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Marianismo, Mental Health, and Educational Persistence of Latina STEM College Students

Polet M. MILIAN[1], Aileen TERRAZAS[2], Pamela AGUILAR[3], Da Hwin KIM[4], Linda G. CASTILLO[5]

[1] *Educational Psychology, Texas A&M University, Texas, USA* *0009-0006-6727-4139*

[2] *Educational Psychology, Texas A&M University, Texas, USA* *0000-0001-8088-7892*

[3] *Educational Psychology, Texas A&M University, Texas, USA* *0009-0003-4644-3691*

[4] *Educational Psychology, Texas A&M University, Texas, USA* *0000-0002-0365-3440*

[5] *Educational Psychology, Texas A&M University, Texas, USA* *0000-0001-7634-7973*

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ABSTRACT

In order to better assist Latinas in STEM, it is imperative to understand the impact of cultural values in their educational persistence. This study uses a national dataset of Latina STEM college students to examine the relationship between positive and negative marianismo beliefs and how this impacts mental health and educational persistence. Findings from the study demonstrated that endorsing positive aspects of marianismo beliefs benefited the educational persistence of Latinx STEM college students. Results can inform institutions on how to develop programs that increase Latina STEM student persistence.

Keywords:
Educational persistence, positive affect, negative affect, marianismo

1. Introduction

The fields of science, technology, engineering, and mathematics (STEM) need diversity at a national level, not only for economic growth, but for racial and gender equity in the United States (Gonzalez et al., 2020; National Academy of Sciences, National Academy of Engineering, and Institute of Medicine 2011). Efforts at the national level to invest in and improve gender and racial diversity in STEM have fallen short and continue to have women and racial minorities underrepresented in their fields (Gonzalez et al., 2020). Research has shown that women of color often experience STEM fields to be unwelcoming, due in part, to the perception of not belonging (Ong et al., 2011). This can lead to feelings of isolation, as well as microaggressions from other classmates or faculty that can include comments regarding their race, sex and which can be subtle or overt (Ong et al., 2011, 2018).

Latinas are not an exception to this, national statistics in 2017 show that Latinas are vastly underrepresented in education, with only 20.6% accounting for overall undergraduate enrollment out of 1.9 million students (Gonzalez et al., 2020; National Center for Educational Statistics, 2020), and within STEM disciplines only 2.31% receive bachelor degrees in engineering, 1.87% in computer science, with the highest percentage being in biological sciences at 7.01% (Gonzalez et al., 2020; National Center for Science and Engineering Statistics, 2019)

[5]Corresponding author's address: Texas A&M University – Educational Psychology, Texas /USA
e-mail: lcastillo@tamu.edu
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Why do women face more challenges? What makes this gender unique in higher education and in STEM? Studies show that the education system and research institutes of the United States systematically underutilize and undereducated women of color (National Science Foundation, 2009; Nelson, 2007; Ong et al., 2010, 2018). This brings forth serious concerns regarding equity that originate from the historical issues of social justice in the education and employment systems of the United States (Ong et al., 2018). The myth that women of color are underrepresented because of their lack of interest in the STEM field has been widely debunked by multiple studies that showed that they are just as likely as their white peers to pursue a STEM degree (Bonous-Hammarth, 2000; Ong et al., 2018). Instead, research has shown that the underlying cultural belief that White males are superior in STEM, as well as the microaggressions and other unwelcoming behaviors experienced by women of color by other students, faculty and staff, pose more of a challenge to staying within the STEM field than other structural factors such as financial aid, teaching assistantships, or recruitment practices (Lee et al., 2020; Ong et al., 2018, 2020).

Research has shown that Latina students in STEM face several challenges in completing their studies. Social-cultural values are a contributing factor that affects several areas of their academic experience, including persistence and well-being (Bleeker & Jacobs, 2004; Castellannos, 2018; Muñoz & Villaneuva, 2019; Venegas & Espinoza-Wade, 2020). Particularly, the gender role of marianismo found within the Latino community for Latinas can impact their well-being and likelihood of continuing studies in STEM (Castellanos, 2018). For example, self-sacrifice is part of the expectations within the marianismo gender role and studies have shown that Latinas often experience feelings of guilt when leaving home to pursue a college education, and for not contributing financially to their family's well-being (Castillo et al., 2010; Rodriguez et al., 2013) Therefore, research on Latina STEM students need to include information about their culture, and other sociocultural factors that affect their experience in higher education, particularly in STEM to better understand what this student population needs (Gonzalez et al., 2022).

1.1 Marianismo Beliefs Among Latinas

For Latina STEM majors, additional sociocultural components, like parental expectations, may have an influential role in Latina stem persistence (Gonzalez et al., 2020). For example, marianimso is a concept within Latino culture that defines Latina gender norms and expectations (Castillo et al., 2010). Scholars note marianismo is composed of both positive and negative components that impact Latinas' well-being (Castillo & Cano, 2007). Positive marianismo components include the spiritual and family pillar, whereas negative components include self-silencing, subordinate, virtuous, and chaste (Castillo & Cano, 2007; Rodriguez et al., 2013).

Research has shown that Latina adolescents who endorse the role of family pillar have more motivation to achieve educational goals because of their determination to help their families succeed (Ojeda et al., 2011). On the other hand, Guyll et al. (2010) found that adolescent Latinas that endorse the negative marianismo beliefs of being subordinate, virtuous, and self-silencing have adverse results in their academic performance. Internalizing these beliefs hinders their desire to succeed in their academics.

1.2. Positive Affect and Negative Affect for Latina STEM Students

College can be extremely stress-inducing and when students are unable to develop coping skills, depressive symptoms may arise (Castillo & Schwartz, 2013). Like many college students, Latinx students experience depression and anxiety, which may interfere with overall mental health. Young Latinx adults ages 18-25 making are 3.7 times more likely than those over the age of 25 to have major depression (Camacho et al., 2015; Garcini et al., 2017). Positive mental health components, such as well-being, can help with decreasing depressive symptomatology amongst Latinx STEM students.

Subjective well-being consists of three factors: life satisfaction, positive affect, and negative affect (Diener et al., 2018). Positive affect is the frequency with which a person experiences emotions, such as optimism and self-efficacy (Diener et al., 2005). Diener et al. (2010) added that this psychological well-being can be better described as the construct of flourishing, in which a person experiences social-psychological prosperity in their social relationships. The individual is also described as being engaged activities, experiences optimism, feels capable, and has a purposeful life. Negative affect is the frequency that a person experiences emotions, such as sadness, anger, and anxiety (Diener et al., 2005).

1.3. Educational Persistence

Persistence is the concept of being able to put in continued effort even when a task becomes difficult (Feather, 1962). In terms of educational persistence, it is the ability to persist in school even when it becomes difficult. For our study, we define persistence as an individual's belief in the ability to complete a postsecondary degree. For Latina students, mental health issues are associated with educational persistence (Castillo & Schwartz, 2013). Balancing stressful intersecting identities such as gender and first-generation status can impede on student success (Strayhorn, 2008).

1.4. Present Study

Using a sample of Latina STEM students, the purpose of the study is to examine the association between positive and negative mental health components, marianismo beliefs, and educational persistence. The following research hypotheses were examined: (1) positive and negative components of marianismo beliefs will be associated with persistence, and (2) mental health (positive and negative components) will mediate the relationship between marianismo beliefs and persistence.

2. Methodology

2.1. Research Sample

The analysis uses the information from a data set collected through a national research study recruitment plan. The data includes a national sample of 569 Latina students. The research was approved by the research investigator's Institutional Review Board. Given the research questions of this analysis, the sample was limited to students who majored in a STEM field and self-identified as Latina.

2.2. Data Collection Tools and Procedure

Positive Affect. The Flourishing Scale (Diener et al., 2010) is a eight item, self-report measure that assesses for components of positive affect such as purpose in life and positive relationships. A sample item is "I am optimistic about my future." Responses were on a 7-point Likert scale ranging from 1 (*strongly disagree)* to 7 (*strongly agree)*. To find the total score, all the items were added together; higher scores indicated a more positive affect. Coefficient alpha for the current study was .67.

Negative Affect. Components of negative affect were evaluated using the Patient Health Questionnaire-9 (PHQ-9; Kroenke et al., 2001). The PHQ-9 comprises nine items that measure symptoms associated with negative affect such as sadness. Participants are asked to provide the frequency they have experienced a specific negative affect. Responses are based on a 4-point Likert scale ranging from 0 (*not at all*) to 3 (*nearly every day*). A sample item is "Feeling down, depressed, or hopeless." Scores range from 0 to 27, with higher scores representing higher levels of symptoms associated with negative affect. For this study, the coefficient alpha was .65.

Marianismo Beliefs. The Marianismo Beliefs Scale (MBS; Castillo et al., 2010) was used to examine positive and negative components of traditional Latina gender role expectations. Responses on the 24-item measure were on a 4-point Likert scale ranging from 1 (*strongly disagree*) to 4 (*strongly agree*). Following Rodriquez et al.'s (2013) scoring procedures, eight items from the Spiritual Pillar and Family Pillar subscales were summed to calculate a positive marianismo beliefs score. Sixteen items from the Virtuous and Chaste, Subordinate to Others, and Self-silencing to Maintain Harmony subscales were totaled to compute the negative marianismo beliefs score. For both positive and negative scale scores, higher scores indicated an endorsement of traditional gender role values. Alphas for the positive and negative score data were .43 and .74, respectively representing low reliability (Leung, 2015). The poor reliability could be a result from item 24 being mistakenly omitted from the survey which reduced spirituality items from three to two. Low reliability could also be a result of a lower sample of Latina women from different sub-groups and generational backgrounds.

Educational Persistence. The Institutional Integration Scale - Revised (IIS-R; French & Oakes, 2004) is a 34-item, self-report measure that assesses for components contributing to educational persistence such as social and academic integration. Sample items are "I will most likely register at this university next fall" and "It is important to me to graduate from college." Responses range from 1 (*strongly disagree*) to 5 (*strongly agree*).

Scores were computed through summation of items with higher scores equating with higher likelihood to persist in completing a college education. Coefficient alpha was .82.

3. Results

Preliminary correlational analyses examined the relationships between positive and negative aspects of marianismo and mental health components, such as depression, positive affect, and persistence. Table 1 provides Pearson product-moment correlations, means, and standard deviations.

Table 1. *Correlation for Independent and Dependent Variables (n = 569)*

Negative Affect	Pearson Correlation	1	.166**	-.280**	-.375**
	Sig. (2-tailed)		<.001	<.001	<.001
	N	1424	1418	1402	1416
Marianismo Beliefs	Pearson Correlation	.166**	1	.274**	-.089**
	Sig. (2-tailed)	<.001		<.001	<.001
	N	1418	1420	1404	1418
Persistence	Pearson Correlation	-.280**	.274**	1	.418**
	Sig. (2-tailed)	<.001	<.001		<.001
	N	1402	1404	1404	1404
Positive Affecrt	Pearson Correlation	-.375**	-.089**	.418**	1
	Sig. (2-tailed)	<.001	<.001	<.001	
	N	1416	1418	1404	1418

**. Correlation is significant at the 0.01 level (2-tailed).

These results indicate that the positive aspects of marianismo and negative and positive components of mental health are significantly related to educational persistence. This suggests Latinx college STEM students that endorse positive gender role beliefs and demonstrate positive mental health components are more likely to have higher levels of educational persistence. In addition, the findings indicate that positive and negative components of marianismo beliefs are significantly related to positive and negative components of mental health which suggests that Latinx college students hold positive marianismo beliefs and hold positive components of mental health are more likely to strive to achieve higher educational goals.

To examine the relationship of psychocultural factors (marianismo, depression, positive affect) with educational persistence, a path analysis was conducted using maximum likelihood to examine the level of fit (see Figure 1).

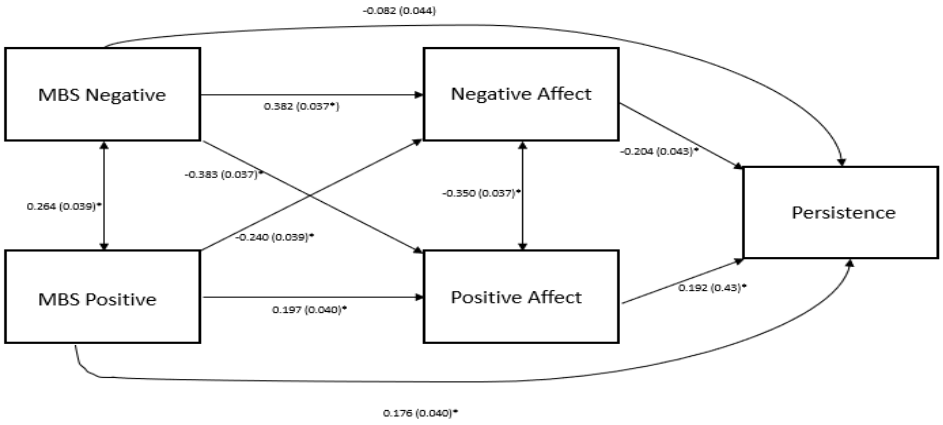

Figure 1. *The Path Model*

Results showed the model had good model fit: $\chi 2$ (0, N = 569) = 0.000 ($p < 0.001$); CFI = 1.000; RMSEA= 0.0001; and TLI = 1.000 (Hu & Bentler, 1999). The standardized coefficient (β), unstandardized coefficient (*B*), the standard error and significance level for each unstandardized coefficient of the paths are presented in Table 2. The analyses did not provide any modification indices, suggesting close fit of the model.

Table 2. *Hypothesized Model Direct Effect Path Coefficients*

Variable	B	SE	β	P-Value
Direct Effects				
Marianismo positive on flourishing	0.197	0.40	4.927	0.000
Marianismo negative depression	0.382	0.037*	10.249	0.000
Depression on persistence	-0.204	0.043*	-4.708	0.000
Flourishing on persistence	0.192	0.043*	4.443	0.000

For Hypothesis 1, results showed the path was not significant. However, the path between positive aspects of marianismo beliefs and persistence was significant (r = .17, p = .04). This suggests that the endorsement of traditional gender roles is related to higher persistence scores. This finding is important because it indicated that although positive marianismo beliefs and negative marianismo beliefs are significantly correlated (r =.039, p = 0.26) it supports the idea that the construct of marianismo itself is complex and can specifically affect Latinx students in different ways. As seen here, negative marianismo and positive marianismo beliefs are impacting Latinx college students' persistence in STEM in different ways.

For Hypothesis 2, we predicted that positive and negative aspects of mental health would mediate the relationship between positive and negative marianismo beliefs and persistence. The results showed that both positive (r = .19, p = .04) and negative mental health (r = .38, p = .37) components mediated the relationship between marianismo beliefs and persistence. These results indicate that positive and negative aspects of mental health do serve as a mediator in the relationship between positive and negative marianismo beliefs and educational persistence of Latinx college students in STEM. This finding is important because it shows how psychosocial factors can simultaneously impact educational persistence of Latinx college students in STEM. Although positive mental health components and negative mental health components are correlated (r = - .350, p = 0.37), the finding supports the notion that different types of mental health can impact persistence in distinct ways. For those who hold strong marianismo beliefs, mental health components can further exacerbate the effects of these beliefs.

4. Conclusion and Discussion

There is a rising interest in understanding the well-being of Latinas in STEM fields and how cultural values aid or hinder their persistence in their chosen STEM sector (Gonzalez et al., 2022; Sparks et al., 2021). The goal of this study was to examine the association between marianismo beliefs and positive and negative effect Latina STEM college students' educational persistence. This study adds to the evidence that marianismo's positive and negative characteristics, as well as negative and positive affect, are significantly linked to educational persistence. Through path analysis, we found various statistically significant conclusions in our study. First, positive features of marianismo beliefs (family devotion, compassion towards others, and spiritual provider) are positively associated with educational persistence. Second, in Latinx STEM college students, positive and negative affect mediated the relationship between marianismo beliefs and educational perseverance. These findings should help institutions promote Latinx students in STEM subjects more effectively.

Our study revealed that when Latinx STEM college students endorsed the positive aspects of marianismo ideas, it benefited their educational persistence. This means that as Latina STEM students endorsed family devotion, spiritual provider, and compassion towards others, they were more likely to persevere in their STEM field compared to Latina STEM students who did not endorse positive aspects of marianismo beliefs. Rodriguez et al. (2013), on the other hand, found that positive marianismo beliefs had no effect on motivation to continue in high school for Latina girls. We found no evidence that negative marianismo beliefs are associated with Latinx STEM college students, which was in contrast to Rodriguez et al. (2013) who found a

significant negative relationship between negative marianismo beliefs and high school persistence. These findings speak to the complexity of marianismo components (Castillo et al., 2010), such that one aspect may affect factors that contribute to educational persistence in Latinx college students in STEM while other aspects do not have significant effects.

It was found that positive and negative affect mediated the relationship between positive and negative aspects of marianismo beliefs and academic persistence. Participants who supported either positive or negative affect mediated the relationship between positive and negative marianismo beliefs and academic persistence. Although positive and negative mental health components are highly associated, the findings support that both negative and positive affective experiences impact persistence among Latinx college students in STEM programs. Our findings illustrate how mental health issues might worsen or improve for individuals that hold strong marianismo beliefs.

There are several study limitations to consider when interpreting the results. First, within-group differences among college students, Latinx, and STEM groups were not taken into consideration. There is a wide range of students from different generations, although they are categorized as college students and this generational gap is not accurately reflected in the analysis. For example, Mexican orientation was a predictor for first generation Latinx undergraduate students' educational persistence, whereas university environment was a significant factor for generation counterparts (Aguinaga & Gloria, 2015). In addition, differences among Latinx cultural groups were not taken into account. Thus, applying the results of this study to a student from Argentina and to a student from Mexico can be completely different. Moreover, the diversity within STEM fields was not taken into account. For instance, certain fields in STEM (e.g., chemistry, statistics, biology) have a more equitable gender distribution than other fields and this may differentially impact the academic experience of Latinas in STEM (Cheryan et al., 2017). Level of acculturation was also not examined. According to Villalba et al. (2018), acculturation was significantly associated with marianismo belief among immigrant Latinas. Third, the impact of sociocultural factors such as socioeconomic status and language on Latina STEM persistence was not assessed, which may influence the study results (Rozek et al., 2019).

Another limitation is the measurements of negative marianismo beliefs (Leung, 2015). Negative marianismo beliefs are shown to have low reliability scores which can impact the results of the analysis as the variables may not have fully captured negative marianismo beliefs of the sample. Furthermore, the study sample reflected Latina women from various sub-groups and generational backgrounds, which may have also influenced the reliability. A possible reason for this low reliability could be the sample size. Future research should aim to recruit a population higher than 500 participants. Finally, given the cross-sectional data, causality cannot be assumed.

The findings provide guidance to mental health professionals working with Latinx STEM college students. Mental health professionals should increase knowledge and awareness of the concept of marianismo in order to provide culturally sensitive therapy to Latina STEM students (Castillo et al., 2010). They need to have a clear understanding of how marianismo belief is connected to depression, positive affect, and academic persistence. In addition, understanding the multidimensional nature of marianismo belief and how each dimension affects the psychological well-being of this population is significant (Castillo et al., 2010). They should provide interventions aimed at strengthening positive marianismo beliefs and lowering negative marianismo beliefs. Educating and increasing awareness amongst Latina STEM students and STEM stakeholders is just as important as educating mental health professionals. Conversely, Wilkins-Yel and colleagues (2022) interviewed graduate level women of color in STEM programs and found increased mental health issue in programs that had lacked institutional support. The lack of support led participants to leave their programs prematurely due to the "chilly STEM climates" and lack of support for their psychological well-being (p. 210). Through various workshops and outreach efforts, mental health professionals can share knowledge on marianismo beliefs and increase awareness of campus mental health services to negate these negative effects. Last, mental health professionals can provide a group therapy opportunity specifically for STEM students of color to help foster social relationships with others with similar experiences and help them build optimism.

The results can inform institutions on ways to assist in Latina STEM student persistence. Schools can focus on developing services for Latina STEM students that help to provide positive, supportive social relationships that are rewarding. For instance, engagement in STEM-related activities in high school is essential in

promoting retention and persistence (Palmer et al., 2011). Peer-based programs focused on helping peers in crisis can be beneficial for Latina STEM students who are struggling with mental health issues (Eisenberg et al., 2016). Institutions can also use federal programs such as the Student Support Services (SSS) Program, an initiative by the U.S. Department of Education serving low-income, first-generation students who demonstrate financial need. This includes TRIO programs such as the Educational Opportunity Program (EOP), Ronald E. McNair Postbaccalaureate Achievement, and Upward Bound, and Upward Bound Math Science programs which offer tutoring, advising, and counseling. Implementing a variety of programs such as the ones listed can create a sense of support and belonging for Latina STEM students.

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