Online ISSN 3007-3197 Print ISSN 3007-3189

http://amresearchreview.com/index.php/Journal/about

Annual Methodological Archive Research Review
http://amresearchreview.com/index.php/Journal/about
Volume 3, Issue 7 (2025)

Female Acceptability in STEM Higher Education in Pakistan: The Role of Gender Expression, Gender Sensitivity, and Supportiveness

[1]Rabia Ahmed, [2*]Muhammad Shoaib, [3]Muhammad Adnan Zaman

Article Details

Key Words: STEM Education, Feminization, Gender Expression, Gender Sensitivity, Supportive Environment

Rabia Ahmed
M. Phil Student, Department of Sociology, University of Gujrat, Gujrat, Pakistan
rahmed0723@gmail.com
Muhammad Shoaib
Associate Professor, Department of Sociology, University of Gujrat, Gujrat, Pakistan
Corresponding Author Email:
shoaibsoc@uog.edu.pk
Muhammad Adnan Zaman
MD, Conemaugh Memorial Medical Ctr, Internal Medicine, Conemaugh Health System, Johnstown, PA, 15905, United States
mzaman@conemaugh.org

ABSTRACT

This study aims to examine the acceptability of females in science, technology, engineering, and mathematics (STEM) fields in higher education in Pakistan, with a specific focus on the roles of gender expression, gender sensitivity, and a supportive environment. It has been found that females have been less likely to participate in STEM education in the past as compared to males. The situation has been changing gradually, and females have been found entering STEM in several countries, and Pakistan is no exception. A quantitative study has been conducted using a cross-sectional survey as a technique of data collection. A sample size of 417 female students has been sampled from the sciences discipline through the proportionate random sampling technique, and 409 female students have participated in the study. A structured questionnaire has been used as a level of measurement, and pre-testing has been done on 25 randomly selected female students to check the reliability, i.e., .714 and above, as mentioned in Table 1. An attitudinal scale has been developed to measure the response of female students. This study has been based on the primary data collected from the female students enrolled in the Faculty of Science at a public sector university. The study findings assert that gender expression, gender sensitivity, supportiveness, and cooperativeness have a positive effect on female acceptability of STEM. However, the results also reveal that personal acceptability, parental acceptability, and peer-based acceptability have a favorable effect on the female acceptability of STEM.

DOI: Availability

INTRODUCTION

It has been found that female students have less preferred the science subject in the past years based on multiple reasons (Lingyu, Wenqin, & Chao, 2021). These include historical, critical, cultural, and structural reasons (Almukhambetova & Kuzhabekova, 2020). Several studies found that females were less likely to be enrolled in science and technology subjects based on their biological characteristics. The size of the female brain as compared to the male brain was smaller (Shoaib & Zaman, 2025; Weiss & Glenn, 1992). In the same way, the societal expectation for females was based on housework and caregiving rather than pursuing higher education (Shaikh, Sahito, & Dehraj, 2019). There were different policies, programs, and initiatives implemented at various educational levels to address the gender difference. It is very difficult for female students to enter Science, Technology, Engineering, and Mathematics (STEM) in developed countries (Shoaib, Waris, & Iqbal, 2025c; Velasco, Hite, Milbourne, & Gottlieb, 2023). Although there were a large number of opportunities, female students faced different challenges. Several opportunities for female students include scholarships, job security, grants, and challenges to gender inequality, stereotypes, and the pay gap in developing countries (Shoaib, Waris, & Iqbal, 2025b; Schein, 1975). Over the past few years, globally, there has been a noticeable change in the number of female students in the STEM field (Shoaib, Waris, & Iqbal, 2025b; David, 2012). Hence, the notion has been changed gradually, and female students are competent with their male counterparts in STEM in developed and developing countries (Shoaib, Waris, & Iqbal, 2025a; Lingyu, Wenqin, & Chao, 2021). Studies in developing countries found that female students entering science, technology, engineering, and mathematics (STEM) had less support from their parents, siblings, and peer group as well (Shoaib, Tariq, Rasool, & Iqbal, 2025; Shoaib, Waris, & Iqbal, 2025a).

Globally, over the past few years, it has been observed that there is a positive increase in the number of females in science subjects (Shoaib, Tariq, & Iqbal, 2025b; Hamilton et al., 2021). Many developed countries solve the problems of female students in education by making new policies and providing them with a scholarship (Shoaib, Tariq, & Iqbal, 2025a). But inequalities and gender gap problems still exist in educational institutions, and females are still less represented compared to males (Shoaib, Shamsher, & Iqbal, 2025). Developing countries face more challenges in female higher education compared to developed countries (Shoaib, Shamsher, & Iqbal, 2025). Common problems faced in education by females of developing countries are cultural barriers, limited resources, family support, and quality of education (Shoaib, Rasool,

Kalsoom, & Ali, 2025). Most of the studies found that gender norms demotivate females to take admission in higher education (Shoaib, Kausar, Ali, & Abdullah, 2025). Developed nations have implemented programs, including competitions, scholarships, and mentorship programs, to encourage young females to pursue science (Shoaib, Iqbal, & Iftikhar, 2025). Many studies have found that the whole world is facing a learning crisis among females, which is causing a skill crisis among females (Shoaib, Ali, & Kausar, 2025; Shoaib & Bashir, 2025). STEM subjects help students to find out how the world works, motivating exploration and discovery of new things (Shoaib, Ali, Iqbal, & Abdullah, 2025). STEM subjects provide a large number of opportunities that help females to solve multiple problems (Shoaib, 2025a; Lee, 2022).

MAIN OBJECTIVE: This study aims to examine the acceptability of females in STEM fields in higher education in Pakistan, with a specific focus on the roles of gender expression, gender sensitivity, and a supportive environment.

REVIEW OF LITERATURE

The study findings outlined the relationship between colleges and STEM professionals' motives to diversify stereotypes and create a greater interest among students in STEM careers (Chen, Chow, & So, 2022). Similarly, the study examined the methods to encourage females to choose science and engineering and also focused on gender disparities in STEM participation in higher education (Smith, 2011). Comparably, the study of Kebede (2023) asserted the attitudes and challenges faced by female learners toward mathematics at the Department of Mathematics in Ethiopia. Correspondingly, the study findings showed that addressing the issue of STEM education mostly in developing countries (Pérez Maldonado, De La Cruz Burelo, & Vicario Solorzano, 2020). Furthermore, the study of Kataeva (2024) indicated the changing aspects of gender in navigating STEM careers in institutions of higher education with perspectives from female faculty. In addition, the study's findings concluded that overcoming gender barriers in STEM education would advance the quality of education in Bangladesh (Islam & Jirattikorn, 2024).

The study findings assert that there were different factors influencing the STEM career interest among students (Shoaib, 2025b). In the same token, the study findings examined that there were multiple gender based problems in higher education in India (Maji, Mitra, & Asthana, 2023). In addition, the argument of the study revealed that higher education helps in introducing greater gender equality for female education and employment in Japan, China, and India (Sinha Mukherjee, 2015). Furthermore, the study of Rogaten and Rienties (2018) asserted that female

students in the first year had been experiencing the most significant learning and taking an interest in STEM subjects. Correspondingly, the study findings showed that feminism, gender, and the global landscape of higher education explore female's educational journeys (Ali, Shoaib, & Kausar, 2025). Comparably, the study of O'Connor et al. (2020) indicated that mentoring and distribution of power in higher education had an unseen advantage for men in STEM fields. Likewise, the study findings concluded that the experiences of female students with STEM majors (Shoaib, 2024e).

The study findings asserted the factors of gender equality in STEM higher education in India (Amirtham S & Kumar, 2021). Similarly, the study findings examined the reasons behind the lower ratio of females in STEM disciplines (Amirtham S & Kumar, 2023). Likewise, the argument of study revealed that by utilizing action research to develop and assess continuous and inclusive engagement strategies aimed at enhancing children's understanding and perception of STEM careers (Emembolu et al., 2020). Comparably, the study of Hackman, Zhang, and He (2021) asserted that attitudes and thinking of secondary school STEM teachers toward STEM education in Liberia. Correspondingly, the study findings showed the gender disparities in access to STEM education and careers across nations, with a specific focus on Poland (Hanson & Krywult-Albańska, 2020). Furthermore, the study of Holmegaard, Madsen, and Ulriksen (2014) indicated that deciding whether to pursue science or not depends on their socialization and on family background. In addition, the study findings concluded that there was a decline and resurgence of motivation among females in STEM courses at the higher education level (Young, Wendel, Esson, & Plank, 2018).

The findings of the study indicated that difficult experiences of females in a male-dominated field (Slattery, Prendergast, & Riordáin, 2023). In the same vein, the study findings examined the perspective of gender roles with STEM education (Shu & Huang, 2021). In addition, the argument of study revealed that there was an impact of a STEM certification model on science outcomes for female and minority students (Wendt, Rockinson-Szapkiw, & Cordes, 2018). Furthermore, the study of Blaney, Wofford, Jeong, Kang, and Feldon (2022) asserted that there was an independence and job advantage in doctoral education for females. Correspondingly, the study findings showed that a case study on proactive recruitment of females in STEM (Guillemin, Wong, & Such, 2023; Abdullah & Nisar, 2024). Comparably, the study of Garibay (2024) indicated that exploring STEM students' attitudes toward engaging in research for social change, analyzing STEM educational backgrounds, and moderating factors. Likewise, the study

findings concluded the impact of race/ethnicity, culture, and gender identity on career (Abdullah, Nisar, & Ahmed, 2025; Sparks, Przymus, Silveus, De La Fuente, & Cartmill, 2023).

The study findings outlined the experiences of minority females underrepresented in STEM programs (Shoaib, 2024d). Similarly, the study examined the connection between pre-service teachers' beliefs and learner-centered approaches in STEM classrooms (Shoaib, 2024b). Comparably, the study of Parson and Ozaki (2018) asserted that gendered student perceptions in STEM higher education. Correspondingly, the study findings showed the supports and challenges with understanding the issue of retaining females' faculty in STEM (Shoaib, 2024c; Abdullah & Ullah, 2016).

Furthermore, the study of Bennett, Bawa, and Ananthram (2021) indicated the gender disparities in STEM and non-STEM disciplines. In addition, the study found that the influence of technology-based home activities on students' STEM achievement (Shoaib, 2024a).

The crux of the study pointed out that awareness among school administrators regarding parental STEM knowledge and student preparedness in STEM was important (Watson, Williams-Duncan, & Peters, 2022). In the same token, the study findings examined that specialized public high schools for science, mathematics, and technology, and the STEM pipeline current insights and future projections (Abdullah & Ullah, 2022; Subotnik, Tai, Rickoff, & Almarode, 2009). In addition, the argument of the study revealed that the ratio of females in STEM was increasing with the passage of time (Abdullah, Matloob, & Malik, 2024; Blackburn, 2017). Furthermore, the study of Blackburn and Heppler (2019) asserted that females in STEM in higher education want to try new things and experience technical subjects. Correspondingly, the study findings showed the trends of gender equity and STEM subjects trajectories within the expanded higher education STEM (Chang & ChangTzeng, 2020). Comparably, the study of Pedersen and Nielsen (2024) indicated that, according to gender, there were differences between self-efficacy, achievements, and level of confidence. Likewise, the study findings concluded that a step forward and speak out, investigating empowerment perspectives among advocacy efforts of STEM teachers in the us (Velasco et al., 2023).

The study finding outlined that, nonetheless, she went on to compare and contrast the experiences of men and females in a community college STEM program (Marco-Bujosa, Joy, & Sorrentino, 2021). Similarly, the study examined the gender disparity in mathematics and science via the PISA score distribution insights from gifted education teachers' perspectives (Yu & Jen, 2023). Likewise, the argument of study revealed the factors affecting the decision of female

students to enroll in undergraduate programs with science majors (Abdullah et al., 2024; Shoaib, 2023b). Comparably, the study of Sevilla, Rangel, and Gonzalez (2023) asserted that motivational beliefs of females in STEM vocational-technical education are evident in Chile. Correspondingly, the study findings showed that promoting equity in underserved communities through STEM education has implications for leadership growth (Abdullah, Nisar, & Malik, 2024; Shoaib, 2023a). Furthermore, the study of Young, Young, and Ford (2019) indicated that cultural resistance exists for female students in STEM education. In addition, the study findings concluded that gender and leadership in public higher education in South Asia investigate individual, socio-cultural, and organizational barriers to female inclusion (Shoaib, 2021).

THEORETICAL FRAMEWORK

SOCIAL LEARNING THEORY: Bandura (1977) states that through modeling and observation, learning occurs. It is affected by different factors such as motivation, attitudes, and emotions. This theory is important to describe the relationship between the two elements, one of which is environmental and the other is cognitive; both affect the learning of people. The theory states that people start learning by witnessing the consequences of others' behavior and learn from the experiences of other people. This theory moves beyond behavioral theories, which suggest that all behaviors are learned. According to Bandura, people observe the behaviors of other people directly or indirectly, directly through social interactions and indirectly by observing behaviors.

This theory gives insight into the concept of the feminization of STEM in higher education, as well as the acceptability and resistance linked with it. According to social learning theory, individuals learn by observing others. In the situation of STEM fields, there is an underrepresentation of females in these disciplines historically, which means that there were only a few female role models for other females to observe. However, when more females enter and succeed in STEM fields, they become role models for other females, encouraging other females to pursue STEM careers. This leads to a positive cycle where successful females in STEM encourage more females to enter these fields. Social learning theory highlights the importance of modeling in shaping behavior. Females who see other females succeeding in STEM fields develop higher self-efficacy beliefs regarding their abilities to succeed in these areas, and they get more confidence. On the other hand, they have fewer female role models in STEM, and their self-efficacy and confidence are lower. So, the presence or absence of role models decides whether females decide to continue in STEM fields or not. Female's observations of the rewards and

punishments associated with entering STEM fields were influenced by observing the experiences of other females in these fields. Positive experiences and success stories serve as encouragement to pursue STEM careers. Negative experiences and failure stories discourage females from entering the STEM field.

Social learning theory suggests that individuals' behavior is influenced by the social context in which they are embedded. In the context of the feminization of STEM, the acceptability of females in these fields varies depending on cultural, historical, and social factors. Resistance to the feminization of STEM arises from traditional gender norms, stereotypes, and biases that represent STEM as a masculine domain. Females who challenge these norms and enter STEM fields face resistance from family, peers, instructors, employers, and society at large. Hence, based on the above review and theoretical framework, the following conceptual framework has been developed;

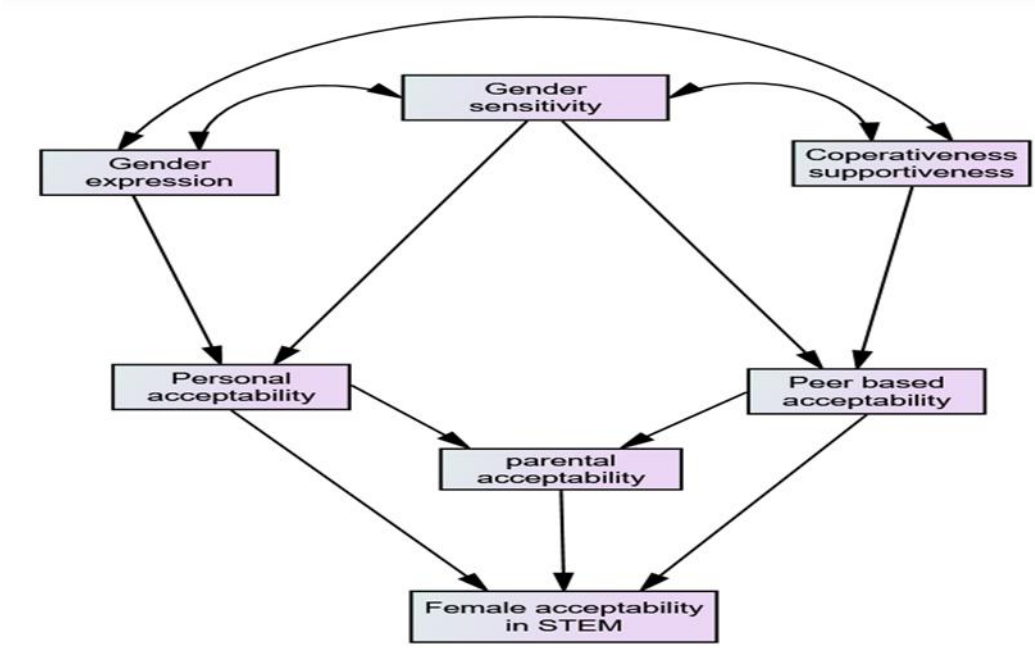

FIGURE 1: CONCEPTUAL FRAMEWORK MODEL

MODEL DESCRIPTION: This has been developed using three independent variables (gender expression, gender sensitivity, and cooperativeness/supportiveness), three path variables (personal acceptability, parental acceptability, and peer-based acceptability), and one dependent variable (female acceptability in STEM).

THE DATA AND METHODS

A quantitative study has been conducted using a cross-sectional survey as a technique of data collection. A sample size of 417 female students has been sampled from the sciences discipline through the proportionate random sampling technique. On the other hand, 409 female students have participated in the study. A structured questionnaire has been used as a level of measurement, and pre-testing has been done on 25 randomly selected female students to check the reliability, i.e., .714 and above, as mentioned in Table 1. An attitudinal scale has been developed to measure the response of female students. Different software, including MS Excel, Statistica, SPSS, and AMOS, have been used to analyze the data. The study findings are presented in detail, along with the statistical analyses. The tables have been used to show the trend of the data. Advanced statistical techniques, including Structural Equation Modelling Technique (SEM), have been applied to measure the effects of the conceptual model. This study has been based on the primary data collected from the female students enrolled in the Faculty of Science at a public sector university.

TABLE 1: ***RELIABILITY TEST***

Variable	Code	Item	Alpha Value
Gender Expression	GEEX	8	.724
Gender Sensitivity	GESE	8	.738
Cooperativeness and Supportiveness	SUAC	8	.732
Personal Acceptability	PEAC	8	.754
Parental Acceptability	PAAC	8	.731
Peer-Based Acceptability	PEBA	8	.714
Female Acceptability in STEM	ACCE	56	.976
Total		104	.988

RESULTS AND DISCUSSIONS

The analysis revealed that the age of 50.1 percent of students was 19 to 20. Similarly, the analysis asserted that the age of 34.4 percent of students was 21 to 22. The analysis revealed that 39.7 percent of fathers' education was matriculation. The analysis revealed that 36.4 percent of mothers' education was matriculation. Similarly, the analysis asserted that 21.8 percent of mothers' education was intermediate. The analysis revealed that the family occupation of 41.8 percent of families was business. The analysis revealed that the income of 63.3 percent of families

was 80000 or above. The analysis revealed that 41.6 percent of students have 2 to 3 siblings.

TABLE 2: ***DIRECT EFFECTS OF THE MODEL***

Variables			Standardized Regression Weights	Estimate	S.E.	C.R.	P
SUAC	--->	PEBA	.149	.187	.063	2.956	.003
GESE	--->	PEBA	.196	.226	.058	3.889	***
GESE	--->	PEAC	.119	.108	.047	2.312	.021
GEEX	--->	PEAC	.314	.284	.047	6.090	***
PEAC	--->	PAAC	.111	.129	.049	2.645	.008
PEBA	--->	PAAC	.511	.468	.038	12.163	***
PAAC	--->	ACCE	.435	1.126	.049	23.208	***
PEBA	--->	ACCE	.480	1.137	.044	25.808	***
PEAC	--->	ACCE	.416	1.252	.048	25.926	***
Covariances							
GESE	<-->	GEEX		8.034	.952	8.437	***
GESE	<-->	SUAC		5.272	.832	6.334	***
GEEX	<-->	SUAC		8.334	.895	9.311	***
Variances							
GESE				17.390	1.218	14.283	***
GEEX				17.563	1.230	14.283	***
SUAC				14.656	1.026	14.283	***
e3				21.304	1.492	14.283	***
e1				12.255	.858	14.283	***
e2				13.903	.973	14.283	***
e4				13.354	.935	14.283	***

Model Fit Summary: AGFI=.927, NLI=973, IFI=.932, NFI=.905, CFI=.899, RMSEA=.071

HYPOTHESIS 1: *Supportiveness, cooperativeness, and gender sensitivity had a direct effect on peer-based acceptability.*

The result of the regression weights supports hypothesis 1. In hypothesis 1, supportiveness and cooperativeness (β = .149) and gender sensitivity (β = .196) had a direct significant effect on

peer-based acceptability. The study findings have been linked with the previous studies on the subject. Similarly, the study findings outlined that educated and degree-holding girls help their families as well as the economy of the country (Shoaib & Ullah, 2019). Likewise, the analysis of the study reported that by providing education to every gender equally, society reduces all negative activities (Shoaib, Fatima, & Jamil, 2021). Correspondingly, the study findings showed that by education, countries also reduce the poverty rate and improve their economic condition (Shoaib, Ali, & Akbar, 2021). As the conclusion of the research articulated that most of the females taking interest in the education who know about the past struggles of the females (Shoaib & Ullah, 2021b). In the same token, the study findings examined that businesses are a field that is linked with males, and females are not allowed to start their businesses in most cultures (Shoaib & Ullah, 2021a).

HYPOTHESIS 2: *Gender sensitivity and gender expression had a direct effect on personal acceptability.*

Results in Table 2 showed that there is a significant effect of the variable gender sensitivity (β = .119) and also gender expression (β = .314) on the personal acceptability. The study findings have been linked with the previous studies on the subject. Similarly, the study findings outlined that educated girls are less likely to marry at a young age; they want to start their career first (van Langen, Bosker, & Dekkers, 2006). Likewise, the analysis of the study reported that the education of females provides power to the economy and moves toward equality (Rehman, Ilyas Khan, Dayan, & Munir Ahmad, 2024). Correspondingly, the study findings showed that females face the problem of the pay gap during jobs, and it is due to the gaps between skills (Ullah, Qureshi, & Ali, 2024). As the conclusion of the research articulated, in poor families, there is a large number of siblings present, and it is not possible for the parents to provide good education to all (Troutman, 2017). In the same token, the study findings examined that in many countries, females have no opportunities for higher education and have less access to higher education (Tops et al., 2023).

HYPOTHESIS 3: *Personal acceptability and peer-based acceptability had a direct effect on parental acceptability.*

Outcomes of the table showed that personal acceptability had a (β = .111) direct effect on the parental acceptability, and personal acceptability (β = .511) also had a direct effect on the parental acceptability. The study findings have been linked with the previous studies on the subject. The study findings outlined that females are considered less dominant in the house and

males are responsible for the decision making (Shoaib, Tariq, Shahzadi, & Ali, 2022). Likewise, the analysis of the study reported that females make decisions immediately and make decisions emotionally (Shoaib, Shehzadi, & Abbas, 2023). Correspondingly, the study findings showed that females are taking resources from the educational institution but not returning to the labor market (Shoaib, Usmani, & Abdullah, 2023). The conclusion of the research articulated that sometimes sociocultural factors force females to do things in which they may not be interested (Ali, Zaman, & Shoaib, 2024). In the same token, the study findings examined that in many traditional societies, education is considered a negative thing; it provides a bad mindset to the girls (Shoaib, Shehzadi, & Abbas, 2024b).

HYPOTHESIS 4: *Parental acceptability, peer-based acceptability, and personal acceptability had a direct effect on the acceptability of STEM*

The result of the table accepted hypothesis 4, there is a direct effect of parental acceptability (β = .435), peer-based acceptability (β = .480), and personal acceptability (β = .416) on acceptability of STEM. The study findings have been linked with the previous studies on the subject. Similarly, the study findings outlined that females face difficulties in managing their traditional and career opportunities together (Stevenson, Szczytko, Carrier, & Peterson, 2021). Likewise, the analysis of the study reported that students perform well in the subjects in which they have personal interest (Solomon, 1997). Correspondingly, the study findings showed that education not only helps females in making a good career but also helps in providing good knowledge about their rights (Smith, 2010). As the conclusion of the research articulated that to reduce the gender inequality, parental education matters a lot, it starts from home (Simon, 2020). In the same vein, the study findings examined that the education level of parents impacts the children strongly (Shimizutani & Yamada, 2024).

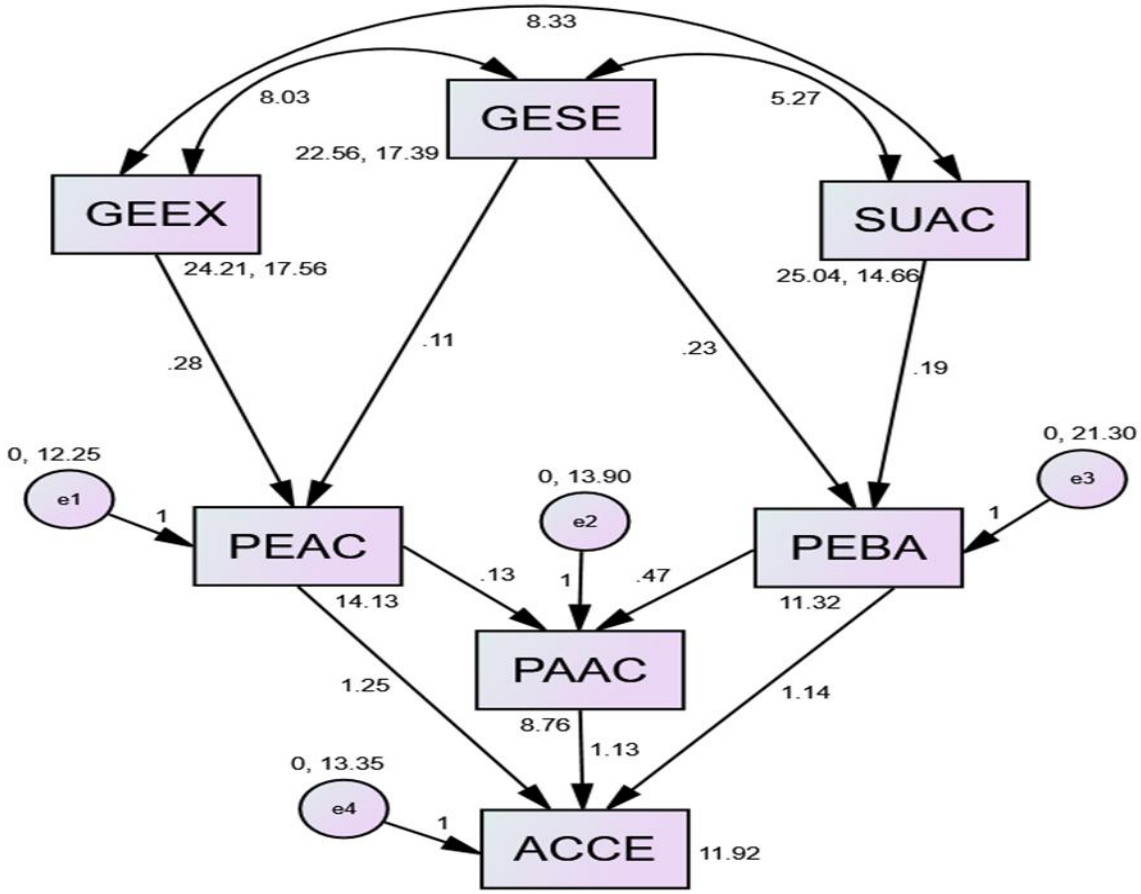

FIGURE 2: MODEL FIT DIAGRAM OF MODEL

TABLE 3: ***INDIRECT EFFECTS OF THE MODEL***

Indirect Path	Unstandardized Estimate	Lower	Upper	P-Value	Standardized Estimate
SUAC --> PEBA --> PAAC	0.088	0.035	0.150	0.006	0.076**
SUAC --> PEBA --> ACCE	0.212	0.078	0.358	0.008	0.071**
GEEX --> PEAC --> PAAC	0.037	0.009	0.074	0.028	0.035*
GEEX --> PEAC --> ACCE	0.355	0.230	0.479	0.001	0.131**
GESE --> PEBA --> PAAC	0.106	0.048	0.172	0.003	0.100**
GESE --> PEBA --> ACCE	0.257	0.116	0.398	0.004	0.094**
GESE --> PEAC --> PAAC	0.014	0.002	0.038	0.040	0.013*
GESE --> PEAC --> ACCE	0.135	0.036	0.240	0.023	0.050*
PEBA --> PAAC --> ACCE	0.527	0.425	0.636	0.001	0.222***
PEAC --> PAAC --> ACCE	0.146	0.030	0.263	0.037	0.048*

Significance of Estimates: *** p < 0.001, ** p < 0.010, * p < 0.050, † p < 0.100

HYPOTHESIS 5: *Supportiveness and cooperativeness had an indirect effect on parental acceptability and acceptability of STEM through the mediation of peer-based acceptability.*

Table 3 showed that supportiveness and cooperativeness had an indirect effect on parental acceptability, and supportiveness and cooperativeness also had an indirect effect on the acceptability of STEM through the mediation of peer-based acceptability. The study findings have been linked with the previous studies on the subject. Similarly, the study findings outlined that in most of the countries, males contribute more to family income, and they become more dominant in decision making (Shen, Lee, Tsai, & Chang, 2016). Likewise, the analysis of the study reported that parental perspective in most countries where children spend time in schools increases their income in the future (Shah & Iqbal, 2011). Correspondingly, the study findings showed that it is important to start making investments in female education and make improved policies (Seeberg et al., 2017). As the conclusion of the research articulated, it's a time of online market and important to provide the skills to the females so they can contribute to the market (Schreiber, 2014). In the same token, the study findings examined that females are more sensitive and not suitable for labor work (Sayeed, Oakman, Dillon, & Stuckey, 2022).

HYPOTHESIS 6: *Gender expression had an indirect effect on parental acceptability and acceptability of STEM through the mediation of peer-based acceptability.*

Outcomes of the data revealed that gender expression had an indirect effect on parental acceptability, and gender expression also had an indirect effect on the acceptability of STEM through the mediation of peer-based acceptability. The study findings have been linked with the previous studies on the subject. Similarly, the study findings outlined that the education of girls has an impact on the overall economy of the nation and helps to become a developed nation (Shoaib, Shehzadi, & Abbas, 2024a). Likewise, the analysis of the study reported that most of the females and their parents feel unsafe to send them to an institute (Shoaib, Ali, & Abbas, 2024). Correspondingly, the study findings showed that it is important to design a safe and friendly environment in universities (Shoaib, Iqbal, & Tahira, 2021). The conclusion of the research articulated that most of the females choose the subjects that their friends choose (Shoaib, Fatima, et al., 2021). In the same token, the study findings examined that at this time, most societies are facing the critical challenge of child marriage, which is a barrier to female education (Shoaib, Abdullah, & Ali, 2021).

HYPOTHESIS 7: *Gender sensitivity had an indirect effect on parental acceptability and acceptability of*

STEM through the mediation of parental acceptability.

Outcomes of the primary data revealed that gender sensitivity had an indirect effect on parental acceptability, and gender sensitivity also had an indirect effect on the acceptability of STEM through the mediation of parental acceptability. The study findings have been linked with the previous studies on the subject. Similarly, the study findings outlined that efforts are required to change the misconception in most societies about STEM (Shoaib, Ahmad, Ali, & Abdullah, 2021). Likewise, the analysis of the study reported that most of the families discourage their daughters from going to school (Shoaib, Abdullah, et al., 2021). Correspondingly, the study findings showed that STEM required more space and labs, which is difficult to provide in developing countries (Ahmad, Shoaib, & Shaukat, 2021). The conclusion of the research articulated that most of the females need support from their siblings in education (Ahmad, Ahmad, Shoaib, & Shaukat, 2021). In the same vein, the study findings examined that in developing countries, education is going to be expensive day by day, which is problematic for poor families (Shoaib, Abdullah, & Ali, 2020).

HYPOTHESIS 8: *Gender sensitivity had an indirect effect on parental acceptability and acceptability of STEM.*

Outcomes of the analysis revealed that gender sensitivity had an indirect effect on parental acceptability, and gender sensitivity also had an indirect effect on the acceptability of STEM through the mediation of personal acceptability. The study findings have been linked with the previous studies on the subject. Similarly, the study findings outlined that education is important for every individual and the basic rights of everyone (Phuthi & Mazarire, 2024). Likewise, the analysis of the study reported that for the empowerment of females, it is important to promote education (Shoaib, Ahmad, et al., 2021). Correspondingly, the study findings showed that education increases the tolerance among the students and, in modernity, gives space to other matters. The research concludes that familiar poverty can be reduced easily if everyone contributes to it (Njifen, 2024). In the same token, the study findings examined that females are also helpful in economic development, but space and chance are required (Shen, Lee, Tsai, & Chang, 2016).

HYPOTHESIS 9: *Peer-based acceptability and personal acceptability had an indirect effect on acceptability of STEM through the mediation of parental acceptability.*

Outcomes of the results revealed that peer-based acceptability and personal acceptability both had an indirect effect on acceptability of STEM through the mediation of parental acceptability.

The study findings have been linked with the previous studies on the subject. Similarly, the study findings outlined that females living in poor families face multiple barriers in education (Oon & Subramaniam, 2015). Likewise, the analysis of the study reported that female's wo get a basic education parents who do not allow their daughters to pursue higher education due to the age of marriage (Ogunniyi & Iwuanyanwu, 2024). Correspondingly, the study findings showed that poor families want child marriages when they do not bear the expenses of their daughter (Ofori Atakorah, Honlah, Atta Poku Jr, Frimpong, & Achem, 2023). As the conclusion of the research articulated that female also support their families by doing a job, education is important for it (Nyakato et al., 2024). In the same token, the study findings examined that most of the families who have low income prefer boys' education with this income (Njifen, 2024).

CONCLUSION

The conclusion of this study was based on the primary data collected from the female students enrolled in the Faculty of Science at the public sector university. The study findings concluded that gender expression, gender sensitivity, supportiveness, and cooperativeness had a positive effect on female acceptability of STEM. However, the results also concluded that personal acceptability, parental acceptability, and peer-based acceptability had a favorable effect on the female acceptability of STEM. The study revealed that female students had less preference for the science subject in the past years based on multiple reasons. These included historical, critical, cultural, and structural reasons. Several opportunities for female students included scholarships, job security, grants, and challenges such as gender inequality, stereotypes, and the pay gap in developing countries. However, over the past few years, globally, there has been a noticeable change in the number of female students in the STEM field. Hence, the notion had been changed gradually, and female students were competent with their male counterparts in STEM in developed and developing countries.

REFERENCES

Abdullah, F., & Nisar, N. (2024). WOMEN ACADEMICIANS AND AUTONOMY: CONSTRUCTING IDENTITIES IN HIGHER EDUCATION. *International Journal of Social Sciences Bulletin*, *2*(4), 1053–1060. https://ijssbulletin.com/index.php/IJSSB/article/view/161

Abdullah, F., & Ullah, H. (2016). Physical Violence on Women: A Comparative Study of Rural and Urban Areas of Muzaffarabad, Azad Jammu and Kashmir. *Journal of Gender and Social Issues*, *15*(2), 113.

https://link.gale.com/apps/doc/A497793910/AONE?u=anon~54132f5b&sid=googleScholar&xid=c3282c17

Abdullah, F., & Ullah, H. (2022). Lived Experiences of Women Academicians in Higher Education Institutions of Azad Jammu and Kashmir. *South Asian Studies*, *37*(02), 323-340. https://sasj.pu.edu.pk/9/article/view/1292

Abdullah, F., Matloob, T., & Malik, A. (2024). Decision-Making Trajectories of Working Women in Azad Jammu and Kashmir. *Policy Research Journal*, *2*(4), 2189-2197.

Abdullah, F., Ahmed, N., Shaheen, I., & Sultana, R. (2024). Women academicians' career progression in higher education of Azad Jammu and Kashmir. *Regional Lens*, *3*(1), 86-94. https://doi.org/10.62997/rl.2024.31042

Abdullah, F., Nisar, N., & Malik, A. (2024). Gendered higher education and women academicians' career development. *The Regional Tribune*, *3*(1), 418-428. https://doi.org/10.63062/trt/v24.076

Abdullah, F., Nisar, N., & Ahmed, N. (2025). Career Trajectories of Women Academics in Higher Education of Azad Jammu and Kashmir. *The Knowledge*, *4*(2), 1-10. https://doi.org/10.63062/tk/2k25b.42057

Ahmad, J., Ahmad, A., Shoaib, M., & Shaukat, B. (2021). Public Library Online Information Resources to Library Patrons during COVID-19 Pandemic: A Case of Higher Education Institutions. *Library Philosophy and Practice*, 1-14.

Ahmad, J., Shoaib, M., & Shaukat, B. (2021). Academic Library Resources and Services at Higher Education Institutions during COVID-19 Pandemic: A Case of Students' Satisfaction. *Library Philosophy and Practice*, 1-17.

Ali, R., Zaman, M. A., & Shoaib, M. (2024). Trends of Research Visualization of Gender Inequality, Equality, and Equity: A Bibliometric Analysis from 1981 to 2020. *Pakistan Journal of Law, Analysis and Wisdom*, *3*(8), 237–252.

Ali, S. R., Shoaib, M., & Kausar, N. (2025). Gender Disparity in Enrolment, Classroom, Learning Environment, and Learning Achievements of the Students in Higher Education in Pakistan. *Journal of Media Horizons*, *6*(3), 330-342.

Almukhambetova, A., & Kuzhabekova, A. (2020). Factors affecting the decision of female students to enrol in undergraduate science, technology, engineering and mathematics majors in Kazakhstan. *International Journal of Science Education*, *42*(6), 934-954. doi:10.1080/09500693.2020.1742948

Amirtham S, N., & Kumar, A. (2021). Gender parity in STEM higher education in India: a trend analysis. *International Journal of Science Education*, *43*(12), 1950-1964. doi:10.1080/09500693.2021.1946867

Amirtham S, N., & Kumar, A. (2023). The underrepresentation of women in STEM disciplines in India: a secondary analysis. *International Journal of Science Education*, *45*(12), 1008-1031. doi:10.1080/09500693.2023.2179901

Bandura, A. (1977). Social learning theory. *Englewood Cliffs*.

Bennett, D., Bawa, S., & Ananthram, S. (2021). Gendered differences in perceived employability among higher education students in STEM and non-STEM disciplines. *Perspectives: Policy and Practice in Higher Education*, *25*(3), 84-90. doi:10.1080/13603108.2020.1871090

Blackburn, H. (2017). The Status of Women in STEM in Higher Education: A Review of the Literature 2007–2017. *Science & Technology Libraries*, *36*(3), 235-273. doi:10.1080/0194262X.2017.1371658

Blackburn, H., & Heppler, J. (2019). Women in STEM in Higher Education: A Citation Analysis of the Current Literature. *Science & Technology Libraries*, *38*(3), 261-271. doi:10.1080/0194262X.2019.1645080

Blaney, J. M., Wofford, A. M., Jeong, S., Kang, J., & Feldon, D. F. (2022). Autonomy and Privilege in Doctoral Education: An Analysis of STEM Students' Academic and Professional Trajectories. *The Journal of Higher Education*, *93*(7), 1037-1063. doi:10.1080/00221546.2022.2082761

Chang, D.-F., & ChangTzeng, H.-C. (2020). Patterns of gender parity in the humanities and STEM programs: the trajectory under the expanded higher education system. *Studies in Higher Education*, *45*(6), 1108-1120. doi:10.1080/03075079.2018.1550479

Chen, Y., Chow, S. C. F., & So, W. W. M. (2022). School-STEM professional collaboration to diversify stereotypes and increase interest in STEM careers among primary school students. *Asia Pacific Journal of Education*, *42*(3), 556-573. doi:10.1080/02188791.2020.1841604

David, M. E. (2012). Feminism, gender and global higher education: women's learning lives. *Higher Education Research & Development*, *31*(5), 679-687. doi:10.1080/07294360.2012.691465

Emembolu, I., Padwick, A., Shimwell, J., Sanderson, J., Davenport, C., & Strachan, R. (2020). Using action research to design and evaluate sustained and inclusive engagement to

improve children's knowledge and perception of STEM careers. *International Journal of Science Education*, *42*(5), 764-782. doi:10.1080/09500693.2020.1729442

Garibay, J. C. (2024). Latinx STEM Students' Values toward Conducting Research for Social Change: Examining STEM Educational Experiences, HSIs, and Moderating Effects. *Journal of Latinos and Education*, *23*(1), 384-402. doi:10.1080/15348431.2022.2144863

Guillemin, M., Wong, E., & Such, G. (2023). Affirmative recruitment of women in STEM: a case study. *Journal of Higher Education Policy and Management*, *45*(3), 291-305. doi:10.1080/1360080X.2022.2157928

Hackman, S. T., Zhang, D., & He, J. (2021). Secondary school science teachers' attitudes towards STEM education in Liberia. *International Journal of Science Education*, *43*(2), 223-246. doi:10.1080/09500693.2020.1864837

Hamilton, M., O' Dwyer, A., Leavy, A., Hourigan, M., Carroll, C., & Corry, E. (2021). A case study exploring primary teachers' experiences of a STEM education school-university partnership. *Teachers and Teaching*, *27*(1-4), 17-31. doi:10.1080/13540602.2021.1920906

Hanson, S. L., & Krywult-Albańska, M. (2020). Gender and access to STEM education and occupations in a cross-national context with a focus on Poland. *International Journal of Science Education*, *42*(6), 882-905. doi:10.1080/09500693.2020.1737341

Holmegaard, H. T., Madsen, L. M., & Ulriksen, L. (2014). To Choose or Not to Choose Science: Constructions of desirable identities among young people considering a STEM higher education programme. *International Journal of Science Education*, *36*(2), 186-215. doi:10.1080/09500693.2012.749362

Islam, N., & Jirattikorn, A. (2024). Breaking gender barriers in STEM education for achieving the SDG of quality education in Bangladesh. *Development in Practice*, *34*(1), 129-135. doi:10.1080/09614524.2023.2229965

Kataeva, Z. (2024). Gender and the navigation of STEM careers in higher education institutions: Narratives of female faculty in post-Soviet Tajikistan. *Compare: A Journal of Comparative and International Education*, *54*(1), 55-73. doi:10.1080/03057925.2022.2078954

Kebede, W. (2023). Investigating female learners' attitude and challenges towards mathematics at the department of mathematics, Injibara college of teachers' education, Injibara, Ethiopia. *Cogent Education*, *10*(2), 2256202. doi:10.1080/2331186X.2023.2256202

Lee, A. (2022). A Forgotten Underrepresented Group: Students with Disabilities' Entrance into STEM Fields. *International Journal of Disability, Development and Education*, *69*(4), 1295-1312. doi:10.1080/1034912X.2020.1767762

Lingyu, L., Wenqin, S., & Chao, L. (2021). The rise of women in STEM higher education in China: achievements and challenges. *Gender Equity in STEM in Higher Education*, 27-44.

Maji, S., Mitra, S., & Asthana, M. K. (2023). 'Treading the no woman's land': the gender-STEM dynamics in higher education in premier institutions of India. *European Journal of Engineering Education*, *48*(3), 422-447. doi:10.1080/03043797.2023.2168518

Marco-Bujosa, L. M., Joy, L., & Sorrentino, R. (2021). Nevertheless, She Persisted: A Comparison of Male and Female Experiences in Community College STEM Programs. *Community College Journal of Research and Practice*, *45*(8), 541-559. doi:10.1080/10668926.2020.1727382

Njifen, I. (2024). Sub-Saharan Africa's higher education: investment decisions on human capital in the presence of youth unemployment. *Studies in Higher Education*, *49*(2), 351-367. doi:10.1080/03075079.2023.2234397

Nyakato, V. N., Kemigisha, E., Mugabi, F., Namatovu, S., Michielsen, K., & Kools, S. (2024). Pregnant and abandoned: qualitative assessment of COVID-19 pandemic educational challenges faced by pregnant college students in Uganda. *Gender and Education*, *36*(1), 1-18. doi:10.1080/09540253.2023.2256765

O'Connor, P., O'Hagan, C., Myers, E. S., Baisner, L., Apostolov, G., Topuzova, I., . . . Caglayan, H. (2020). Mentoring and sponsorship in higher education institutions: men's invisible advantage in STEM? *Higher Education Research & Development*, *39*(4), 764-777. doi:10.1080/07294360.2019.1686468

Ofori Atakorah, P., Honlah, E., Atta Poku Jnr, P., Frimpong, E., & Achem, G. (2023). Challenges to online studies during COVID-19: The perspective of Seventh-day Adventist College of Education students in Ghana. *Cogent Education*, *10*(1), 2162680. doi:10.1080/2331186X.2022.2162680

Ogunniyi, M., & Iwuanyanwu, P. N. (2024). Analysis of Teachers' Perspectives Towards the Use of IKS to Improve STEM Education for Sustainable Development. *African Journal of Research in Mathematics, Science and Technology Education*, *28*(3), 319-329. doi:10.1080/18117295.2024.2352980

Oon, P.-T., & Subramaniam, R. (2015). University Programme Preferences of High School Science Students in Singapore and Reasons that Matter in their Preferences: A Rasch analysis. *International Journal of Science Education*, *37*(2), 367-388. doi:10.1080/09500693.2014.987714

Parson, L., & Ozaki, C. C. (2018). Gendered Student Ideals in STEM in Higher Education. *NASPA Journal About Women in Higher Education*, *11*(2), 171-190. doi:10.1080/19407882.2017.1392323

Pedersen, J. V., & Nielsen, M. W. (2024). Gender, self-efficacy and attrition from STEM programmes: evidence from Danish survey and registry data. *Studies in Higher Education*, *49*(1), 47-61. doi:10.1080/03075079.2023.2220702

Pérez Maldonado, Y., De La Cruz Burelo, E., & Vicario Solorzano, C. M. (2020). The problem of pseudo-STEM programs in higher education: A classification criterion. *Cogent Education*, *7*(1), 1833813. doi:10.1080/2331186X.2020.1833813

Phuthi, N., & Mazarire, T. (2024). Technical and vocational education provision in Zimbabwe: leveraging institutional support for learners with special educational needs. *Journal of Vocational Education & Training*, *76*(5), 1084-1103. doi:10.1080/13636820.2022.2152078

Rogaten, J., & Rienties, B. C. (2018). Which first-year students are making most learning gains in STEM subjects? *Higher Education Pedagogies*, *3*(1), 161-172. doi:10.1080/23752696.2018.1484671

Sayeed, M. S. I., Oakman, J., Dillon, M. P., & Stuckey, R. (2022). Influential factors for access to and participation in rehabilitation for people with lower limb amputation in East, South, and Southeast Asian developing countries: a scoping review. *Disability and Rehabilitation*, *44*(25), 8094-8109. doi:10.1080/09638288.2021.1994025

Schein, V. E. (1975). Relationships between sex role stereotypes and requisite management characteristics among female managers. *Journal of applied psychology*, *60*(3), 340.

Schreiber, C. (2014). The construction of 'female citizens': a socio-historical analysis of girls' education in Luxembourg. *Educational Research*, *56*(2), 137-154. doi:10.1080/00131881.2014.898911

Seeberg, V., Baily, S., Khan, A., Ross, H., Wang, Y., Shah, P., & Wang, L. (2017). Frictions that activate change: dynamics of global to local non-governmental organizations for female

education and empowerment in China, India, and Pakistan*. *Asia Pacific Journal of Education*, *37*(2), 232-247. doi:10.1080/02188791.2017.1296815

Sevilla, M. P., Rangel, V. S., & Gonzalez, E. (2023). Understanding motivational beliefs of women in postsecondary STEM- vocational-technical education. Evidence from Chile. *Journal of Education and Work*, *36*(2), 125-137. doi:10.1080/13639080.2023.2167957

Shah, S., & Iqbal, M. (2011). Pakistani diaspora in Britain: intersections of multi-locationality and girls' education. *British Journal of Sociology of Education*, *32*(5), 763-783. doi:10.1080/01425692.2011.596376

Shaikh, M. A., Sahito, Z. H., & Dehraj, M. A. (2019). STEM education: social, cultural, and economic barriers faced by women of Khairpur (Pakistan). *Global Regional Review*, *4*(2), 392-403.

Shen, K.-M., Lee, M.-H., Tsai, C.-C., & Chang, C.-Y. (2016). Undergraduate students' earth science learning: relationships among conceptions, approaches, and learning self-efficacy in Taiwan. *International Journal of Science Education*, *38*(9), 1527-1547. doi:10.1080/09500693.2016.1198060

Shimizutani, S., & Yamada, E. (2024). Long-term Consequences of Civil War in Tajikistan: The Gendered Impact on Education and Labor Market Outcomes. *Defence and Peace Economics*, *35*(1), 72-85. doi:10.1080/10242694.2022.2141946

Shoaib, M. (2021). *Sociological Analysis of Teachers Perspectives on Students Academic Performance in Higher Education in the Punjab*. (PhD Thesis). International Islamic University Islamabad, Central Library.

Shoaib, M. (2023a, September 22). Galvanising Bourdieu's typology with Pakistani education and social class. *The Nation*, p. 4.

Shoaib, M. (2023b, December 05). Gender Differences in Academic Performance. *The Nation*.

Shoaib, M. (2024a, January 09). Gender Disparity in Education. *The Nation*.

Shoaib, M. (2024b). Gender Diversity and Inclusion in Higher Education in Pakistan. *Pakistan Journal of Law, Analysis and Wisdom*, *3*(1), 207-222.

Shoaib, M. (2024c, April 30). Gendered Space in Higher Education. *Daily Parliament Times*, p. 3.

Shoaib, M. (2024d). Gendering Bourdieu's Cultural Capital in Higher Education in Pakistan. *Pakistan Journal of Law, Analysis and Wisdom*, *3*(2), 265-278.

Shoaib, M. (2024e). Tailoring Theoretical Lens and Nudging Bourdieu's Cultural Capital on Gender and Academic Performance. *Journal of Social Sciences Review*, *4*(4), 87–101.

Shoaib, M. (2025a). Academic Achievement and Gender Inequality in Higher Education: A Systematic Review of Muslim Majority Nations. *Sociology & Cultural Research Review 3*(02), 373–380.

Shoaib, M. (2025b). A Systematic Review of Gender Disparities in Academic Achievement in Higher Education Across Muslim Countries. *Advance Social Science Archive Journal*, *3*(02), 1622–1639.

Shoaib, M., & Bashir, Z. (2025). *Virtual Classrooms and Academic Performance of the Students in Higher Education during the COVID-19 Outbreak*. Paper presented at the 5th International Conference of PNQAHE and AGM on Stakeholder Engagement in Quality Assurance – Shaping Higher Education with Inputs from All Relevant Voices, Forman Christian College University, Lahore.

Shoaib, M., & Ullah, H. (2019). Female and Male Students' Educational Performance in Tertiary Education in the Punjab, Pakistan. *Pakistan Journal of Social Issues*, *X*(1), 83-100.

Shoaib, M., & Ullah, H. (2021a). Classroom Environment, Teacher, and Girl Students' Learning Skills. *Education and Urban Society*, *53*(9), 1039-1063. doi:10.1177/00131245211001908

Shoaib, M., & Ullah, H. (2021b). Teachers' perspectives on factors of female students' outperformance and male students' underperformance in higher education. *International Journal of Educational Management*, *35*(3), 684-699. doi:10.1108/IJEM-05-2020-0261

Shoaib, M., & Zaman, M. A. (2025). Evaluating Academic Performance in Higher Education during COVID-19 A Study of Virtual Learning Environments. *Pakistan Journal of Law, Analysis and Wisdom*, *4*(4), 64-78.

Shoaib, M., Abdullah, F., & Ali, N. (2020). Library Resources and Research Environment in Higher Education Institutions: Students' Satisfaction. *Library Philosophy and Practice*, 1-18.

Shoaib, M., Abdullah, F., & Ali, N. (2021). A Research Visualization of Academic Learning Skills among Students in Higher Education Institutions: A Bibliometric Evidence from 1981 to 2020. *Library Philosophy and Practice*, *5579*, 1-34.

Shoaib, M., Ahmad, A., Ali, N., & Abdullah, F. (2021). Trend of Research Visualization of Learning, Classroom, and Class Participation in Higher Education Institutions: A Bibliometric Analysis from 2001 to 2020. *Library Philosophy and Practice*, *5743*, 1-26.

Shoaib, M., Ali, R., & Akbar, A. (2021). Library Services and Facilities in Higher Education Institutions in Pakistan: Satisfaction of Patrons. *Library Philosophy and Practice*, 1-19.

Shoaib, M., Ali, S. R., & Abbas, Z. (2024). Self-Fulfilling Prophecy of Learning Skills Among Students in Higher Education. *Pakistan Journal of Law, Analysis and Wisdom*, *3*(7), 164-177.

Shoaib, M., Ali, S. R., & Kausar, N. (2025). Gender Disparity on Teaching Materials, Communication, Institutional Support, and Learning Achievements of the Students in Higher Education in Pakistan. *International Journal of Social Sciences Bulletin*, *3*(7), 169-183.

Shoaib, M., Ali, S. R., Iqbal, T., & Abdullah, F. (2025). Gender Disparity in Learning Achievements of the Students in Higher Education in Pakistan. *International Journal of Social Sciences Bulletin*, *3*(6), 840-853.

Shoaib, M., Fatima, U., & Jamil, R. (2021). Academic Library and Students' Learning at University Level: Nothing is Pleasanter than Exploring a Library. *Library Philosophy and Practice*, 1-19.

Shoaib, M., Iqbal, A., & Iftikhar, I. (2025). Engagement of Students in Learning in Higher Education: The Role of Academic Library Spaces. *The Regional Tribune*, *4*(3), 311-328.

Shoaib, M., Iqbal, S., & Tahira, G. (2021). Digitalization of Academic Libraries in Higher Education Institutions during COVID-19 Pandemic. *Library Philosophy and Practice*, 1-15.

Shoaib, M., Kausar, N., Ali, S. R., & Abdullah, F. (2025). Gender Disparity in Learning Achievements in Higher Education: Insights from a Literature Review. *Policy Research Journal*, *3*(6), 634–648.

Shoaib, M., Rasool, S., Kalsoom, A., & Ali, S. R. (2025). Exploring Gender-Based Dissimilarities in Educational Outcomes at the Tertiary Level: A Review of Existing Literature. *Policy Research Journal*, *3*(7), 287–302.

Shoaib, M., Shamsher, A., & Iqbal, S. (2025). A Systematic Review of Academic Library Spaces as Facilitators of Student Engagement in Higher Education Learning. *The Knowledge*, *4*(1), 123-134.

Shoaib, M., Shamsher, A., & Iqbal, S. (2025). Understanding Student Engagement in Higher Education: The Contribution of Academic Library Spaces. *ProScholar Insights*, *4*(1), 245-257.

Shoaib, M., Shehzadi, K., & Abbas, Z. (2023). Contemporary Research on Learning Spaces and Teacher Effectiveness in Higher Education. *Pakistan Journal of Law, Analysis and Wisdom*, *2*(03), 352–369.

Shoaib, M., Shehzadi, K., & Abbas, Z. (2024a). Inclusivity and Teachers' Aptitude in Higher Education in Pakistan. *Pakistan Journal of Law, Analysis and Wisdom*, *3*(6), 219-237.

Shoaib, M., Shehzadi, K., & Abbas, Z. (2024b). Inclusivity, Teacher Competency, and Learning Environment at Higher Education: Empirical Evidences. *Pakistan Journal of Law, Analysis and Wisdom*, *3*(5), 244-261.

Shoaib, M., Tariq, I., & Iqbal, S. (2025a). Extracurricular Activities in Higher Education: Diversity and Inclusion. *Regional Lens*, *4*(1), 174-187.

Shoaib, M., Tariq, I., & Iqbal, S. (2025b). Intersectionality and Student Inclusion in Higher Education: A Study of Class, Residence, Culture, and Extracurricular Participation. *Journal of Social Horizons*, *2*(1), 1-14.

Shoaib, M., Tariq, I., Rasool, S., & Iqbal, S. (2025). The Role of Extracurricular Activities in Fostering Diversity and Inclusion in Higher Education: A Systematic Review. *Advance Social Science Archive Journal*, *3*(2), 1377–1392.

Shoaib, M., Tariq, M., Shahzadi, S., & Ali, M. (2022). Role of Academic Libraries in Online Academic Activities during COVID-19 Outbreak at Tertiary Level: A Library is a Thought in Cold Storage. *Library Philosophy and Practice*, 1-19.

Shoaib, M., Usmani, F., & Abdullah, F. (2023). Plotting The Literature On Social Work Education From 1971-2020: A Scientometric Analysis. *Pakistan Journal of Social Research*, *5*(2), 1347-1360.

Shoaib, M., Waris, T., & Iqbal, S. (2025a). A Review-Based Examination of Gender Dynamics in Virtual Learning Environments in Higher Education. *Sociology & Cultural Research Review*, *3*(02), 448–454.

Shoaib, M., Waris, T., & Iqbal, S. (2025a). Assessing Gendered Participation Spaces in Online Learning Environments in Higher Education in Pakistan. *The Knowledge*, *4*(2), 63-74.

Shoaib, M., Waris, T., & Iqbal, S. (2025b). Gender Dynamics in Online Higher Education: Insights from Empirical Evidence. *The Regional Tribune*, *4*(2), 89-102.

Shoaib, M., Waris, T., & Iqbal, S. (2025b). Virtual Learning Environments and Gendered Spaces in Higher Education in Pakistan: A Quantitative Approach. *Regional Lens*, *4*(2), 65-78.

Shoaib, M., Waris, T., & Iqbal, S. (2025c). A Quantitative Study of Gendered Interactions and Spatial Perceptions in Online Higher Education in Pakistan. *ProScholar Insights*, *4*(2), 96-108.

Shu, Y., & Huang, T.-C. (2021). Identifying the potential roles of virtual reality and STEM in Maker education. *The Journal of Educational Research*, *114*(2), 108-118. doi:10.1080/00220671.2021.1887067

Simon, M. (2020). The Emotionality of Whiteness in Physical Education Teacher Education. *Quest*, *72*(2), 167-184. doi:10.1080/00336297.2020.1739541

Sinha Mukherjee, S. (2015). More educated and more equal? A comparative analysis of female education and employment in Japan, China and India. *Gender and Education*, *27*(7), 846-870. doi:10.1080/09540253.2015.1103367

Slattery, O., Prendergast, M., & Riordáin, M. N. (2023). Navigating a male dominated domain: experiences of female STEM students in higher education in Ireland. *Irish Educational Studies*, *42*(4), 861-880. doi:10.1080/03323315.2023.2261418

Smith, E. (2010). Is there a crisis in school science education in the UK? *Educational Review*, *62*(2), 189-202. doi:10.1080/00131911003637014

Smith, E. (2011). Women into science and engineering? Gendered participation in higher education STEM subjects. *British Educational Research Journal*, *37*(6), 993-1014.

Solomon, J. (1997). Girls' science education: choice, solidarity and culture. *International Journal of Science Education*, *19*(4), 407-417. doi:10.1080/0950069970190404

Sparks, D. M., Przymus, S. D., Silveus, A., De La Fuente, Y., & Cartmill, C. (2023). Navigating the Intersectionality of Race/Ethnicity, Culture, and Gender Identity as an Aspiring Latina STEM Student. *Journal of Latinos and Education*, *22*(4), 1355-1371. doi:10.1080/15348431.2021.1958332

Stevenson, K. T., Szczytko, R. E., Carrier, S. J., & Peterson, M. N. (2021). How outdoor science education can help girls stay engaged with science. *International Journal of Science Education*, *43*(7), 1090-1111. doi:10.1080/09500693.2021.1900948

Subotnik, R. F., Tai, R. H., Rickoff, R., & Almarode, J. (2009). Specialized Public High Schools of Science, Mathematics, and Technology and the STEM Pipeline: What Do We Know Now and What Will We Know in 5 Years? *Roeper Review*, *32*(1), 7-16. doi:10.1080/02783190903386553

Tops, W., Jansen, D., Ceulemans, E., Petry, K., Hilton, N. H., & Baeyens, D. (2023). Participation problems and effective accommodations in students with dyslexia in higher education. *European Journal of Special Needs Education*, *38*(3), 317-333. doi:10.1080/08856257.2022.2089507

Troutman, S. (2017). Fabulachia: urban, black female experiences and higher education in Appalachia. *Race Ethnicity and Education*, *20*(2), 252-263. doi:10.1080/13613324.2015.1110340

Ullah, H., Qureshi, A. W., & Ali, R. (2024). Grade inflation in Pakistan higher education: teachers' perspective. *Journal of Further and Higher Education*, *48*(7), 700-713. doi:10.1080/0309877X.2024.2386455

Ur Rehman, A., Ilyas Khan, M., Dayan, U., & Munir Ahmad, S. (2024). Women academics' motivation for higher education and empowerment: a qualitative case study in Pakistan. *Gender and Education*, *36*(6), 599-614. doi:10.1080/09540253.2024.2363240

Van Langen, A., Bosker, R., & Dekkers, H. (2006). Exploring cross-national differences in gender gaps in education. *Educational Research and Evaluation*, *12*(2), 155-177. doi:10.1080/13803610600587016

Velasco, R. C. L., Hite, R. L., Milbourne, J. D., & Gottlieb, J. J. (2023). Stand out and speak up: exploring empowerment perspectives among advocacy activities of STEM teachers in the US. *Teacher Development*, *27*(4), 525-541. doi:10.1080/13664530.2023.2207095

Watson, S., Williams-Duncan, O. M., & Peters, M. L. (2022). School administrators' awareness of parental STEM knowledge, strategies to promote STEM knowledge, and student STEM preparation. *Research in Science & Technological Education*, *40*(1), 1-20. doi:10.1080/02635143.2020.1774747

Weiss, M. R., & Glenn, S. D. (1992). Psychological Development and Females' Sport Participation: An Interactional Perspective. *Quest*, *44*(2), 138-157. doi:10.1080/00336297.1992.10484048

Wendt, J. L., Rockinson-Szapkiw, A., & Cordes, M. (2018). Examining the influence of a STEM certification model on female, minority science outcomes. *The Journal of Educational Research*, *111*(6), 666-677. doi:10.1080/00220671.2017.1396437

Young, A. M., Wendel, P. J., Esson, J. M., & Plank, K. M. (2018). Motivational decline and recovery in higher education STEM courses. *International Journal of Science Education*, *40*(9), 1016-1033. doi:10.1080/09500693.2018.1460773

Young, J. L., Young, J. R., & Ford, D. Y. (2019). Culturally Relevant STEM Out-of-School Time: A Rationale to Support Gifted Girls of Color. *Roeper Review*, *41*(1), 8-19. doi:10.1080/02783193.2018.1553215

Yu, H.-P., & Jen, E. (2023). Exploring the gender gap in mathematics and science from the score distribution of PISA: Lessons learned from gifted education teachers' perspective. *Gifted and Talented International*, *38*(2), 107-121.