Frances McClelland Institute
Children, Youth, and Families

Multiple Contextual Identities of Latinx Adolescents: Examining Ethnic and Science, Technology, Engineering, and Math (STEM) Identities

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Literature Review

Latinx Students. In the US, Latinx students lack representation in STEM college programs (Crisp & Nora, 2012), inhibiting access to career opportunities and potential increased future earnings (NCES, 2016).

- Latinx students are the largest minority group in the US public K-12 school system, yet have lower levels of enrollment in math and science courses and score significantly lower on math and science achievement tests (NCES, 2016).
- We turn to the contextual integration of multiple identities model (McLean & Syed, 2015; Syed & McLean, 2016) to examine how multiple personally meaningful identities may help us understand Latinx students' STEM trajectories.

Identity. Adolescence is an important time for identity development because of increased logical reasoning and cognitive abilities (Erickson, 1968). Latinx adolescents likely develop co-occurring identities, such as ethnic identity and STEM identity, that are salient for STEM trajectories.

- Ethnic identity refers to the personal importance and identification with one's ethnicity (Sellers et al., 1997). For Latinx students, ethnic identity has been linked to higher grades (Chang & Le, 2010), greater academic proficiency (Rivas-Drake, 2011), positive work habits (Supple et al., 2006), and educational values (Perreira, Fuligni, & Potochnick, 2010).
- STEM identity is referred to as the self-recognition as a math and/or science person (Anderson, 2007; Carlone et al., 2015).
- High levels of STEM identity have been linked to future STEM career commitment and attainment among college students (Chemers et al., 2013; Martin-Hansen, 2018).
- Studies have yet to assess the co-occurrence of ethnic and STEM identities in Latinx middle school students, which is important given that these identities during early adolescence may influence their future STEM commitment.

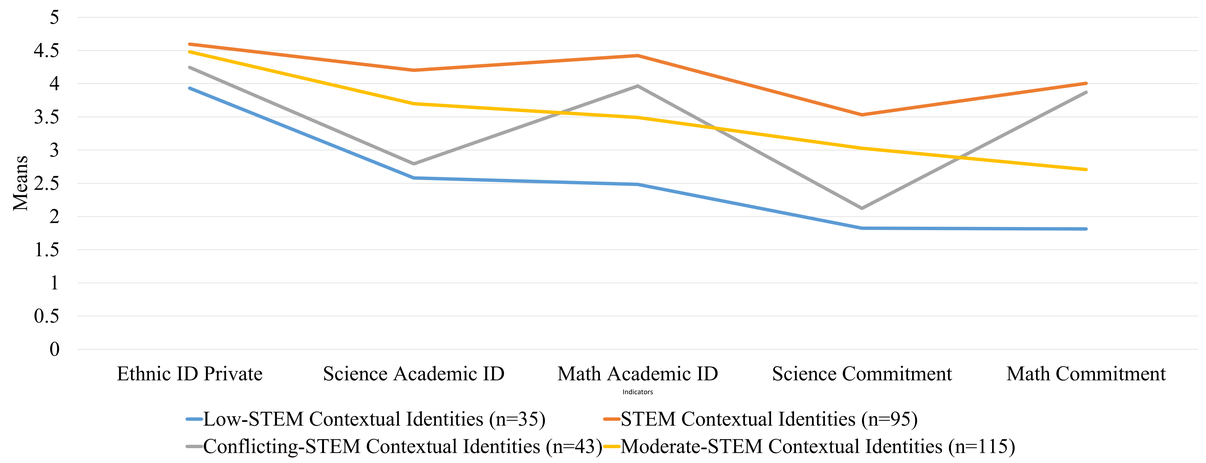

Figure 1. Means of Study Variables by Profile ($N = 288$)

Present Study

Research Goals

- **Goal 1:** We explored Latinx students' co-occurrence of identity development. Specifically, we examined profiles of Latinx students' ethnic identity, STEM identity (i.e. math and science identity), and STEM commitment (math and science commitment).
- **Goal 2:** We examined how students with distinct profiles of ethnic and STEM identities at Time 1 (T1) differed across math and science commitment at Time 2 (T2).

Method

Participants and Procedures

The sample included 288 families with middle school students (*Mage* = 13.69, *SD*= .56; 42% female; 86% U.S.-born) recruited from middle schools in Central Texas. Participants completed telephone interviews in English or Spanish.

Measures

Ethnic Identity.

- Ethnic identity was assessed using an adapted version of the MIBI (Sellers et al., 1997). We used the private regard subscale (4 items; e.g., "I am proud to be a member of my ethnic group" α = .87).

STEM Identity

- *Science and Math Identity.* Science and math identity were assessed using an adapted academic measure of college major academic identity for use among middle school students (Walker & Syed, 2013). The modified questions focused on academic identity in science and math (the original items focused on college majors). We used the science identity subscale (9 items; e.g., "I think I am a good science student" α = .85) and math identity subscale (9 items; e.g., "I think I am a good math student." α = .86).
- *Commitment to Science & Math Career.* Commitment to a math and science career were each assessed using an adapted measure on college students' intentions to work in a math or science career for use with middle school students (Chemers et al., 2011). We used the science career subscale (7 items; e.g., "I intend to work in a science career" α = .94) and math career subscale (7 items; "I intend to work in a math career." α = .94).

Table 1. Summary of Correlations, Means, Standard Deviations of Study Variables ($N = 288$)

	1	2	3	4	5
1. Ethnic Identity	--				
2. Science Identity	.31**	--			
3. Math Identity	.27**	.49**	--		
4. Science Commitment	.15*	.59**	.24**	--	
5. Math Commitment	.08	.21**	.66**	.28**	--
M	4.42	3.60	3.76	2.92	3.22
SD	.71	.79	.79	1.03	1.00
Min.	1	1	1.25	1	1
Max.	5	5	4	5	5

Table 2. Latent profile analysis fit indices and statistics ($N = 288$)

Number of profiles	BIC	AIC	Entropy	LMRT p-value	Profile probability
1	3684.52	3652.81	--	--	1.00
2	3524.65	3462.91	.74	.004	.87 .95
3	3467.23	3397.46	.77	.22	.89 .90 .90
4	3432.32	3343.53	.76	.03	.88 .90 .83 .87
5	3386.37	3278.55	.80	.08	.90 .89 .83 .86 .94

* p≤.05; ** p≤.01; *** p≤.001

Results

Analytic Plan. We conducted latent profile analysis (LPA) in Mplus, version 7.2. Selection of the best fitting model was guided by the Bayesian information criteria (BIC) and the adjusted BIC (ABIC); values closer to zero indicate a better fitting solution. We also used a Lo-Mendell-Rubin likelihood ratio test (LRT); significant LRT suggests that the model with *k* number of profiles fit the data better than the model with *k*-1 number profiles. Determination of the best fitting solution was also based on the pattern of means for each profile, conceptual relevance, and theory.

Results. See table 1 for descriptive statistics.

Goal 1:

- Based on fit indices and substantive meaning, a 4-profile solution was selected (Figure 1). Groups were termed ***STEM Contextual Identities*** (33%), ***Moderate-STEM Contextual Identities*** (40%), ***Low-STEM Contextual Identities*** (12%), and ***Conflicting-STEM Contextual Identities*** (15%).

Goal 2:

- ANOVA results revealed that the profiles differed on T2 Math [F= (3,161) = 22.15, p < .001] and T2 Science [F= (3, 161) = 13.34, p<.001] commitment.
- For T2 Math and Science commitment, the results suggested the *STEM Contextual* group (M_{math} = 3.63, $M_{science}$ = 3.46) was stronger in math and science commitment the *Moderate-STEM* (M_{math} = 2.83, $M_{science}$ = 2.89) and *Low-STEM* groups (M_{math} = 1.63, $M_{science}$ = 2.06).
- T2 Math and Science commitment were not significantly different between the *STEM Contextual* and *Conflicting-STEM* groups (M_{math} = 3.47, $M_{science}$ = 2.34) or between the *Moderate-STEM* and *Conflicting-STEM* groups.

Discussion

- This is the first study to examine the co-occurrence of ethnic identity and STEM identity in Latinx middle school students.
- Our findings suggest the importance of programming that incorporates culture in STEM subjects and fostering STEM identity before high school (Gándara, 2006; Syed et al, 2011).

Goal 1

- First, our findings provide evidence of the contextual integration of multiple identities model, in that ethnic identity and academic identity co-occur. Given the salience of identity development in adolescence (Erickson, 1968), these findings suggest the importance of fostering both ethnic and STEM identities to support Latinx students' future STEM interest.

Goal 2

- Second, the findings evidence that STEM commitment significantly differs across the STEM identity profiles. As anticipated from the literature, students in the *STEM Contextual* group (i.e. those with high co-occurring identity domains) had the highest T2 STEM commitment. This result suggests that for Latinx middle schoolers, STEM commitment is strengthened by the interplay of high ethnic identity and high STEM identity.

Limitations and Future Directions

This study used adolescent self-reported cross-sectional data, and a sample of youth from a specific southern region in the US. Thus, these findings may not be generalizable to other Latinx students. Future work should examine these links over time, include teacher and parent reports to triangulate findings, and test links with samples in other areas of the US.

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