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Research Article

Organizational and contextual support in the interest in STEM careers. Gender differences.

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ABSTRACT

The objective of the study was to test the empirical sustainability of the theoretical model for men and women on the relationship between the organizational and contextual support perceived in high school students in Mexico, on the interest in studying professions in STEM disciplines. 249 men and 235 women from 14 educational establishments participated, distributed in the six semesters that make up upper secondary education. The results indicate statistical differences between men and women only with respect to interest in studying STEM professions, being higher in men. The overall model presents acceptable fit indicators. The measurement invariance for the models (males and females) was estimated, with the female model being the one with the best fit to the proposed theoretical relationship. It is concluded that there is a need for high school organizations to generate career models and strategies to promote the interest of women in STEM disciplines

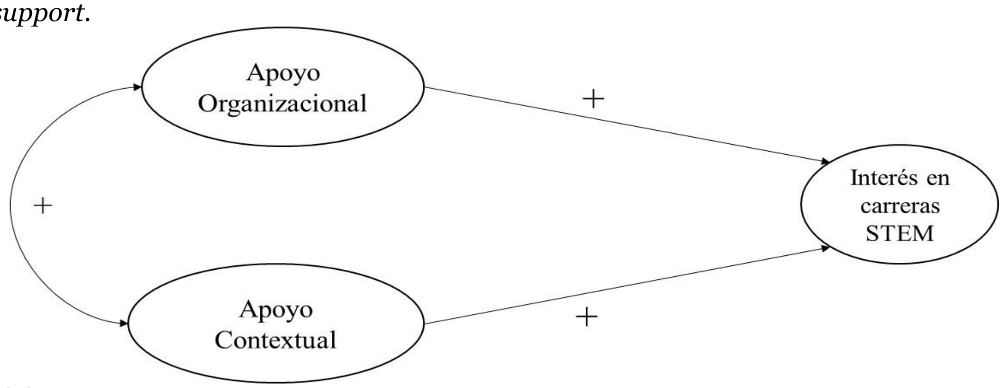
Keywords: STEM, upper secondary education, organizational support, contextual support.

Introduction

The social support that women can receive from their educational institutions and environment is crucial to creating an environment that fosters confidence, inclusion, and access to educational resources, allowing women to be interested, participate, and succeed in Science, Technology, Engineering, and Mathematics (STEM) professions.
From an economic perspective, women's participation in STEM (science, technology, engineering and mathematics) areas has a significant impact on several aspects, both for women individually and for society in general (Zubieta & Herzig, 2015).
The participation of women in these disciplines not only has individual economic benefits, such as higher salaries and job stability (Broyles, 2009; Kahn & Ginther, 2017), but also contributes to gender equality in the economic sphere (Langdon et al., 2011), promotes innovation and economic growth (Castillo et al., 2014), and plays a critical role in transforming society towards greater diversity and equity (Hanson & Krywult-Albanian, 2020). The presence of women in professions associated with STEM disciplines can boost the creation and leadership of companies, thus contributing to economic growth and development (Magaña-Medina & Aguilar-Morales, 2020).
Upper secondary education in Mexico represents an important moment in students' professional future, as they decide whether to continue with higher education and in which areas. It is therefore crucial that institutions are a role model, as schools and the community can provide additional resources and opportunities to engage women in STEM activities, such as clubs, workshops, mentoring programs, and special events. These resources can increase your exposure and experience in STEM fields and with it your interest in these

disciplines. It is therefore necessary for high school institutions to carry out activities that promote the inclusion of women in this type of profession without gender bias (Cundiff et al., 2013).
This research aims to test a theoretical model that supports the direct relationships between institutional support and the context on interest in developing in STEM professions for men and women, and thus identify whether this model is better explained in a female population (Figure 1).

Figure 1
Theoretical model proposed for interest in STEM professions in relation to perceived organizational and contextual support.



Note. Own elaboration.

In Mexico there are few empirical studies (Avendaño, 2018; Gudiño Paredes, 2018; Magaña-Medina, Aguilar-Morales, et al., 2023; Pantoja et al., 2020) on the subject and no studies were identified that have proven this relationship to support the need for institutional policies for the promotion of STEM disciplines in men and women. Studies have been carried out on the attitude and interest of women in these disciplines (Bottia et al., 2015; Buccheri et al., 2011), about the conditions or environments that promote them (EL-Deghaidy et al., 2017; Pathoni et al., 2021), or the predictors of interest (Gnilka & Novakovic, 2017; Nugent et al., 2015), but there is a lack of models that allow corroborating these theoretical relationships in various population groups.

Theoretical Referents

Organizational Support

Organizational support refers in this study to the support that institutions, such as schools or universities, provide to students in terms of resources, educational programs, and learning opportunities related to professions in STEM disciplines.
Without a doubt, the information and support that educational institutions can provide so that an increasing number of women can be motivated to choose a profession in a STEM discipline is extremely important. Authors such as Dong et al., (2019) have pointed out the relevant role that directors and administrative staff play in the professional development of students.
In this sense, the Theory of Self-Determination of Deci and Ryan, (2008) is particularly relevant when considering what institutions and schools can do to foster women's interest in STEM careers. This theory focuses on intrinsic motivation and how people feel empowered and engaged when they meet their basic psychological needs: competence, autonomy, and relationship. For example, schools can offer practical challenges that improve students' competencies in these disciplines, so that they feel attracted to this group of professions, either through a positive relationship with their teachers, the development of projects or role models that allow them to generate a clear expectation about these disciplines. Particularly in women, it has been proven (Mouganie & Wang, 2017) that require these role models to generate expectation and interest.

Contextual support

Contextual support refers to the social and cultural environment in which individuals find themselves and how these influence their interest in and motivation towards professions in STEM disciplines.
The work of Lent et al., (1994) He clearly explains through his social cognitive theory of career development, how professional vocation is determined jointly by individual and environmental factors.
On the other hand, the theory of Ecological Intervention of Bronfenbrenner y Ceci, (1994) It also allows us to understand the relevance of the environment as part of the elements that intervene in the behavior and decisions of individuals. This theory examines how different systems in a person's environment (family, school, community) interact to influence their development. In the context of women in STEM, social support from different levels, such as family, school, and community, can create a cohesive and supportive environment to foster interest in and selection of professions in STEM disciplines (Bronfenbrenner & Evans, 2000).
Another approach that reinforces the importance of context is the social identity theory of Tajfel and Turner, (1979). This theory suggests that people seek to belong to groups with which they identify. Community social support can help strengthen gender identity and the identity of being part of the STEM field, which in turn can increase their participation and persistence in these disciplines.

Interest in STEM disciplines

The motivation aspect is mainly related to individual issues (Gnilka & Novakovic, 2017) such as stereotypes (Wu et al., 2020), self-perception (Chemers et al., 2011; Liu et al., 2014), expectations (Maton et al., 2016), intrinsic motivation and goals (Stout et al., 2011), all of which influence career choice (Vázquez-Alonso & Manassero-Mas, 2015) and that it is also directly related to the environment and beliefs of the parents (Avendaño et al., 2018; Sheldon, 2003).

In particular, the theory of interest of Hidi & Renninger, (2006) They allow us to understand how interest in a specific activity or area develops and is maintained over time. This theory is divided into three phases: a) the detection where the individual generates an initial interest, b) in this second phase the interest is sustained through continuous participation in the activities that generate it and c) in the last phase the interest can evolve towards a deeper specialization, where the individual is committed to more advanced learning.

In this sense, trying to extend the second phase guarantees the success of the last one and allows interest to be translated into commitment to a given activity, which makes it relevant to identify the factors that trigger it.

Gender differences

The choice of women for professions in STEM disciplines has its origins in gender theory (Collins et al., 1993), through three aspects: capacity, socialization and motivation.

The capacities of women, in various areas of knowledge, is a topic that has been extensively researched (Addis & Pagnini, 2010; CONICYT & Comunidad Mujer, 2016; González-Jiménez, 2003; Radovic, 2018) where the gender differences for these disciplines have not been overwhelming. This situation, although it may have a biological origin, is not a real barrier to their inclusion in the different contexts with male predominance.

Socialization, on the other hand, includes three aspects: gender socialization expresses that giving different reinforcement to boys and girls for certain behaviors translates into differentiated behaviors between them, their references being the people who are important to them, especially parents and teachers. The second aspect is the social role theory, which indicates that boys and girls tend to follow the gender role with which they identify. The third aspect is the theory of the gender schema, which indicates that boys and girls become aware of how they should behave according to their gender, influencing their social behavior, which translates into girls or young women with highly reinforced feminine behaviors choosing fewer careers of traditionally male dominance (Vázquez-Cupeiro, 2015).

Methodology

Participants

A deterministic sample of 484 high school students from 14 institutions located in 12 different municipalities in the states of Jalisco and Tabasco in Mexico was used. A total of 249 (51.4%) males (Mean age = 16.8 years, SD=1.20) and 235 (48.6%) females (Mean age = 16.6 years, SD=1.2) between 15 and 23 years of age participated in the survey. Table 1 presents the distribution by semester with which the sample was formed, considering it important to include students from all semesters that comprise upper secondary education in Mexico, in order to obtain a sample of maximum intentional variation (Otzen & Manterola, 2017), in order to analyze a perspective of students at different stages of their educational process prior to undergraduate studies.

Board 1

Distribution of the surveyed population by age range and sex

Rank	Man		Woman		Total	
	Fr	%	Fr	%	Fr	%
Under 16 years old	86	34.5	107	45.5	193	39.9
17 – 18 years old	150	60.2	114	48.5	264	54.5
19 -20 years	12	4.8	10	4.3	22	4.5
Over 21 years old	1	0.4	4	1.7	5	1
TOTAL	249	51.4%	235	48.6%	484	100

Note. Prepared by the authors based on survey data processed with the SPSS ver. 25 (IBM, 2017).

Instruments

Interest in STEM disciplines

The scale on interest in science, technology, engineering and mathematics disciplines has been developed and refined by the research group over various interventions (Avendaño-Rodríguez et al., 2017; Magaña-Medina, Hernández-Mena, et al., 2023; Magaña et al., 2013) and sources (Kier et al., 2014; Romine et al., 2016; Shin et al., 2016) that gave rise to the four items presented in the model (example: *I am interested in a career related to science, technology, engineering or mathematics*) which were presented in a five-choice Likert format (1= strongly disagree, 2= disagree, 3= neither agree nor disagree, 4= agree, and 5= strongly agree). The measurement model of the Interest in Disciplines in Science, Technology, Engineering and Mathematics (ISTEM) scale presents values for the exploratory factor analysis of the Kaiser-Meyer Olkin (KMO) measure of 0.84. *gl*= 6 and a value of $\chi 2= 908.17$, *which allows this procedure to be validated, which* Using a maximum likelihood extraction method and a direct oblimin rotation, it presents 62% of the explained variance and factor load values ranging from 0.77 to 0.81, which describes a solid model for this stage (Williams et al., 2010). The confirmatory factor analysis corroborated the one-dimensional theoretical structure of the exploratory factorial and presents adjustment indicators that are also considered acceptable (*$\chi 2$= 8.08, df*= 2, *p* > 0.018, SRMR=0.03, AGFI=0.96, RMSEA 0.08 IC90[0.02-0.14], TLI=0.98, y CFI=0.99) (Littlewood, 2004; Manzano & Zamora, 2010). With respect to the reliability of the measurement, Cronbach's Alpha coefficient reports a value of 0.87 and Mc Donald's Omega 0.86 CI 95 [0.84 – 0.88], which are favorable for the model (Domínguez-Lara & Merino-Soto, 2017; Ventura-Leon & Caycho-Rodríguez, 2017).

Organizational and Contextual Support

For the measurement model of the organizational and contextual support variables, the AOC-STEM scale was used, previously validated by the research group (Magaña-Medina, Aguilar-Morales, et al., 2023). This scale contains two factors and was also made up of a Likert-type scale with five response options (1= strongly disagree, 2= disagree, 3= neither agree nor disagree, 4= agree, and 5= strongly agree). The exploratory factor analysis reports for the model in this dataset sufficient values for this procedure (KMO= 0.74, df= 15, $\chi^{2\ =\ 483.94),\ \text{which}}$ Using maximum likelihood and direct oblimin, it reports two factors (organizational and contextual support) that explain a total of 38.43% of the variance, with factor load values in both factors ranging from 0.38 to 0.82 considered as acceptable minimums (Lloret-Segura et al., 2014). The confirmatory factor analysis for this dataset also showed relatively low results for the parsimony adjustments but in accordance with the proposed theoretical structure ($\chi 2$= 44.2, *Gl*= 8, *p* > 0.000, SRMR=0.08, AGFI=0.92, RMSEA 0.09 IC90[0.07-0.12], TLI=0.91 y CFI=0.95)(McDonald & Ho, 2002).

Data Collection Procedures

Steps were taken with the aforementioned school institutions to be able to carry out the survey on paper and pencil and the informed consent of the students and parents was requested through the school authorities, which also provided their written authorization. They were guaranteed at all times the confidential use of the data provided and its presentation for academic purposes only. All students accepted the invitation to participate in the study. Data collection was carried out by the group of researchers in the classrooms of the participating institutions. The information was given to them in a question book and an answer sheet that was later processed in an optical reader for capture.

Data analysis

In order to estimate the structural model, the lost data were handled with the regression imputation method. Subsequently, descriptive analyses of the population were carried out for each of the variables under study and the demographic data collected.

Reliability is usually validated with the calculation of Cronbach's Alpha, but several authors (Dunn et al., 2014; Ventura-Leon & Caycho-Rodríguez, 2017) have pointed out that it is not sufficient, since this coefficient has limitations and suggests the use of Mc Donald's omega coefficient (ω), which is estimated from factor loads. The calculation of ω was performed using the JASP team (2023) version 0.17.3 free access software.

Subsequently, for each measurement model, the Kaiser-Meyer-Olkin (KMO) and Bartlet sphericity indicators were verified as principles for the multivariate analysis of each measurement. Exploratory factor analysis (EFA) was performed for each variable using the method of factor extraction by maximum likelihood and direct Oblimin rotation. For these estimates, SPSS version 25 software was used (IBM, 2017).

For confirmatory factor analysis (CFA), the Bootstrap method (2,000 replications, 95% confidence interval) of AMOS version 23 was used (Arbuckle, 2011; Ledesma, 2008). In the analysis of the goodness of fit of the measurement models, the general model and by groups, the maximum likelihood (ML) estimation method was used. The main indicators of the degree of goodness of fit ($\chi 2$ associated with a value of $p < .001$) were estimated. Absolute fit indices such as the RMSEA (Approximation Index of the Root of Mean Squares of Error Absolute Fit Indices), the SRMR (the Mean Square Root of the Residuals), and the AGFI (Adjusted Goodness of Fit Index) were also considered. Finally, incremental adjustment indices such as the CFI (comparative adjustment index) and the TLI (non-regulated adjustment index) were reported (Littlewood & Bernal, 2014; Manzano & Zamora, 2010).

To compare the model of interest in STEM disciplines in male and female students, structural invariance between groups was first verified, following a multigroup analysis approach (Byrne, 2016). The approach is used to test whether a structural model replicates in groups of the same population. For the study, it was analyzed whether the structural pathway described in Figure 1 was invariant in each group of men (n = 249) and women (n = 235). To test the invariance of the structural model between groups, the sequence of nested models that increase the constraints from one model to the next was followed (Byrne, 2016). The configurational model (Model 1) was the first step in establishing invariance. Configural invariance implies that a similar model structure in both groups fits the data. The configurational model served as a reference model for testing later models. Then, the measurement weights model (Model 2) was tested, the restriction that all factor loads were equal in all groups was imposed. This test passed if the measurement model works similarly in all groups. Finally, structural invariance was tested by adding cross-group constraints to the structural regression pathway (Model 3) and the residual error of the latent variables (Model 4). The invariance of each model was verified by the indicators that the literature reports as acceptable ($\Delta\chi^2$ with $p \geq .001$, ΔCFI < .01 and

ΔRMSEA < .015) (Byrne, 2016). Because the χ2 statistic is sensitive to large samples (Tomarken & Waller, 2003) when the Δχ-based approach[2] and other goodness-of-fit indices (ΔCFI and ΔRMSEA) do not agree, the values of ΔCFI and ΔRMSEA are taken as a reference to evaluate the fit of the model.
To conclude, a test was carried out *t* by calculating the value of the *d* to determine the differences between the two population groups and the size of the effect (Cárdenas & Arancibia, 2014).

Results

Descriptive

In order to verify the necessary conditions to perform the exploratory factor analysis, a descriptive analysis was developed in the first instance, which included the values of the mean, standard deviation, asymmetry and kurtosis of each of the items. These indicators made it possible to identify whether the distribution of the data resembles a normal distribution (Table 2).

Board 2
Descriptive of the items of the Organizational and Contextual Support scale in the promotion of interest in STEM disciplines (AOC-STEM), and interest in STEM professions (ISTEM).

Items	M	OF	Minimal	Maximum	Asymmetry	Curtosis
Item AO1.	3.37	1.432	1	5	-0.43	-1.12
AO2 Item.	3.18	1.327	1	5	-0.23	-1.26
AO3 item.	3.35	1.255	1	5	-0.36	-0.80
Item AC1.	3.47	1.341	1	5	-0.52	-0.89
Item AC2.	3.46	1.141	1	5	-0.56	-0.38
Item AC3.	3.44	1.165	1	5	-0.58	-0.42
ISTEM1 Item	3.27	1.162	1	5	-0.33	-0.61
ISTEM2 Item	3.10	1.199	1	5	-0.27	-0.75
ISTEM3 Item	3.51	1.258	1	5	-0.59	-0.60
ISTEM4 Item	3.49	1.201	1	5	-0.64	-0.42

Source: Authors' elaboration based on the survey data processed with the SPSS see. 25 (IBM, 2017).

Multigroup analysis by gender.

A multigroup confirmatory factor analysis was performed to corroborate the invariance of the measurement of interest in STEM disciplines and perceived organizational and contextual support (AyOSTEM) for the promotion of STEM professions among men and women. The freely configurable invariance model (M1) was tested, which proposed that the variable in the measurement model presents a factor structure in all groups (men and women), and factor loads, intercepts and error variances were allowed to be estimated freely. Subsequently, the metric invariance model was verified, in which the factor loads were restricted so that they were equal in the groups of men and women. Table 3 presents the results of the adjustment of the models compared with the configuration model, the scalar invariance model test (M3) in which the intercepts as well as the factor loads were restricted among the population groups, to finally estimate the strict invariance model (M4), in which the following factors were restricted, in addition to the factor loads, intercepts, and error variances. The indices obtained in the last model (*χ2=30.50, gl*=16 , *p* =.016, CFI=.98. 043 IC90 [.019-.067]) for the multigroup AFC of the ISTEM scale and the AyOSTEM scale (*χ2=77.46, gl*=35 , *p* =.000, CFI=.94. RMSEA=.050 IC90 [.035-.065]) indicated that the fit was appropriate when testing for strict invariance, since the comparison of the three models in both cases allowed the results to be corroborated in an acceptable way (ΔX2, p ≥ .001, ΔCFI ≤ .01, and ΔRMSEA ≤.015) according to the literature (Tomarken & Waller, 2005). In the case of the general model, only the strong invariance model is tested by comparing the acceptable values of the literature (Byrne, 2016).

Board 3: Summary of adjustment statistics to test the measurement invariance of the dimensional models of the Organizational and Contextual Support (AyOSTEM) of Interest Promotion (ISTEM) by STEM disciplines.

Measure	*X2*	gl	*p*	*χ2*/gl	CFI	RMSEA	D *x2*	ΔCFI	ΔRMSEA
SAME									
M1. Configuration Invariance	10.59	4	.031	2.64	.993	.058 IC90 [.016-.103]			
M2. Metric or weak invariance	16.85	7	.018	2.40	.989	.054 IC90 [.021-.088]	6.25 (3), p=.100	.004	.004
M3. Scalar or strong invariance	26.66	11	.005	2.42	.982	.054 IC90 [.028-.081]	16.06(7), p=.024	.007	.000

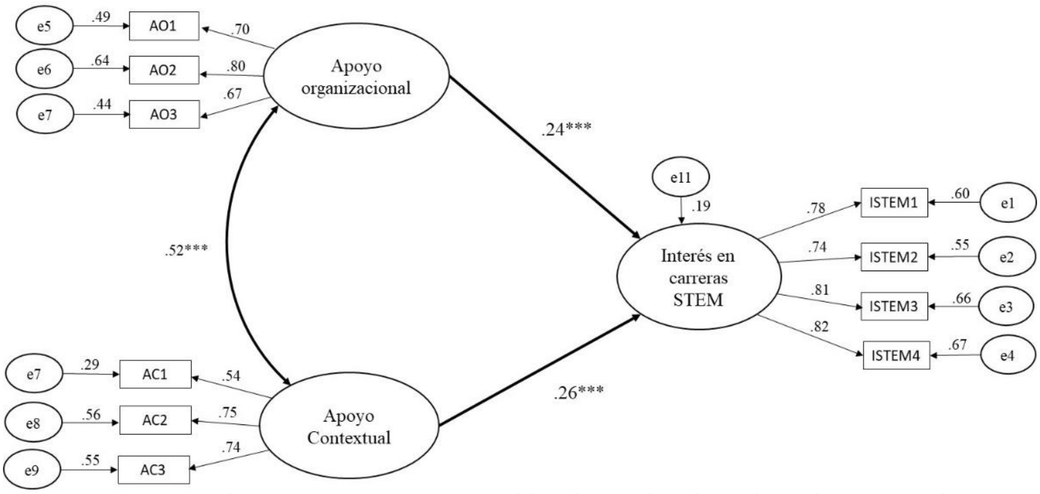
M4. Strict invariance	30.50	16	.016	1.90	.984	.043 IC90 [.019-.067]	19.91(12), p=.069	-.002	.011
AyOSTEM									
M1. Configuration Invariance	52.81	16	.000	1.78	.952	.069 IC90 [.049-.090]			
M2. Metric or weak invariance	58.21	20	.000	1.86	.951	.063 IC90 [.044-.082]	5.40 (4), p=.248	0.001	0.006
M3. Scalar or strong invariance	73.56	26	.000	1.85	.939	.062 IC90 [.045-.078]	20.75(10), p=.023	0.012	0.001
M4. Strict invariance	77.46	35	.000	14.52	.945	.050 IC90 [.035-.065]	24.64(19), p=.172	-.006	0.012
Theoretical Model									
M1. Configuration Invariance	104.52	64	.001	1.633	.977	.036 IC90 [.023-.049]			
M2. Metric or weak invariance	116.06	71	.001	1.635	.974	.036 IC90 [.024-.048]	11.54 (7), p=.117	0.003	0.000
M3. Scalar or strong invariance	117.28	73	.001	1.607	.974	.035 IC90 [.023-.047]	12.75(9), p=.174	0.000	0.001
M4. Strict invariance	127.54	87	.003	1.466	.977	.035 IC90 [.018-.042]	18.29(13), p=.147	-0.003	0.000

Note. ISTEM= interest in STEM disciplines; AyOSTEM= Perceived organizational and contextual support for the promotion of STEM professions.
N = 484, men = 249 and women = 235.
Prepared by the author based on the survey data processed with the SPSS see. 25 (IBM, 2017).

Model Evaluation

The results of the general structural model are presented in Figure 2. The main adjustment indices ($\chi 2$ = 72.88, *df* = 32, *p* = .000; TLI = .96, SRMR= .06, AGFI = .95, CFI=.97; RMSEA= .05; IC 90 [.03-.06]), indicate that it supports the theoretical proposal. The direct effects indicate that high school students perceive that the organizational support (β= .24, *p=.000*) and contextual support (β= .26, *p=.000)* they received for the promotion of *STEM* professions is related to the interest they have developed in these disciplines.

Figure 2
Structural model for interest in STEM professions in relation to perceived organizational and contextual support.

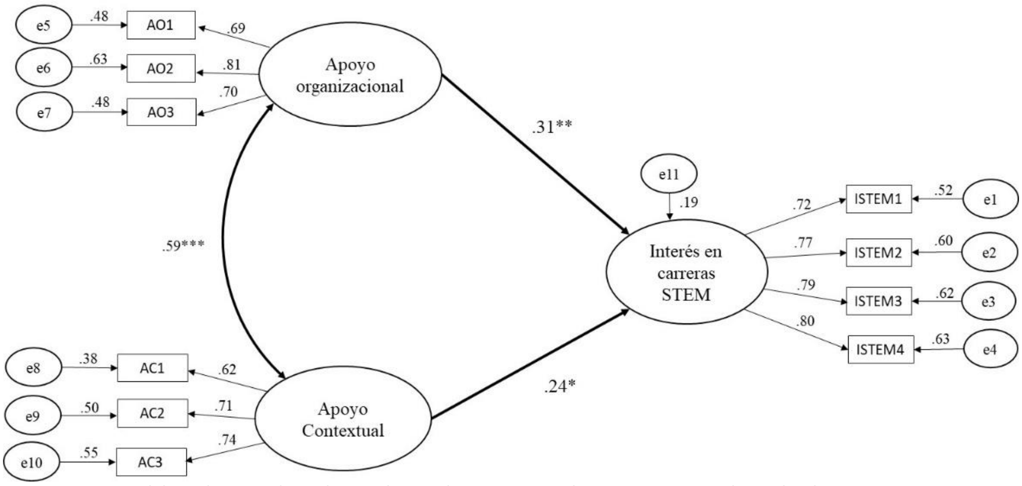


Note. N = 484, men = 249 and women = 235. Prepared by the author based on the survey data processed with the SPSS see. 25 (IBM, 2017).
**p<.05,* ***p<.01,* ****p<.001.*

Once the invariance of the measures between men and women has been determined, the models for both groups can be analyzed. Figure 3 shows the values obtained for the male population. Acceptable values are also reported for the main adjustment indicators ($\chi 2$ = 57.40, *df* = 32, *p* = .004; TLI = .96, SRMR= .06, AGFI = .92, CFI=.97; RMSEA= .06; 90 CI [.03-.08]). In this model, it is also found that there is a direct relationship between organizational support (β= .31, *p=.002) and contextual support (β= .24, p=.019) in relation to the interest that the student perceives towards* STEM professions, however, the levels of statistical significance are lower than the general one.

Figure 3

Structural model for interest in STEM professions in relation to perceived organizational and contextual support in men.

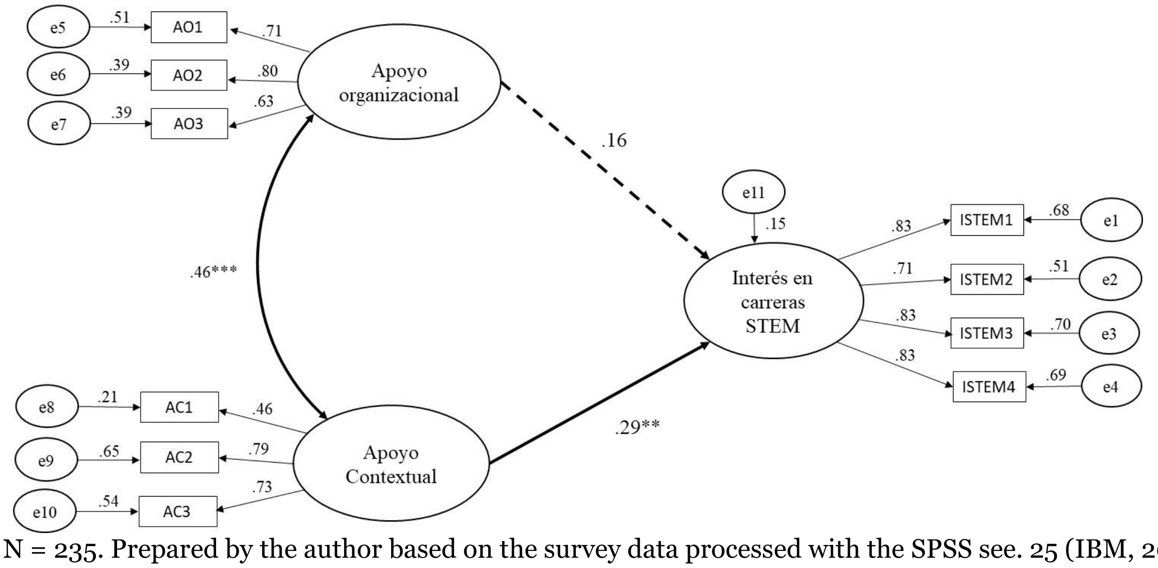


Note. N = 249. Prepared by the author based on the survey data processed with the SPSS see. 25 (IBM, 2017). **p<.05, **p<.01, ***p<.001.*

In the theoretical model of women (Figure 4), fit indicators can also be considered acceptable ($\chi 2$ = 47.12, *df* = 32, *p* = .041; TLI = .97, SRMR= .07, AGFI = .93, CFI=.98; RMSEA= .05; 90 CI [.00-.07]). Contrary to the general model, for women the direct relationship between organizational support and interest in STEM professions was not corroborated (β= .16, *p=.082)*. Contextual support, on the other hand, did present a direct relationship (β= .29, *p=.002) adhering to the theoretical model proposed.*

Figure 4

Structural model for interest in STEM professions in relation to perceived organizational and contextual support in women.



Note. N = 235. Prepared by the author based on the survey data processed with the SPSS see. 25 (IBM, 2017). **p<.05, **p<.01, ***p<.001.*

To conclude the evaluation of the models, Table 4 presents the main adjustment indicators, which, as already mentioned, are acceptable for both the general model, the model for men and women. In the table the following is added: the Akaike Information Criterion (AIC) and the Bayes Information Criterion (BIC) which address the aspect of parsimony and in both cases the smaller values represent a better fit for the model (Byrne, 2016). It can be seen in the table that the women's model is the one that best explains the proposed theoretical relationship.

Board 4

Comparison of the indices of the structural models (general, men and women).

Indicator	Indicators of the degree of goodness of fit of the model					Model Adjustment
	X2	*gl*	*p*	*χ2/gl*		AIC
Expected values			> .001	1 a 3		
General model	72.89	32	.000	2.27		118.89
Men's Model	57.40	32	.004	1.79		103.40
Women's Model	47.12	32	.041	1.47		93.12
Indicator	Absolute Fit Indices			Increment adjustment rates		Model Adjustment
	SRMR	RMSEA	AGFI	TLI	CFI	BIC
Expected values	<.08	.06 a .08	≥ .90	≥ .90	≥ .95	
General model	.06	.05 IC 90 [.03-.06]	.95	.96	.97	215.08
Men's Model	.06	.06 IC 90 [.03-.08]	.92	.96	.97	184.30
Women's Model	.07	.04 IC 90 [.00-.07]	.93	.97	.98	172.69

Note. N= 484, men = 249 and women = 235. Acceptable reference values (Hu & Bentler, 1999; Manzano & Zamora, 2010). Prepared by the author based on the survey data processed with the SPSS see. 25 (IBM, 2017).

Mean difference

Finally, Table 5 shows the difference in means with respect to the two population groups that are compared (men and women) for each of the variables that make up the structural model. It can be seen that there are only statistically significant differences with respect to interest, being lower in women. This difference according to the statistics of the *d* of Cohen we can point out that sex explains 24% of the differences perceived by men and women, which according to Cárdenas and Arancibia, (2014) is relatively low and that is why other factors must be considered in the explanation of the variable interest in STEM disciplines.

Board 5

Student's t-test and size of the effect of the variables with respect to sex

Variable	Man		Woman		t	*d Cohen*
	M	OF	M	OF		
Interest in STEM disciplines	3.47	1.07	3.20	1.17	2.58*	0.24
Organizational Support	3.46	.94	3.32	.95	1.70	0.14
Contextual Support	3.31	.99	3.44	.93	-1.49	-0.13

Note. Prepared by the authors based on survey data processed with the SPSS ver. 25 (IBM, 2017).
*p<.05, **<.01, ***<.001, N= 484

Discussion and conclusions

The relationship between organizational and contextual support and interest in STEM (science, technology, engineering, and mathematics) careers may have different influences depending on gender. Although it is important to note that gender differences in the choice of STEM careers are the result of a complex combination of social, cultural and personal factors (Gnilka & Novakovic, 2017), and cannot be attributed exclusively to organizational and contextual support, the results of the study corroborate the direct relationships between organizational and contextual support on the interest in developing in a STEM profession.

These results are consistent with the social cognitive theory of career (R. W. . Lent et al., 1994), which points out that both individual and contextual factors create unique learning experiences that influence the development of interests, these and academic actions related to professional development.

In the general theoretical model presented, both the support of the school as an organization towards the promotion of STEM professions, as well as the support of the community and the context in which young people in upper secondary education develop, explain their possible interest in this type of profession. However, for women, it could only be corroborated that it is the support received by their context that truly influences their interest in performing in this type of profession.

The results allow us to point out that the empirical model of women better fits the statistical indicators to the theory. On the other hand, the model for men allows corroborating all the relationships established in the general model. Student's t-test only identified differences between males and females with respect to interest in STEM professions with a relatively low effect size (24%).

Thibaut et al., (2018) found that the managerial support that teachers perceive towards their educational practices in STEM projects had a significant impact on teachers' attitudes towards them, which is why they point out its importance in the construction and implementation of educational practices to promote STEM professions.

For women, the results point to the relevance of the support not only of the institution in the promotion of STEM vocations but also of their environment. Wang the Decimal, (2017) They found that women may be more susceptible to social influences than men, which can be detrimental if their parents or teachers do not support their mathematical or scientific interests, which is frequently the case in Western culture. Likewise Mouganie y Wang, (2017) indicate that a higher proportion of high-performing women in STEM fields increases the probability that a greater number of women will be integrated into these disciplines in the educational field, as it generates an affirmation effect that can encourage them to follow this trajectory.

In general, greater organizational and contextual support can have a positive impact on interest in STEM careers for both men and women (Dong et al., 2019). However, there are some differences between these population groups that may arise in this relationship, with the support that women could receive from their close environment, such as fathers, being of particular importance (Avendaño Rodríguez et al., 2020), the companions (Mouganie & Wang, 2020), and their educational environment in general (Bahia et al., 2007) in the selection process of a profession associated with a STEM discipline.

The results of this study contribute to understanding the relationships proposed in the general theoretical model, both for men and women, however, some limitations must be considered. First, a cross-sectional design was used, therefore, the results cannot be assumed as causal relationships between the included variables. For future research, the use of longitudinal designs can be contemplated to test the possible causal variables that affect interest in STEM professions. Second, all data were based on self-reported measures, so future studies should consider other sources of information from multiple perspectives. Third, the sample only considers two states of the Mexican Republic, so it may not be representative of all regions of Mexico due to the diversity of schools and contexts, so it is necessary to carry out studies with diverse samples in future research.

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