of Educational Psychology, 45*(1), 63–82.
58. Jensen, C. G., Vangkilde, S., Frokjaer, V., & Hasselbalch, S. G. (2012). Mindfulness training affects attention – Or is it attentional effort? *Journal of Experimental Psychology: General, 141*(1), 106-123. http://dx.doi.org/10.1037/a0024931
59. Jorm, A. F., Christensen, H., Henderson, A. S., Jacomb, P. A., Korten, A. E., & Rodgers, B. (1999). Using the BIS/BAS scales to measure behavioural inhibition and behavioural activation: Factor structure, validity and norms in a large community sample. *Personality and Individual Differences, 26*(1), 49–58. https://doi.org/10.1016/S0191-8869(98)00143-3
60. Lareau, A. (1987). Social class differences in family-school relationships: The importance of cultural capital. *Sociology of Education, 60*(2), 73.
61. Lareau, A., & Weininger, E. B. (2003). Cultural capital in educational research: A critical assessment. *Theory and Society, 32*(5/6), 567-606.
62. Markus, K. A., & Borsboom, D. (2013). *Frontiers of test validity theory: Measurement, causation, and meaning*. Routledge.

63. Martens, A., Johns, M., Greenberg, J., & Schimel, J. (2006). Combating stereotype threat: The effect of self-affirmation on women's intellectual performance. *Journal of Experimental Social Psychology, 42*, 236-243.

64. Marx, D. M., & Roman, J. S. (2002). Female role models: Protecting women's math test performance. *Personality and Social Psychology Bulletin, 28*(9), 1183–1193.

65. Maslow, A. H. (1999). Peak-experiences as acute identity experi- ences. In A. H. Maslow (Ed.), *Toward a psychology of being* (3rd ed., pp. 113-125). New York, NY: John Wiley. (Reprinted from American Journal of Psychoanalysis, 1961, 21, 254-260)

66. Master, A., & Meltzoff, A. N. (2016). Building bridges between psychological science and education: Cultural stereotypes, STEM, and equity. *Prospects, 46*(2), 215–234.

67. Matos, L., Lens, W., Vansteenkiste, M., & Mouratidis, A. (2017). Optimal motivation in Peruvian high schools: Should learners pursue and teachers promote mastery goals, performance-approach goals or both? *Learning and Individual Differences, 55*, 87–96. https://doi.org/10.1016/j.lindif.2017.02.003

68. Murphy, T. E., Gaughan, M., Hume, R., & Moore, S. G., Jr. (2010). College graduation rates for minority students in a selective technical university: Will participation in a summer bridge program contribute to success? *Educational Evaluation and Policy Analysis, 32*(1), 70–83. https://doi.org/10.3102/0162373709360064

69. Multon, K. D., Brown, S. D., & Lent, R. W. (1991). Relation of self-efficacy beliefs to academic outcomes: A meta-analytic investigation. *Journal of Counseling Psychology, 38*(1), 30–38.

70. Murphy, M. C., & Zirkel, S. (2015). Race and belonging in school: How anticipated and experienced belonging affect choice, persistence, and performance. *Teachers College Record*, 41.

71. Musu-Gillette, L. (2015, July 30). *Education attainment differences by students' socioeconomic status.* Retrieved from https://nces.ed.gov/blogs/nces/post/educational-attainment-differences-by-students-socioeconomic-status

72. Nadler, J. T., & Clark, M. H. (2011). Stereotype threat: A meta-analysis comparing African Americans to Hispanic Americans. *Journal of Applied Social Psychology, 41*(4), 872–890.

73. Noonan, R. (2017, November 13). *Women in STEM: 2017 update.* Retrieved from http://www.esa.doc.gov/sites/default/files/women-in-stem-2017-update.pdf

74. NSC Research Center (2017, April 26). *Completing college - National by race and ethnicity - 2017.* Retrieved from https://nscresearchcenter.org/signaturereport12-supplement-2/

75. Nunnally, J. C. (1978). Psychometric theory (2nd ed.). New York: McGraw-Hill.

76. Paunesku, D., Walton, G. M., Romero, C., Smith, E. N., Yeager, D. S., & Dweck, C. S. (2015). Mind-set interventions are a scalable treatment for academic underachievement. *Psychological Science, 26*(6), 784–793. https://doi.org/10.1177/0956797615571017

77. Penfield, R. D. (2014). An NCME Instructional Module on Polytomous Item Response Theory Models. *Educational Measurement: Issues and Practice, 33*(1), 36-48.

78. Pennington, C. R., Heim, D., Levy, A. R., & Larkin, D. T. (2016). Twenty years of stereotype threat research: A review of psychological mediators. *PLoS ONE, 11*(1), 1-25.

79. Phan, H. P. (2009). Amalgamation of future time orientation, epistemological beliefs, achievement goals and study strategies: Empirical evidence established. *British Journal of Educational Psychology, 79*(1), 155–173.

80. Phan, H. P. (2010) Empirical model and analysis of mastery and performance-approach goals: A developmental approach, *Educational Psychology, 30*(5), 547-564. 10.1080/01443410.2010.491936

81. Pineda-Roa, C. A., Castro-Muñoz, J. A., & Chaparro-Clavijo, R. A. (2018). Psychometric study of the Ryff Psychological Well-Being Scales in young Colombian adults. *Psychological Thought, 16*(1), 44-55. doi: 10.11144

82. Raque-Bogdan, T. L., & Lucas, M. S. (2016). Career aspirations and the first generation student: Unraveling the layers with social cognitive career theory. *Journal of College Student Development, 57*(3), 248–62.

83. Rattan, A., Savani, K., Chugh, D., Dweck, C.S. (2015). Leveraging mindsets to promote academic achievement: Policy recommendations. *Perspectives on Psychological Science, 10*, 721-726.

84. R Core Team (2018). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. https://www.R-project.org/.

85. Redblock, B. (2020). *Ben Redblock loading GIF*. https://tenor.com/view/ben-redblock-loading-circle-gif-19361051

86. Rodríguez, B. A. (2014). The threat of living up to expectations: Analyzing the performance of Hispanic students on standardized exams. *Journal of Hispanic Higher Education, 13*(3), 191–205.

87. Ro, H. K., & Loya, K. I. (2015). The effect of gender and race intersectionality on student learning outcomes in engineering. *Review of Higher Education: Journal of the Association for the Study of Higher Education, 38*(3), 359–396.

88. Sarrasin, J. B., Nenciovici, L., Foisy, L.-M. B., Allaire-Duquette, G., Riopel, M., & Masson, S. (2018). Effects of teaching the concept of neuroplasticity to induce a growth mindset on motivation, achievement, and brain activity: A meta-analysis. *Trends in Neuroscience and Education, 12*, 22-31.

89. Schmader, T., & Johns, M. (2003). Converging evidence that stereotype threat reduces working memory capacity. *Journal of Personality and Social Psychology, 85*(3), 440–452.

90. Schmader, T., Johns, M., & Forbes, C. (2008). An integrated process model of stereotype threat effects on performance. *Psychological Review, 115*(2), 336–356.

91. Schmader, T., Hall, W., & Croft, A. (2015). Stereotype threat in intergroup relations. In M. Mikulincer, P. R. Shaver, J. F. Dovidio, & J. A. Simpson (Eds.), *APA handbook of personality and social psychology, Volume 2: Group processes.* (pp. 447–471). Washington: American Psychological Association.

92. Schmader, T., & Sedikides, C. (2018). State authenticity as fit to the environment: The implications of social identity for fit, authenticity, and self-segregation. *Personality and Social Psychology Review, 22*(3), 228-259.

93. Sherman, D. K., & Cohen, G. L. (2006). The psychology of self-defense: Self-affirmation theory. In M. P. Zanna (Ed.) Advances in Experimental Social Psychology (Vol. 38, pp. 183-242). San Diego, CA: Academic Press.

94. Sherman, D. K., Hartson, K. A., Binning, K. R., Purdie-Vaughns, V., Garcia, J., Taborsky-Barba, S., … Cohen, G. L. (2013). Deflecting the trajectory and changing the narrative: How self-affirmation affects academic performance and motivation under identity threat. *Journal of Personality and Social Psychology, 104*(4), 591-618.

95. Shih, M., Wout, D. A., & Hambarchyan, M. (2015). Predicting performance outcomes from the manner of stereotype activation and stereotype content. *Asian American Journal of Psychology, 6*(2), 117–124. https://doi.org/10.1037/a0037707

96. Sijtsma, K. (2009). On the use, the misuse, and the very limited usefulness of Cronbach's alpha. *Psychometrika, 74*(1), 107–120. https://doi.org/10.1007/s11336-008-9101-0

97. Smith, J. L., Brown, E. R., Thoman, D. B., & Deemer, E. D. (2015). Losing its expected communal value: How stereotype threat undermines women's identity as research scientists. *Social Psychology of Education: An International Journal, 18*(3), 443–466. https://doi.org/10.1007/s11218-015-9296-8

98. Statistics Solutions (2022). *Cronbach's alpha*. https://www.statisticssolutions.com/cronbachs-alpha/

99. Steele, C. M., & Aronson, J. (1995). Stereotype threat and the intellectual test performance of African Americans. *Journal of Personality and Social Psychology, 69*(5), 797-811.

100. Stephens, N. M., Brannon, T. N., Markus, H. R., & Nelson, J. E. (2015). Feeling at home in college: Fortifying school-relevant selves to reduce social class disparities in higher education: selves and social class disparities. *Social Issues and Policy Review*, *9*(1), 1–24.

101. Stephens, N. M., Fryberg, S. A., Markus, H. R., Johnson, C. S., & Covarrubias, R. (2012). Unseen disadvantage: How American universities' focus on independence

undermines the academic performance of first-generation college students. *Journal of Personality and Social Psychology*, *102*(6), 1178–1197.

102. Stephens, N. M., Hamedani, M. G., & Destin, M. (2014). Closing the social-class achievement gap: A difference-education intervention improves first-generation students' academic performance and all students' college transition. *Psychological Science*, *25*(4), 943–953.

103. Stephens, N. M., Markus, H. R., & Fryberg, S. A. (2012). Social class disparities in health and education: Reducing inequality by applying a sociocultural self model of behavior. *Psychological Review*, *119*(4), 723–744.

104. Stephens, N. M., Markus, H. R., & Phillips, L. T. (2014). Social class culture cycles: How three gateway contexts shape selves and fuel inequality. *Annual Review of Psychology*, *65*(1), 611–634.

105. Stephens, N. M., Townsend, S. S. M., Markus, H. R., & Phillips, L. T. (2012). A cultural mismatch: Independent cultural norms produce greater increases in cortisol and more negative emotions among first-generation college students. *Journal of Experimental Social Psychology*, *48*(6), 1389–1393.

106. Storms, M. D., & McCaul, K. D. (1976). Attribution processes and emotional exacerbation of dysfunctional behavior. *New directions in attribution research*, *1*, 143-164.

107. Telles, E. E., & Sue, C. A. (2009). Race Mixture: Boundary Crossing in Comparative Perspective. *Annual Review of Sociology, 35,* 129–146. http://www.jstor.org/stable/27800072

108. U.S. Bureau of Labor Statistics (2020). *Labor force statistics from the current population survey.* https://www.bls.gov/cps/cpsaat11.htm

109. U.S. Department of Education (2021). *Family Educational Rights and Privacy Act (FERPA).* U.S. Department of Education. https://www2.ed.gov/policy/gen/guid/fpco/ferpa/index.html

110. University of California, Santa Barbara (2022). *Facts and Figures.* UC Santa Barbara. https://www.ucsb.edu/about/facts-and-figures#:~:text=UC%20Santa%20Barbara's%20total%20enrollment,transfer%20class%20of%20about%202%2C453.

111. VanderWeele, T. J., & Vansteelandt, S. (2014). Mediation analysis with multiple mediators. *Epidemiological Methods, 2*(1), 95-115. 10.1515/em-2012-0010

112. Vuong, M., Brown-Welty, S., & Tracz, S. (2010). The Effects of Self-Efficacy on Academic Success of First-Generation College Sophomore Students. *Journal of College Student Development, 51*(1), 50-64.

113. Walton, G. M., & Cohen, G. L. (2007). A question of belonging: Race, social fit, and achievement. *Journal of Personality and Social Psychology, 92*(1), 82–96.

114. Walton, G. M., & Cohen, G. L. (2011). A brief social-belonging intervention improves academic and health outcomes of minority students. *Science, 331*(6023), 1447–1451.

115. Walton, G. M., & Spencer, S. J. (2009). Latent ability: grades and test scores systematically underestimate the intellectual ability of negatively stereotyped students. *Psychological Science*, *20*(9), 1132–1139.

116. Walton, G. M., & Wilson, T. D. (2018). Wise Interventions: Psychological Remedies for Social and Personal Problems. *American Psychological Association, 125*(5), 617-655.

117. Wang, X., Chan, H.-Y., Soffa, S., & Nachman, B. (2017). A Nuanced look at women in STEM fields at two-year colleges: Factors that shape female students' transfer intent. *Frontiers in Psychology. 8*(146).

118. Wilson, M. (2003). On choosing a model for measuring. *Methods of Psychological Research Online, 8*(3), 1-22.

119. Wilson, M. (2005). *Constructing Measures. An Item Response Modeling Approach*. Mahwah, NJ: Lawrence Erlbaum Associates, Inc.

120. Woodcock, A., Hernandez, P. R., Estrada, M., & Schultz, P. W. (2012). The consequences of chronic stereotype threat: Domain disidentification and abandonment. *Journal of Personality and Social Psychology, 103*(4), 635-646. doi: 10.1037/a0029120.

121. Woodcock, A., Hernandez, P. R., & Schultz, P. W. (2016). Diversifying Science: Intervention Programs Moderate the Effect of Stereotype Threat on Motivation and Career Choice. *Social Psychological and Personality Science*, *7*(2), 184–192. https://doi.org/10.1177/1948550615608401

122. Yeager, D. S., Walton, G. M., Brady, S. T., Akcinar, E. N., Paunesku, D., Keane, L., … Dweck, C. S. (2016). Teaching a lay theory before college narrows achievement gaps at scale. *Proceedings of the National Academy of Sciences*, *113*(24), E3341–E3348.

123. Zimmerman, B. J. (2000). Self-efficacy: An essential motive to learn. *Contemporary Educational Psychology, 25*, 82-91.

Appendix A: The S'FICE instrument

Each part of the instrument had the following instructions, "Please indicate how strongly you agree with each of the following statements".

Participants indicated their agreement on a 4-point Likert scale ranging from 1 Strongly Disagree to 4 Strongly Agree. There was no neutral option.

Items measuring self-concept fit

1. My family and I always assumed that I would go to college.
2. The transition to college was very difficult for me.
3. I'm more aware of things like my race, gender, financial background, etc. in classes for my major than at home.
4. I think being a student is a very big part of who I am.
5. Being a student in my major taps into who I truly am.
6. I am comfortable in my major.
7. I am basically the same person in college as I am in the place I am most comfortable in.
8. I feel out of my depth in my major.
9. When I ask questions in class I worry that they will reflect badly on me.
10. My family is just as involved in my college education as they are in other aspects of my life.
11. My true self and who I am in college are completely different.
12. I am nervous about going to professors' office hours and asking them questions.
13. I am nervous about going to TAs' office hours and asking them questions.

Items measuring goal fit

1. The goals emphasized in my major match my own goals for being in college.
2. When I'm working on my major, I feel like I'm getting closer to achieving goals that are important to me.
3. I feel like many professors and/or TAs in my major went to college for the same reasons as I did.
4. I find the coursework for my major naturally interesting.
5. I enjoy working on the coursework for my major.
6. I am happy with how coursework in my major is taught.
7. The resources available to me in college are completely useless in helping me reach my goals.
8. I plan to pursue a career that the typical successful student in my major would pursue.
9. I have seriously considered switching my major.

Items measuring social fit

1. When I am in the classes for my major, I see a lot of people who are very similar to me (in terms of things like my race, gender, financial background, etc.).
2. I wish I knew more people in my major who I could relate to, or who could relate to me.
3. I feel out of place when I sit in classes for my major and look around at the other students.
4. I feel like I need to prove to the professors and/or TAs in my major that I am JUST AS good as my classmates.
5. I avoid sharing many of my personal issues with people in college because I don't think they would understand them.

6. I know many people in college who like me for who I am.

7. At least some of my closest friends are in college with me.

8. At least some of my closest friends are in my major with me.

9. I change a lot of things about myself when I interact with other students in my major.

10. When I think about the other students in my major (friends or otherwise), I feel like I belong among them.

11. I feel like the professors and/or TA's can't relate to the struggles I experience in my major.

12. I feel like my family background and upbringing affect my social interactions in college.

Appendix B: Fit items, fluency items, and the authenticity item used by Aday and Schmader (personal communication, November 20, 2018)

Fit items

Self-concept fit

1. Even when I'm alone and doing nothing simply being at UBC makes me feel like myself
2. Just being at UBC suits the way I see myself
3. UBC feels true to who I am
4. Being at UBC brings out my true self
5. I feel at home when I'm at UBC

Goal fit

1. UBC is a place where I feel intrinsically motivated by my own goals
2. Standards of success at UBC match what I think it means to be successful
3. I often feel that UBC is a place that allows me to realize my own goals
4. My behavior at UBC is motivated by things I value
5. Classes at UBC are designed in a way that fits how I like to learn

Social fit

1. When I'm around other students on campus, I feel like I am my true self
2. I don't feel like I need to be a different person around others at UBC
3. Other students at UBC do NOT judge for being my true self
4. I never have to hide the 'real me' when I'm around others at UBC
5. I feel that people at UBC understand exactly who I am

Fluency items

Cognitive fluency

1. My ability to focus my attention on tasks has been _____ (1 Difficult - 7 Easy)
2. My concentration levels have been ___ (1 Low - 7 High)
3. I have ___ felt distracted by other thoughts or concerns (1 Never - 7 Frequently)
4. I have ___ felt self-conscious (1 Never - 7 Frequently)
5. I have ___ felt distracted by thoughts about myself (1 Never - 7 Frequently)

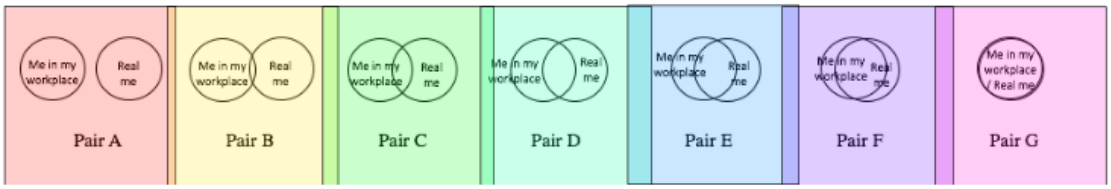
Motivational fluency

1. My ability to pursue my goals has felt ____ (1 Difficult - 7 Effortless)
2. My motivational energy has felt ___ (1 Low - 7 High)
3. I have ___ had to force myself to do things (1 Never - 7 Frequently)
4. My progress towards my goals has been ___ (1 Forced - 7 Smooth)
5. In working towards my goals, I have felt ___ (1 Hesitant - 7 Eager)

Interpersonal fluency

1. My ability to interact with others has felt ___ (1 Forced - 7 Smooth)
2. My conversations with others have felt ___ (1 Awkward - 7 Engaging)
3. I have ___ had to monitor what I say (1 Never - 7 Frequently)
4. I have ___ had to match my behaviors to what others expect of me (1 Never - 7 Frequently)
5. My interactions with others have felt ____ (1 Uncomfortable - 7 Comfortable)

Authenticity item



Note: The word "workplace" would be replaced depending on the context.

Appendix C: Interview items

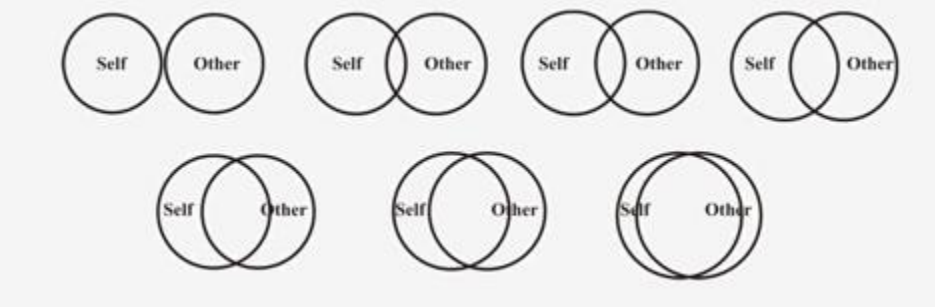
General question:

1. Can you tell me what your major (if you have one) is?

Self-concept fit

1. The next question I want to ask is a little more general. For this question, could you think about (your major/UCSB) overall. How would you define success (in your major/at UCSB)?
2. Could you describe the type of student that would typically achieve [this success/each type of success] [at UCSB/in your major]?
3. What does the word identity mean for you?
    a. [note their response and adjust next segment accordingly]
4. Thank you. Now here's my interpretation: people can have multiple identities. These are ways that people define themselves and they can be both qualities as well as memberships to certain groups. For instance, a person can define themselves as female, Latina/o/x, good at music, a hard worker, and the first in their family to go to college.
5. Do you have certain identities that you think fit well in [your major/UCSB]? Could you elaborate?
6. Do you have certain identities that you think do not fit as well in [your major/UCSB]? Could you elaborate?
7. [Inclusion of Other in Self scale (Aron, Aron, & Smollan, 1992):] Please choose the picture that best describes the relationship between who you are and the type of person who [your major/UCSB] values and thinks will be successful. Ten

separate diagrams are provided. Fill in the type of identity you have in mind (e.g. general, gender identity, etc.) and choose the picture to best describe the relationship between each identity and the type of person valued in your college/major. Fill in the blank for whether you're thinking about your college or major as well.

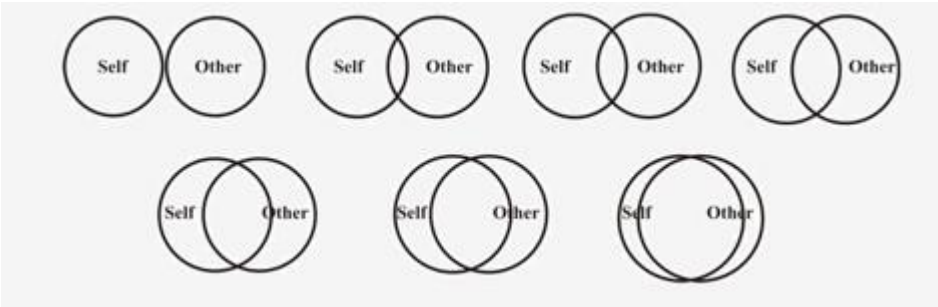


8. As a final step in this portion, I have a few agree-disagree statements, and I'd like to hear the extent to which you agree with them. [Give them a Likert scale example on a piece of paper]. As you can see, we have a 7-point scale ranging from Strongly Disagree to Strongly Agree. Please let me know what number or option you choose for each:
    a. Even when I'm alone and doing nothing, simply being in classes for my major makes me feel like myself
    b. Just being in UCSB suits the way I see myself
    c. UCSB feels true to who I am
    d. Being in UCSB brings out my true self
    e. I feel "at home" when I'm in UCSB
    f. I do NOT feel isolated from my inner self in UCSB
    g. I feel at ease with myself being in UCSB

9. Do you think these answers would change if we were discussing [your major/certain classes that you've taken] instead of UCSB in general? Can you elaborate?

Goal fit

1. Thank you so much! Now, let's move on to the next portion.
2. Let's come back to the idea of the typical successful student [in your major/at UCSB]. What sort of goals would [your major/UCSB] want such a student to have?
3. What types of resources do you think [your department/UCSB] offers to get to those goals?
4. There are so many different goals that students can have, though. What are your goals? Or in other words, what do you hope to achieve by being in [you major/UCSB]?
5. [If different for what they indicated for the typical student] And what resources does [your department/UCSB] offer for you to get to those goals?
6. [Inclusion of Other in Self scale (Aron, Aron, & Smollan, 1992)]: Again, could you choose the picture that best describes the relationship between your goals and the goals valued by [your major/UCSB].

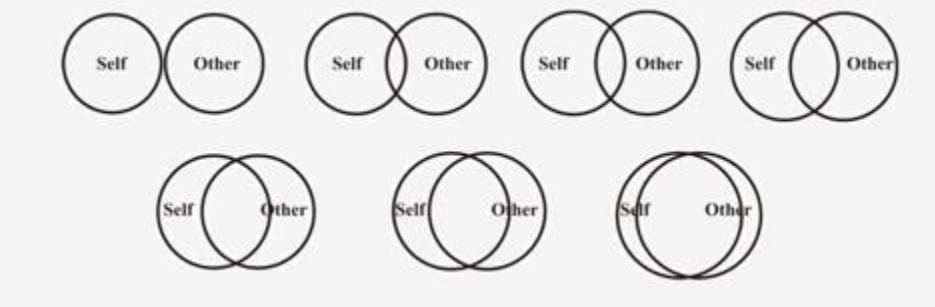


7. Again, as a final step in this portion, I have a few agree-disagree statements, and I'd like to hear the extent to which you agree with them. [Give them a Likert scale example on a piece of paper]. We have the same 6-point scale ranging from Strongly Disagree to Strongly Agree. Please let me know what number or option you choose for each:
    a. [Classes in my major are a place/UCSB is a place] where I feel intrinsically motivated by my own goals
    b. Standards of success in [UCSB/my major] match what I think it means to be successful
    c. I often feel that [my major/UCSB] allows me to realize my own goals
    d. My behavior in my classes is motivated by things I value
    e. [My major/UCSB] allows me to pursue topics and interests I am motivated to learn about
    f. When working [on my major/on my classes in UCSB] I feel like I am working toward my most prized goals

Social fit

1. Thank you! Now we are on to the final stage of our questions. What qualities and characteristics of yours emerge when you're surrounded by people you are the most comfortable with?
2. To what extent do you express these qualities and characteristics in college?
3. Does this change depending on what context we're talking about (e.g. with your roommate versus in class)? Please elaborate.

4. Let me briefly remind you of what an identity is: it's a number of ways people describe themselves and can include personality characteristics as well as group memberships. How would you describe the student body [in UCSB/ in your major] in terms of how similar they are to you in terms of their identities?
5. To what extent do you see other students in [UCSB/your major] as going through similar processes as you in college?
6. How easy do you find it to make friends in college?
7. [Inclusion of Other in Self scale (Aron, Aron, & Smollan, 1992):] Please choose the picture that best describes the relationship between you and all students in college in terms of your different identities. Again, 10 diagrams have been provided, so fill in the identity you are thinking of (e.g. racial identity) and the extent to which you see similarity between this identity and the identities of others in [UCSB/your major].



8. And finally, we have another set of agree-disagree statements, and I'd like to hear the extent to which you agree with them. [Give them a Likert scale example on a piece of paper]. We have the same 7-point scale ranging from Strongly Disagree to Strongly Agree. Please let me know what number or option you choose for each:

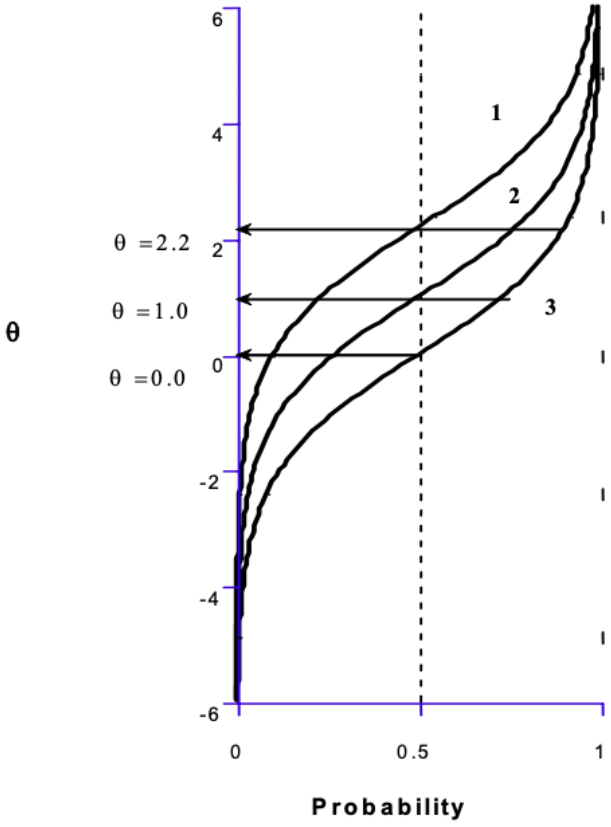
a. When I’m around other students, I feel like I am my true self
b. I don’t feel like I need to be a different person around other students
c. Other students do NOT judge me for being my true self
d. I never have to hide the “real me” when I’m with other students
e. I feel that other students understand exactly who I am
f. When I’m with other students, I feel I can be myself
g. I feel connected to other students
h. I feel that other students accept me for who I am
i. Other students see me in the same way I see myself.

Appendix D: Item Characteristic Curves

Item Characteristic Curves (ICCs) graphically illustrate how a person's ability would be used to predict the response that they would choose for a particular item. Figure 28 shows an example of multiple ICCs. Here each curve is the ICC for items 1 through 3. And the θ values indicate three individuals with different abilities. The person with a θ of 2.2 has the highest ability (let us refer to them as person A). Item 1 has the highest difficulty. This is indicated by looking at the probability of person A agreeing with item 1. Their probability of agreeing with item 1 is .50 whereas the other two individuals' probability of agreeing with item 1 is much lower. Since an individual needs higher ability to have a greater chance of agreeing with item 1, this item is deemed more difficult than the other items.

Figure 28

An example of ICCs where the X axis indicates the probability of agreeing with an item and the Y axis indicated the person ability (θ)



Interpreting Figure 29 in this manner leads us to make the conclusion that for person A, the probability of agreeing with item 3 is extremely high, the probability of agreeing with item 2 is somewhat lower but still high and the probability of agreeing with item 1 is the lowest. The important point is that this rule also applies for the other two persons. For each of these individuals, item 3 is the easiest and item 1 is the hardest to agree with.

Although the ICC curves for the S'FICE instrument would look somewhat different because the S'FICE items have multiple options (each item has 4 steps from Strongly Disagree to Strongly Agree), the S'FICE instrument follows a similar pattern. The items are designed such that items that are easier to agree with (e.g., require lower self-concept fit to

agree with) are easier to agree with for all participants in comparison to items that are harder to agree with (e.g., require higher self-concept fit to agree with).

Appendix E: Demographics items

1. What is your major?

_____

2. What is your race/ethnicity?

a) Asian/East Asian/South Asian/Asian American

b) Black/African American

c) Latino/Latina/Latin American/Hispanic

d) Middle Eastern/Arab American

e) Caucasian/White/European/European American

f) Native Hawaiian/Pacific Islander

g) Native American/American Indian/Alaskan Native

h) Other or Multiple Ethnicities (please describe)

3. What is the highest level of education your mother (Parent 1) completed?

a) Did not finish high school

b) High school/GED

c) Two-year college AA degree

d) Four-year college degree

e) Graduate degree

4. What is the highest level of education your father (Parent 2) completed?

a) Did not finish high school

b) High school/GED

c) Two-year college AA degree

d) Four-year college degree

e) Graduate degree

5. Which of the following terms best describes your current gender identity?

a) Female

b) Male

c) Trans male/ Trans man

d) Trans female/ Trans woman

e) Non-binary/ Genderqueer/ Gender non-conforming

6. Are you a transfer student?

a) Yes

b) No

7. Are you a freshman?

a) Yes

b) No

8. Are you an international student?

a) Yes

b) No

Appendix F: Items for the personality self-survey

Participants were asked to respond to the following questions:

1. This is a question about the personality qualities that make up your true self. Please read through the whole list first.

Now, please choose the 5 personality qualities that make up your true self:

a. Trustful
b. Shy
c. Communicative
d. Spontaneous
e. Confident
f. Calm
g. Determined
h. Affectionate
i. Cheerful
j. Considerate
k. Curious
l. Dependent
m. Imaginative
n. Impulsive
o. Responsible

Note: These traits were derived from Barnett (1991) and Chaplin, John, and Godlberg (1988).

2. This question is about the **goals** that **guide your decisions in life**. Please read through the whole list first.

Now, please choose the **5 goals** that **guide your decisions in life**:

a. Contribute to my family's wellbeing

b. Be a role model for people in my community

c. Bring honor to my family

d. Show that people with my background can succeed

e. Give back to my community

f. Provide a better life for my own children

g. Expand my knowledge of the world

h. Become an independent thinker

i. Explore new interests

j. Explore my potential in many domains

k. Discover more about my interests

l. Become an expert in (at least) one thing

m. Pursue options I'm passionate about

n. Prove to myself that I can succeed in life

o. Fulfill the expectations set for me by my family

Note: These reasons and goals were derived from Stephens, Fryberg, and colleagues (2012).

3. This question is about the **membership groups** that you **strongly identify with**. Please read through the whole list first.

Now, please choose the **5 membership groups** that you **strongly identify with**:

a. First-generation

b. Gamers

c. Spiritual seekers

d. Athletes/fitness enthusiasts

e. Risk-takers

f. LGBTQ+ community

g. BIPOC community

h. Women in STEM

i. Introverts

j. Extroverts

k. Political activists

l. Fraternity/Sorority members

m. Hikers/Nature lovers

n. Cooks/Bakers/Foodies

o. Artists/Creative individuals

Appendix G: Screenshots of what participants saw in the All components fit, Only Self-concept fit, Only Goal fit, Only Social fit, and All components low fit conditions when they received feedback on their fit to their ideal career

Figure 29

Screenshot of what participants in the all components fit condition saw (participants choosing Legal occupations as their ideal career)

Your responses	Match with Legal occupations
Personality qualities	**Excellent** match
Life Goals	**Excellent** match
Membership groups	**Excellent** match

The **personality qualities** you chose as making up your **true self** are an **excellent match** with **Legal occupations.**

The **goals** you chose as **guiding your life decisions** are an **excellent match** with **Legal occupations.**

The **membership groups** you chose as ones **you strongly identified with** are an **excellent match** with **Legal occupations.**

Note. This image was obtained by taking a screenshot of the Qualtrics survey for Study 2 after selecting "Legal occupations" as the ideal career in the "Preview survey" view.

Figure 30

Screenshot of what participants in the only self-concept fit condition saw (participants choosing Legal occupations as their ideal career)

Your chosen responses	Match with Legal occupations
Personality qualities	**Excellent** match
Life goals	**Low** match
Membership groups	**Low** match

The **personality qualities** you chose as making up your **true self** are an **excellent match** with **Legal occupations.**

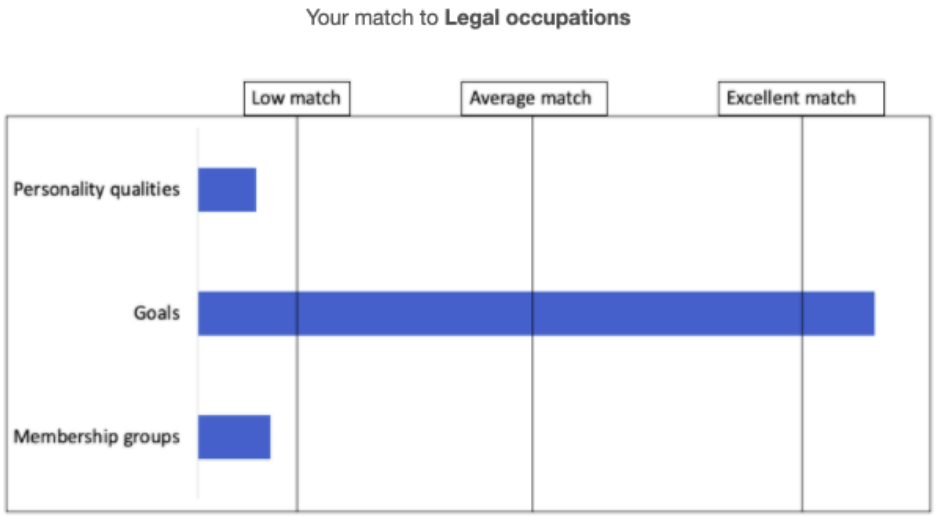
The **goals** you chose as **guiding your life decisions** are a **low match** with **Legal occupations.**

The **membership groups** you chose as ones **you strongly identified with** are a **low match** with **Legal occupations.**

Note. This image was obtained by taking a screenshot of the Qualtrics survey for Study 2 after selecting "Legal occupations" as the ideal career in the "Preview survey" view.

Figure 31

Screenshot of what participants in the only goal fit condition saw (participants choosing Legal occupations as their ideal career)



Your chosen responses	Match with Legal occupations
Personality qualities	**Low** match
Life goals	**Excellent** match
Membership groups	**Low** match

The **personality qualities** you chose as making up your **true self** are a **low match** with **Legal occupations.**

The **goals** you chose as **guiding your life decisions** are an **excellent match** with **Legal occupations.**

The **membership groups** you chose as ones **you strongly identified with** are a **low match** with **Legal occupations.**

Note. This image was obtained by taking a screenshot of the Qualtrics survey for Study 2 after selecting "Legal occupations" as the ideal career in the "Preview survey" view.

Figure 32

Screenshot of what participants in the only social fit condition saw (participants choosing Legal occupations as their ideal career)

Your chosen responses	Match with Legal occupations
Personality qualities	**Low** match
Life goals	**Low** match
Membership groups	**Excellent** match

The **personality qualities** you chose as making up your **true self** are a **low match** with **Legal occupations.**

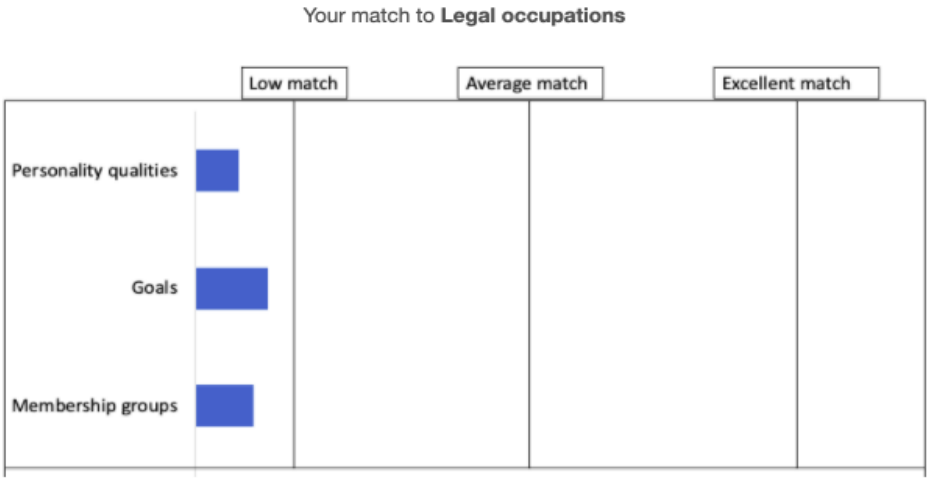
The **goals** you chose as **guiding your life decisions** are a **low match** with **Legal occupations.**

The **membership groups** you chose as ones **you strongly identified with** are an **excellent match** with **Legal occupations.**

Note. This image was obtained by taking a screenshot of the Qualtrics survey for Study 2 after selecting "Legal occupations" as the ideal career in the "Preview survey" view.

Figure 33

Screenshot of what participants in the all components low fit condition saw (participants choosing Legal occupations as their ideal career)



Your chosen responses	Match with Legal occupations
Personality qualities	**Low** match
Life goals	**Low** match
Membership groups	**Low** match

The **personality qualities** you chose as making up your **true self** are a **low match** with **Legal occupations.**

The **goals** you chose as **guiding your life decisions** are a **low match** with **Legal occupations.**

The **membership groups** you chose as ones **you strongly identified with** are a **low match** with **Legal occupations.**

Note. This image was obtained by taking a screenshot of the Qualtrics survey for Study 2 after selecting "Legal occupations" as the ideal career in the "Preview survey" view.

Appendix H: Fluency instrument adapted to refer to students' ideal career

Cognitive fluency

1. My ability to focus my attention on tasks at work in my ideal career will be _____ (1 Difficult - 7 Easy)
2. My concentration levels on tasks at work in my ideal career will be ___ (1 Low - 7 High)
3. I will ___ feel distracted by other thoughts or concerns at work in my ideal career (1 Never - 7 Frequently)
4. I will ___ feel self-conscious work in my ideal career (1 Never - 7 Frequently)
5. I will ___ feel distracted by thoughts about myself work in my ideal career (1 Never - 7 Frequently)

Motivational fluency

1. My ability to pursue my goals at work in my ideal career will feel ____ (1 Difficult - 7 Effortless)
2. My motivational energy at work in my ideal career will feel ___ (1 Low - 7 High)
3. I will ___ have to force myself to do things at work in my ideal career (1 Never - 7 Frequently)
4. My progress towards my goals at work in my ideal career will be ___ (1 Forced - 7 Smooth)
5. In working towards my goals at work in my ideal career, I will feel ___ (1 Hesitant - 7 Eager)

Interpersonal fluency

1. My ability to interact with others in the context of work in my ideal career will feel ___ (1 Forced - 7 Smooth)
2. My conversations with others in the context of work in my ideal career will feel ___ (1 Awkward - 7 Engaging)
3. I will ___ have to monitor what I say at work in my ideal career (1 Never - 7 Frequently)
4. I will ___ have to match my behaviors to what others expect of me at work in my ideal career (1 Never - 7 Frequently)
5. My interactions with others at work in my ideal career will feel ____ (1 Uncomfortable - 7 Comfortable)

Appendix I: Utrecht Work Engagement Survey – Student Form (Schaufeli, Martínez, Marques, Pinto, Salanova, & Bakker, 2002) adapted to students' ideal career

1. I anticipate that at work in my ideal career, I will feel bursting with energy.
2. I anticipate that at work in my ideal career, I will feel mentally strong
3. I anticipate that at work in my ideal career I will be enthusiastic about my work.
4. I anticipate that at work in my ideal career, my work will inspire me.
5. I anticipate that when I get up in the morning, I will feel like going to work in my ideal career.
6. I anticipate that at work in my ideal career I will feel happy when I am working intensely.
7. I anticipate that at work in my ideal career I will be proud of my work.
8. I anticipate that in my ideal career I will be able to continue for a very long time when I am working
9. I anticipate that at work in my ideal career I will get carried away when I am working.
10. When working in my ideal career, I anticipate that I will feel strong and vigorous
11. I anticipate that at work in my ideal career I will find my work to be full of meaning and purpose
12. I anticipate that at work in my ideal career I will find my work challenging
13. I anticipate that at work in my ideal career time will fly when I'm studying
14. When I am working in my ideal career, I anticipate that I will forget everything else around me

Appendix J: Self-regulation learning (Zimmerman et al., 1992) adapted to participants' ideal career

Participants responded to the following prompt:

How much confidence do you have that you will be able to successfully...

1. finish work assignments by deadlines?
2. work when there are other interesting things to do?
3. concentrate on work subjects?
4. take work notes of projects?
5. use multiple resources to get information on work assignments?
6. plan your work flow?
7. organize your work flow?
8. remember information presented in work meetings?
9. arrange a place to work without distractions?
10. motivate yourself to do work?
11. participate in work meetings?

Appendix K: The S'FICE instrument adapted for participants' ideal career

Items measuring self-concept fit

1. My family and I always assumed that I would work **in my ideal career.**
2. I think the transition to work **in my ideal career** will be very difficult for me.
3. I think I will be more aware of things like my race, gender, financial background, etc. when at work **in my ideal career**.
4. I think working **in my ideal career** will be a very big part of who I am.
5. I think working **in my ideal career** will tap into who I truly am.
6. I think I will be comfortable at work **in my ideal career**.
7. I think I will basically be the same person at work **in my ideal career** as I am in the place I am most comfortable in.
8. I think I will feel out of my depth at work **in my ideal career.**
9. I think that when I ask questions during workplace meetings at work **in my ideal career**, I will worry that the questions will reflect badly on me.
10. I think my family will be just as involved in me pursuing my work **in my ideal career** as they are in other aspects of my life.
11. I think my true self and who I will be at work **in my ideal career** will be completely different.
12. I think I will be nervous about going to my supervisors at work **in my ideal career** and asking them questions.
13. I think I will be nervous about going to my supervisors at work **in my ideal career** and asking them questions.

Items measuring goal fit

1. I think the goals emphasized at work **in my ideal career** will match my own goals.
2. When working on tasks at work **in my ideal career**, I think I will feel like I'm getting closer to achieving goals that are important to me.
3. I think I will feel like my supervisors and colleagues chose to be **in my ideal career** for the same reasons as me.
4. I think I will find the work **for my ideal career** naturally interesting.
5. I think I will enjoy working on tasks at work **in my ideal career**.
6. I think I will be happy with how tasks at work **in my ideal career** will be structured.
7. I think the resources that will be available to me at work **in my ideal career** will be completely useless in helping me reach my goals.
8. I think I will seriously consider switching out of **my ideal career** at some point.

Items measuring social fit

1. When at work **in my ideal career**, I think I will see a lot of people who are very similar to me (in terms of things like my race, gender, financial background, etc.).
2. I think I will wish that I knew more people at work **in my ideal career** who I could relate to, or who could relate to me.
3. I think I will feel out of place when I sit at work **in my ideal career** and look around at my colleagues.
4. I think I will feel like I need to prove to the supervisors at work **in my ideal career** that I am JUST AS good as my colleagues.

5. I think I will avoid sharing many of my personal issues with people at work **in my ideal career** because I would not think they will understand them.
6. I think many people at work **in my ideal career** will like me for who I am.
7. I think I will have at least a few close friends at work **in my ideal career** with me.
8. I think I will change a lot of things about myself when I interact with other people at work **in my ideal career.**
9. I think I will feel like I belong among the other people (friends or otherwise) at work **in my ideal career.**
10. I think my supervisors and colleagues at work **in my ideal career** will not be able to relate to the struggles I will experience in my ideal career.
11. I think my family background and upbringing will affect my social interactions at work **in my ideal career**.

Appendix L: Debriefing forms and debriefing emails received by participants in Study 2

Participants in the All components low fit received the following debriefing form at the end of Study 2. This is a screenshot taken from Qualtrics.

Figure 33

Screenshot of debriefing email for all components low fit participants

Thank you for taking the time to participate in our study. We would like to tell you a little more about the purpose of the study and the materials you completed.

First of all, **the information you received about your match with your ideal career is false.** Our personality-career survey was a set of randomly chosen questions and the match statistics we provided were also randomly assigned to different participants.

In fact, research shows that the human brain is flexible and that if you set your mind to a goal and work hard at it, you can absolutely attain it (Dweck, 2008). The harder you work at your career goals, the more likely you are to succeed in your ideal career (Grant & Dweck, 2003).

The reason we provided you with false information regarding the match to your ideal career was to obtain your natural reaction to such information. Knowing now the truth about our study, you may choose to withdraw your consent of having your data used in our study.

Let us tell you a little more about the study as well:

The purpose of this study is to understand factors that lead people to be engaged in their education and career goals. In particular, we wanted to test whether people would be more engaged in their career when that career is an "excellent match" to their personality characteristics, life goals, and social identities. To test this theory, we asked you to complete a survey and provided you with feedback about how well your personality characteristics, life goals, and social identities matched the goals of people working in your ideal career. We predict that people will be more engaged in their ideal career when told that they are an excellent match to it based on their personality characteristics, life goals, and social identities.

This is why we had you complete a fabricated career personality survey, so that we could give you false feedback on your match to your ideal career.

If you wish to further discuss the study or have any other comments, please contact Anudhi Munasinghe (anudhi_munasinghe@ucsb.edu). If you have any questions regarding your rights and participation as a research subject, please contact the Human Subjects Committee at (805) 893-3807 or hsc@research.ucsb.edu. Or write to the University of California, Human Subjects Committee, Office of Research, Santa Barbara, CA 93106-2050

Again, thank you for participating in our study, we really appreciate it! If you have any comments on the study, we would love to hear your feedback.

Now that you are fully informed about the nature and purpose of the study, please let us know if we can keep your data for research purposes. If you agree to allow us to use your data, select "Finish the survey". If you do not want your responses to be included in our analyses, select "Do not use my data".

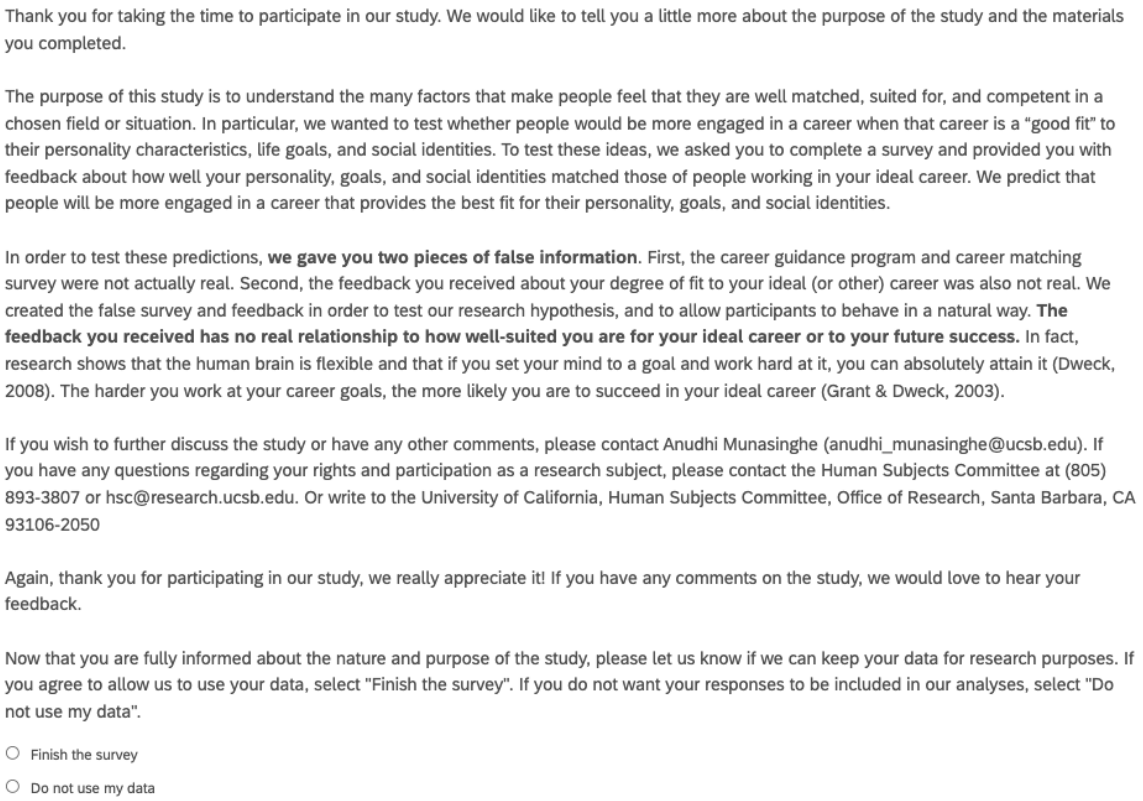
○ Finish the survey

○ Do not use my data

All other participants received the following debriefing form at the end of Study 2. This is a screenshot taken from Qualtrics.

Figure 34

Screenshot of debriefing email for all other participants



Thank you for taking the time to participate in our study. We would like to tell you a little more about the purpose of the study and the materials you completed.

The purpose of this study is to understand the many factors that make people feel that they are well matched, suited for, and competent in a chosen field or situation. In particular, we wanted to test whether people would be more engaged in a career when that career is a "good fit" to their personality characteristics, life goals, and social identities. To test these ideas, we asked you to complete a survey and provided you with feedback about how well your personality, goals, and social identities matched those of people working in your ideal career. We predict that people will be more engaged in a career that provides the best fit for their personality, goals, and social identities.

In order to test these predictions, **we gave you two pieces of false information**. First, the career guidance program and career matching survey were not actually real. Second, the feedback you received about your degree of fit to your ideal (or other) career was also not real. We created the false survey and feedback in order to test our research hypothesis, and to allow participants to behave in a natural way. **The feedback you received has no real relationship to how well-suited you are for your ideal career or to your future success.** In fact, research shows that the human brain is flexible and that if you set your mind to a goal and work hard at it, you can absolutely attain it (Dweck, 2008). The harder you work at your career goals, the more likely you are to succeed in your ideal career (Grant & Dweck, 2003).

If you wish to further discuss the study or have any other comments, please contact Anudhi Munasinghe (anudhi_munasinghe@ucsb.edu). If you have any questions regarding your rights and participation as a research subject, please contact the Human Subjects Committee at (805) 893-3807 or hsc@research.ucsb.edu. Or write to the University of California, Human Subjects Committee, Office of Research, Santa Barbara, CA 93106-2050

Again, thank you for participating in our study, we really appreciate it! If you have any comments on the study, we would love to hear your feedback.

Now that you are fully informed about the nature and purpose of the study, please let us know if we can keep your data for research purposes. If you agree to allow us to use your data, select "Finish the survey". If you do not want your responses to be included in our analyses, select "Do not use my data".

○ Finish the survey

○ Do not use my data

All participants received the following email from a Research Assistant containing the Amazon gift card code as well as a reminder that the feedback they received was false. This is a screenshot from the Google email account managed by the Research Assistants.

Figure 35

Email received by all participants

Hi,

Thank you so much for participating in this study! I really appreciate it as does my thesis student who is working on this project as well.

I just want to remind you: the feedback on the survey was **FALSE** and your responses have NO EFFECT on how well you will do in your ideal career. We wish you the best of luck with your ideal career! :)

The claim code for your $5 Amazon gift card is: [redacted]

Let me know if you run into any issues or have any questions.

Again, thank you so much for helping us out. We could not do this research without you!

Best wishes for the end of the quarter,
[redacted]

Appendix M: Version 2 of the S'FICE instrument

Items measuring self-concept fit

1. My family and/or I always assumed that I would go to college.
2. When I'm in college, I'm more aware of things like my race, gender, financial background, etc.
3. I think being a student is a very big part of who I am.
4. Being a student in my major taps into who I truly am.
5. I am comfortable in my major.
6. When I ask questions in class I worry that they will reflect badly on me.
7. I feel like I am my true self (or one of my true selves) when I am in college.
8. Within the last few weeks, I have felt nervous about going to professors' office hours and asking them questions.

Items measuring goal fit

1. The goals typically associated with my major match my own goals for being in college.
2. When I'm working on my major, I feel like I'm getting closer to achieving goals that are important to me.
3. I find the coursework for my major naturally interesting.
4. I enjoy working on the coursework for my major.
5. I am happy with how coursework in my major is taught.
6. I plan to pursue one of the careers that a typical successful student in my major would pursue.

Items measuring social fit

1. I know at least a few people in college who I can relate to, or who can relate to me.
2. I feel out of place when I sit in classes for my major (in person) and look around at the other students.
3. I don't think people in college would understand the types of personal issues I'm facing
4. I know at least a few people in college who like me for who I am.
5. I change a lot of things about myself when I interact with other students in college.
6. When I think about the other students in my major (friends or otherwise), I feel accepted by them.

Appendix N: Discussion on the lack of any responses for Agree and Strongly Agree for goal_1

As mentioned above, no participants selected Agree or Strongly Agree for the first item measuring goal fit. This was not concerning, given that the data was not analyzed using a Partial Rating Scale model which requires there to be data in each category for each item. The Rating Scale Model, on the other hand, calculates a common step threshold that all items share, and thus merely requires sufficient data in each category across all items.

Therefore, I next calculated the number of participants who selected strongly disagree, disagree, agree, and strongly agree across all items. Table 29 indicates the raw numbers as well as percentage breakdown of the number of participants who selected each response category.

Table 29

Number (and percentage breakdown) of participant responses for each category

Category	*N* (Participants who selected category)	% of participants compared to total responses)
Strongly Disagree	348	5.65
Disagree	1565	25.41
Agree	2984	48.44
Strongly Agree	1263	20.5

The categories Agree and Strongly Agree do not seem to show a lower number of participants. In fact, Agree was the most frequently selected response. Therefore, the fact that

no participants selected Agree or Strongly Agree for the goal_1 item is not a cause for concern.

Appendix O: Utrecht Work Engagement Survey – Student Form (Schaufeli, Martínez, Marques, Pinto, Salanova, & Bakker, 2002)

1. When I study, I feel bursting with energy.
2. When I'm studying, I feel mentally strong
3. I am enthusiastic about my studies.
4. My studies inspire me.
5. When I get up in the morning, I feel like going to class.
6. I feel happy when I am studying intensely.
7. I am proud of my studies.
8. I can continue for a very long time when I am studying
9. I can get carried away when I am studying.
10. When studying, I feel strong and vigorous
11. I find my studies to be full of meaning and purpose
12. I find my studies challenging
13. Time flies when I'm studying
14. When I am studying, I forget everything else around me

Appendix P: Self-regulation learning (Zimmerman et al., 1992)

Participants responded to the following prompt:

How much confidence do you have that you can successfully...

1. finish homework assignments by deadlines?
2. study when there are other interesting things to do?
3. concentrate on school subjects?
4. take class notes of class instruction?
5. use the library to get information on class assignments?
6. plan your schoolwork?
7. organize your schoolwork?
8. remember information presented in class and textbooks?
9. arrange a place to study without distractions?
10. motivate yourself to do schoolwork?
11. participate in class discussions?

Appendix Q: Stereotype Vulnerability Scale, Ambient belonging measure, Belonging uncertainty, and motives for coming to college

Revised Stereotype Vulnerability Scale (Spencer, 1994; Woodcock, et al., 2012)

Participants responded to these items on a 5-point Likert scale ranging from 1 Never to 5 Almost always.

1. Some people believe that you have less ability.
2. If you're not better than average, people assume you are limited.
3. Professors expect you to do poorly.
4. Professors are less likely to encourage you.
5. You are not fully accepted or included into your program.
6. If you ask a simple question, people will think it is because of your ethnicity.
7. If you do poorly on a test, people will assume that it is because of your ethnicity.
8. People of your ethnicity face unfair evaluations because of their ethnicity.

Ambient belonging measure (Cheryan, et al., 2009)

Participants responded to both questions on an 8-point Likert scale ranging from 1 Not at all to 7 Extremely.

1. How much do you feel like you belong in your major/anticipated major?
2. How similar do you feel to the people in your major/anticipated major?

Belonging uncertainty (Walton & Cohen, 2007)

Participants responded to both questions on an 8-point Likert scale ranging from 1 Strongly Disagree to 7 Strongly Agree.

1. Sometimes I feel that I belong at [school name], and sometimes I feel that I don't belong at [school name].

2. When something good happens, I feel that I really belong at [school name].
3. When something bad happens, I feel that maybe I don't belong at [school name].

Motives for coming to college (Stephens, Fryberg, et al., 2012)

Participants were asked what their motives were for attending college and were requested to choose as many as they wanted to from the provided list that consisted of both interdependent and independent motives

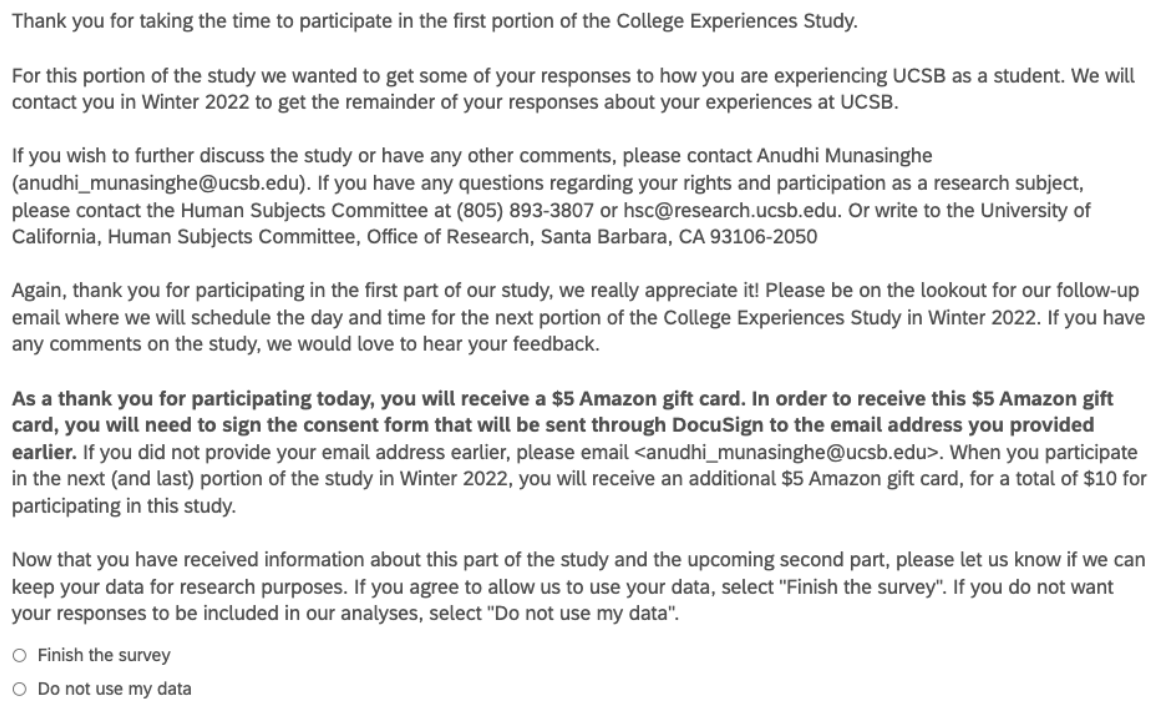
1. Help my family out after I'm done with college
2. Be a role model for people in my community
3. Bring honor to my family
4. Show that people with my background can do well
5. Give back to my community
6. Provide a better life for my own children
7. Expand my knowledge of the world
8. Become an independent thinker
9. Explore new interests
10. Explore my potential in many domains
11. Learn more about my interests
12. Expand my understanding of the world

Appendix R: The partial debriefing form given to participants at the end of Study 4 Part I

The following is a screenshot of what participants saw when they were debriefed on Qualtrics.

Figure 36

Screenshot of the partial debriefing form received by participants after Study 4 Part I



Thank you for taking the time to participate in the first portion of the College Experiences Study.

For this portion of the study we wanted to get some of your responses to how you are experiencing UCSB as a student. We will contact you in Winter 2022 to get the remainder of your responses about your experiences at UCSB.

If you wish to further discuss the study or have any other comments, please contact Anudhi Munasinghe (anudhi_munasinghe@ucsb.edu). If you have any questions regarding your rights and participation as a research subject, please contact the Human Subjects Committee at (805) 893-3807 or hsc@research.ucsb.edu. Or write to the University of California, Human Subjects Committee, Office of Research, Santa Barbara, CA 93106-2050

Again, thank you for participating in the first part of our study, we really appreciate it! Please be on the lookout for our follow-up email where we will schedule the day and time for the next portion of the College Experiences Study in Winter 2022. If you have any comments on the study, we would love to hear your feedback.

As a thank you for participating today, you will receive a $5 Amazon gift card. In order to receive this $5 Amazon gift card, you will need to sign the consent form that will be sent through DocuSign to the email address you provided earlier. If you did not provide your email address earlier, please email <anudhi_munasinghe@ucsb.edu>. When you participate in the next (and last) portion of the study in Winter 2022, you will receive an additional $5 Amazon gift card, for a total of $10 for participating in this study.

Now that you have received information about this part of the study and the upcoming second part, please let us know if we can keep your data for research purposes. If you agree to allow us to use your data, select "Finish the survey". If you do not want your responses to be included in our analyses, select "Do not use my data".

○ Finish the survey

○ Do not use my data

Appendix S: Psychological Wellbeing (Ryff, 1989)

Participants will respond to each item on a 6-point Likert scale ranging from 1 (Strongly Disagree) to 6 (Strongly Agree).

1. Most people see me as loving and affectionate
2. I am not afraid to voice my opinion, even when they are in opposition to the opinions of most people.
3. In generally, I feel I am in charge of the situation in which I live.
4. I am not interested in activities that will expand my horizons.
5. I live life one day at a time and don't really think about the future
6. When I look at the story of my life, I am pleased with how things have turned out.
7. Maintaining close relationships has been difficult and frustrating for me.
8. My decisions are not usually influenced by what everyone else is doing.
9. The demands of everyday life often get me down.
10. I don't want to try new ways of doing things—my life is fine the way it is.
11. I tend to focus on the present, because the future always brings me problems.
12. In general, I feel confident and positive about myself.
13. I often feel lonely because I have few close friends with whom to share my concerns.
14. I tend to worry about what other people think of me.
15. I do not fit very well with the people and community around me.
16. I think it is important to have new experiences that challenge how you think about yourself and the world
17. My daily activities often seem trivial and unimportant to me.
18. I feel like many of the people I know have gotten more out of life than I have.

19. I enjoy personal and mutual conversations with family members and friends.
20. Being happy with myself is more important to me than having others approve of me.
21. I am quite good at managing the many responsibilities of my daily life.
22. When I think about it, I haven't really improved much as a person over the years.
23. I don't have a good sense of what it is I'm trying to accomplish in my life.
24. I like most aspects of my personality.
25. I don't have many people who want to listen when I need to talk.
26. I tend to be influenced by people with strong opinions.
27. I often feel overwhelmed by my responsibilities.
28. I have a sense that I have developed a lot as a person over time.
29. I used to set goals for myself, but that now seems a waste of time.
30. I made some mistakes in the past, but I feel that all in all everything has worked out for the best.
31. It seems to me that most other people have more friends than I do.
32. I have confidence in my opinions, even if they are contrary to the general consensus.
33. I generally do a good job of taking care of my personal finances and affairs.
34. I do not enjoy being in new situations that require me to change my old familiar ways of doing things.
35. I enjoy making plans for the future and working to make them a reality.
36. In many ways, I feel disappointed about my achievements in my life.
37. People would describe me as a giving person, willing to share my time with others.
38. It's difficult for me to voice my own opinions on controversial matters.
39. I am good at juggling my time so that I can fit everything in that needs to be done.

40. For me, life has been a continuous process of learning, changing, and growth.
41. I am an active person in carrying out the plans I set for myself.
42. My attitude about myself is probably not as positive as most people feel about themselves.
43. I have not experienced many warm and trusting relationships with others.
44. I often change my mind about decisions if my friends or family disagree.
45. I have difficulty arranging my life in a way that is satisfying to me.
46. I gave up trying to make big improvements or change in my life a long time ago.
47. Some people wander aimlessly through life, but I am not one of them.
48. The past has its ups and downs, but in general, I wouldn't want to change it.
49. I know that I can trust my friends, and they know they can trust me.
50. I judge myself by what I think is important, not by the values of what others think is important.
51. I have been able to build a home and lifestyle for myself that is much to my liking.
52. There is truth to the saying that you can't teach an old dog new tricks.
53. I sometimes feel as if I've done all there is to do in life.
54. When I compare myself to friends and acquaintances, it makes me feel good about who I am

Appendix T: The full debriefing form given to participants at the end of Study 4 Part II

Figure 37

Screenshot of the full debriefing form received by participants after Study 4 Part II

Thank you for taking the time to participate in our study.

We would like to tell you a little more about the purpose of the study and the questions you answered. The purpose of this study is to understand whether the extent to which you feel like you fit in college affects your academic performance and emotional wellbeing. We wanted to see if students who reported higher levels of fit in college would also report higher wellbeing and have higher GPAs.

In order to test these predictions, in Fall 2021 we asked you to respond to the S'FICE questionnaire, which measures fit in college. You also answered a number of other questionnaires. One of the other questionnaires measured fluency, which measured three types of ways you process information about yourself in college. You answered questions about how easily you see yourself as a person fitting into college, how easy you found it to pursue your goals in college, and how easy you found it to maintain social relationships in college.

Two other questionnaires measured your academic engagement, which means how much you identify with being a student and how comfortable you feel about being able to complete your studies. The other questionnaires were created by other researchers to measure factors that might influence students' academic performance.

Our next step was to get you to sign the DocuSign authorizing a one-time release of your GPAs. I will be requesting for your GPAs for Fall 2021 for the purpose of this study.

And the third and final step was to ask you to participate in this second part of the study where we measured your wellbeing.

In summary, we wanted to see if higher fit in college predicted higher fluency in college, and if this in turn predicted higher academic engagement. Finally, we wanted to see if higher academic engagement predicted greater wellbeing and stronger academic performance.

We want to emphasize that research shows that feelings of fit (often called belonging) in college changes over time (Walton & Cohen, 2007). **Over time students' feelings of belonging to college increases.** Also, there are many other things that can affect a student's GPA. For instance, Dweck (2008) showed that **when students believed that their intelligence can improve (in other words, if they had a growth mindset) they performed better in college.**

If you wish to further discuss the study or have any other comments, please contact Anudhi Munasinghe (anudhi_munasinghe@ucsb.edu). If you have any questions regarding your rights and participation as a research subject, please contact the Human Subjects Committee at (805) 893-3807 or hsc@research.ucsb.edu. Or write to the University of California, Human Subjects Committee, Office of Research, Santa Barbara, CA 93106-2050

Again, thank you for participating in our study, we really appreciate it! If you have any comments on the study, we would love to hear your feedback.

Now that you are fully informed about the nature and purpose of the study, please let us know if we can keep your data for research purposes. If you agree to allow us to use your data, select "Finish the survey". If you do not want your responses to be included in our analyses, select "Do not use my data".

- ○ Finish the survey
- ○ Do not use my data

Appendix U: The test of Model Hypotheses 1-4 in Study 4 with all participants (including those who were excluded)

I repeated the analyses for Model Hypotheses 1 - 4 with all the participants who were excluded from the final sample, because they did not have academic performance data and/or wellbeing data.

Testing Model Hypothesis 1

To test Model Hypothesis 1, I conducted correlation tests on self-concept, goal, and social fit, expecting to find a moderate correlational relationship between each pair of them. I expected the correlation coefficients between each of the three types of fit to fall within the range of .1 - .3. Identical to the results with the final sample, the correlation coefficients were stronger than predicted for all three pairs (see Table 30).

Table 30

Correlations between self-concept, goal, and social fit for the full sample of participants

	Variable	*M*	*SD*	1	2	3
1.	self-concept fit	2.71	.37	-		
2.	goal fit	3.00	.49	.51***	-	
3.	social fit	2.86	.46	.55***	.38***	-

Note: ***$p < .001$

Testing Model Hypothesis 2

To test Model Hypothesis 2, I conducted a multiple linear regression test where I entered self-concept, goal, and social fit as predictors and engagement as the dependent variable. I could not run the combined serial and parallel multiple mediator models that I ran

with the final sample, because the dependent variables in these models were GPA and wellbeing and not all participants in this analysis had this data.

Testing Model Hypothesis 2a

To test whether the interaction of self-concept, goal, and social fit would significantly predict engagement, I observed the interaction term in the multiple linear regression model. Contrary to what I predicted, but identical to what was found with the final sample, the interaction of self-concept, goal, and social fit was not significantly associated with engagement, $t(248) = 1.39$, $p = .17$.

Testing Model Hypothesis 2b

The multiple linear regression contradicted the predictions of Model Hypothesis 2b, because self-concept fit was not significantly associated with engagement, $t(248) = 1.94$, $p = .05$. This matched the findings of the final sample.

Testing Model Hypothesis 2c

The regression model also contradicted the hypothesis that goal fit would be significantly associated with engagement, $t(248) = 1.48$, $p = .14$. This finding was also identical to the finding with the final sample.

Testing Model Hypothesis 2d

The regression model also contradicted the hypothesis that social fit would be significantly associated with engagement, $t(248) = 1.63$, $p = .11$. This finding was also identical to the finding with the final sample.

Testing Model Hypothesis 3

In order to test Model Hypotheses 3 and 4, I conducted three parallel multiple mediator models. In each model, one type of fit was entered as the predictor and the three

fluencies, cognitive, motivational, and interpersonal, were entered as mediators, and engagement was entered as the dependent variable.

Testing Model Hypothesis 3a

Just as with the final sample, the parallel multiple mediator model with all participants from Part I supported the prediction that self-concept fit would be associated with cognitive fluency, $F(1, 254) = 77.66$, $p < .001$.

Testing Model Hypothesis 3b

Just as with the final sample, the parallel multiple mediator model with all participants from Part I also supported the prediction that goal fit would be associated with motivational fluency, $F(1, 254) = 60.44$, $p < .001$.

Testing Model Hypothesis 3c

Finally, just as with the final sample, the parallel multiple mediator model with all participants from Part I supported the prediction that social fit would be associated with interpersonal fluency, $F(1, 254) = 127.59$, $p < .001$.

Testing Model Hypothesis 4

Model Hypothesis 4 predicted that each type of fit would be associated with engagement via its respective type of fluency.

Testing Model Hypothesis 4a

The parallel multiple mediator model for all Part I participants with self-concept fit as the predictor showed results that were identical to what I found when I ran the same model on the final sample. This model also partially supported my hypothesis, because the direct relationship of self-concept fit to engagement after accounting for the variance explained by the three fluencies was significant [$t(254) = 4.09$, $p < .001$], but self-concept fit was

associated with engagement via motivational fluency, 95% *CI* [.24, .53], instead of cognitive fluency. Thus, just as the final sample model, these results only partially supported my predictions for Model Hypothesis 4a.

Testing Model Hypothesis 4b

The parallel multiple mediator model with goal fit as the predictor supported my predictions for Model Hypothesis 4b somewhat more than the mediator model I ran with the final sample. The parallel multiple mediator model run on the Part I participants with goal fit as the predictor, showed that when accounting for the three fluencies as mediators, goal fit had a significant direct relationship with engagement, $t(254) = 9.91$, $p < .001$. Further supporting my predictions, only the indirect effect between goal fit and engagement via motivational fluency was significant, 95% *CI* [.11, .32]. Thus, the test of Model Hypothesis 4b differed between the final sample and the Part I sample, with the results of the Part I sample providing more support for this hypothesis (because with the final sample goal fit also related to engagement through cognitive fluency).

Testing Model Hypothesis 4c

Unlike the model run on the final sample, this model revealed more support for the predictions of Model Hypothesis 4c. There was a significant direct relationship between social fit and engagement after accounting for the variance explained by the three fluencies, $t(254) = 2.24$, $p = .03$. However, contrary to my predictions, social fit was not significantly associated with engagement via interpersonal fluency, 95% *CI* [-.04, .13]. Thus, although the parallel multiple mediator model with the Part I sample showed results that supported Model Hypothesis 4c somewhat more than the model with only the final sample, these results still failed to fully support Model Hypothesis 4c.

This analysis overall demonstrated that the results for the Part I sample did not significantly differ from the results for the final sample.