

Gender Inequality, Perceived Social Support, and Academic Career Outcomes Among Women Faculty in Pakistan

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Abstract

Women's entry into higher education does not automatically ensure equitable recognition, professional progression, or access to academic leadership. This study investigates associations between perceived gender inequality, perceived social support, and self-reported academic career outcomes among female university faculty in Pakistan, while describing access to digital resources as a related institutional condition. A cross-sectional questionnaire survey provided reported results for 350 women employed in public and private higher education institutions. Six-item measures of perceived academic outcomes, gender inequality, and social support were used alongside seven items addressing digital empowerment. Reported regression estimates were reviewed and 95% confidence intervals and selected descriptive proportions were independently derived from available coefficients and item-frequency tables. Gender inequality correlated negatively with perceived academic outcomes ($r = -.251$, 95% CI $[-.347, -.150]$); in a joint model it remained negatively associated with outcomes ($B = -.273$, 95% CI $[-.373, -.173]$), whereas social support was positively associated ($B = .340$, 95% CI $[.238, .442]$). Together the predictors accounted for 16.4% of outcome variance. Item responses revealed marked differences between family encouragement and perceptions of institutional support, promotion fairness, and digital training. The findings support an interpretation of academic progression as a combination of organizational conditions and accessible social resources, but do not establish causal effects or a digital mediation pathway. Transparent promotion processes, equitable research opportunities, structured mentoring, and purposeful digital training are practical priorities for Pakistani universities. More discriminating measurement and respondent-level longitudinal evidence are needed to examine mechanisms.



Keywords: gender inequality, perceived social support, women academics, academic careers, Pakistan, higher education, digital inclusion

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1. INTRODUCTION

A very real policy challenge is the growing number of women in universities. While many systems have embraced it, academic success is not equitably distributed (Fauzee et al., 2026; Shaukat et al., 2026). It is not just about whether women can be in positions to undertake professional academic work but whether the institutions provide the same opportunities to publish, be credited, to be in senior positions, and to be able to make decisions (Sumera kanwal et al., 2024). In a large-scale investigation of publishing careers, gender imbalance in the length of careers and attrition rates accounted for a significant portion of the gender discrepancy in cumulatively scientific output despite similar annual productivity among researchers with similar publishing records (Huang et al., 2020; Akram et al., 2022). Research-team records also provided evidence that females were less likely to gain authorship or patent credit for women who had similar involvement with research output (Ross et al., 2022). This makes it more difficult to understand academic success by simply pointing to effort or qualifications (Fatima et al., 2025).

Career progression is produced within a network of rules, relationships, expectations, and opportunities (Mahmood et al., 2024). Decisions about teaching allocations, research funding, committee appointments, travel, promotion, and research collaboration are formally organizational but also shaped by informal relations (Mahmood et al., 2024; Mahmood & Akram, 2026; Mahmood & Ismail, 2022). A scoping review of gendered academic career outcomes identifies authorship and leadership as heavily studied outcomes while observing that connections among different forms of career advantage remain insufficiently examined (Mahmood, Akram, et al., 2023; Mahmood, Kanwal, et al., 2023; Mahmood & Anwar, 2025; Nilofar Pervez et al., 2024). A publication may support promotion; seniority may increase access to resources; recognition may strengthen professional networks. Conversely, repeated disadvantages may accumulate across these stages (Waqas et al., 2026). Separating perceived bias from concrete outcomes is therefore necessary, but studying the perceptions of women working within these arrangements is also informative because those perceptions shape professional choices and access to opportunities (Mahmood et al., 2023; Mahmood & Anwar, 2025).

Pakistan is a useful setting for examining this problem. Universities operate in a social context in which household responsibilities, expectations surrounding women's employment, professional networks, and organizational authority may intersect. Conversations with the female teachers at public universities in Punjab revealed patterns of promotion more influenced by credentials, professional relationships, and institutional promotion procedures, and less by individual drive and ambition (Sadaf et al., 2025). A study of Pakistani women academics' research productivity similarly found that family, collegial, and institutional conditions could encourage or inhibit scholarly work (Khalid et al., 2024). Recent accounts from Balochistan show that academic pathways differ according to educational experiences and the opportunities provided by professional networks and formal institutional support (Khalid, Diankun, et al., 2025). Such findings suggest that gender inequality is neither exclusively a domestic issue nor exclusively a university policy problem (Yusof et al., 2027).

An important question concerns what women can draw upon when institutional conditions are unequal. Perceived social support refers to the belief that assistance and encouragement are accessible from family members, colleagues, supervisors, mentors, or administrators (Mahmood et al., 2026). Support may take the form of time, practical help, research advice, reliable professional information, or recognition of academic ambitions. In Pakistan, qualitative work on women academics balancing motherhood and professional obligations describes the pressure of household duties alongside the usefulness of colleagues and extended-family assistance (Sadaf et al., 2022). An account of female academics' work-life strategies also shows that women may respond actively to restricted circumstances, although coping strategies are not substitutes for fair institutional arrangements (Naseem et al., 2024). Hence it is important to look at support and inequality in concert, as one does not necessarily negate the other.

Digital access has added another dimension to the distribution of opportunity (Mahmood et al., 2026). Online research collections, learning platforms, digital conferences, and scholarly collaboration tools can reduce some spatial and logistical barriers. Yet the availability of technology does not guarantee meaningful participation. The 2024 UNESCO gender report emphasizes that educational technology can reproduce existing inequalities



when access, digital competence, or participation in technology design is unequally distributed (UNESCO, 2024). Amjad et al. (2024) highlighted disparities in access of the marginalized students in the study on Digital Inclusion in Pakistani Universities; the study conducted did not involve faculty. Scherer et al. (2023) found distinctions between higher education teachers regarding specific (subscale) components of online-teaching readiness and why support and prior experience are important when considering digital confidence.

Although there is an ever-increasing qualitative literature on the matter, perceived gender inequality, perceived social support and perceived career outcomes of women academics have not been considered in a single quantitative account in Pakistan to date. Often, though, support is viewed as a general solution and there is no attempt to estimate the association between barriers simultaneously, or institutional recognition and family encouragement. Another issue relates to measurement. Academic success might manifest as actual advances and publications, but a survey might measure satisfaction, perceived fairness, and opportunity. The assertion that these measures are interchangeable results in exaggerated claims. Flat (Fried, 2020) believes that research conclusions should be made explicit in terms of the relationship between constructs and measurements. Therefore, the present study differentiates between perceived academic career outcomes and career achievements that were verified by the participants.

This study poses three questions. First, how do perceived gender inequalities relate to the academic career outcomes that women report? Second, is there additional variation in those outcomes after inequality is accounted for which is explained by perceived social support? Third, what do the reported responses reveal about the institutional, relational and digital setting in which these careers exist? There are two directions of the core analysis: increase in perceived inequality will be associated with decrease in outcome and increase in perceived support will be associated with increase in outcome. The information describing demographic differences and available online resources is presented as descriptive if the evidence available does not provide a more comprehensive explanatory model. The goal is not to draw inference of causal nature but to provide an empirical description with a degree of boundary.

2. LITERATURE REVIEW AND CONCEPTUAL FRAMEWORK

2.1 Gendered opportunity structures in academic careers

Gender inequality in the academic workplace can manifest itself in explicit means and in more subtle ways. A woman might meet all the formal qualifications for a research grant or administrative job, but be invited less often, or less influential mentored, or have fewer opportunities to publish. Both objectively and subjectively, these mechanisms impact the resources she has to work with and her assessment of the academic environment (Al-Zu'bi et al., 2026). Ross et al. (2022) pinpoint systematic variation in credit for science contributions and Huang et al. (2020) show how cumulative outcomes can be a function of unequal career duration and attrition. Taken together, the two patterns raise the possibility of considering institutional mechanisms that link ostensible equality in entry and inequality in advancement.

Leadership is particularly significant as it encompasses both formal qualifications and informal recognition (Mahmood et al., 2026; Shaukat et al., 2026). Ayyildiz and Banoglu (2024) position gendered losses within the journey towards leadership and not necessarily at a specific moment of recruitment. Khan et al. (2025) similarly interpret women's progression in higher education through institutional, organizational, and individual conditions (Mahmood, Akram, Ismail, et al., 2024). Their multilevel account is useful because obstacles may operate simultaneously: unequal committee membership can narrow visibility, limited visibility can diminish nominations, and the resulting scarcity of women leaders may leave the original procedures intact. A purely individual explanation would miss this sequence. In the Pakistani context, Sadaf et al. (2025) show why pathways to professorship involve workplace relationships and the organization of promotion procedures as well as personal strategy.

Job prospects should also be considered in the context of research output and the scattering of care. Academic labor does not consist solely of publishing; it includes mentoring, teaching, service, and administrative duties, each valued differently in formal advancement (Haron et al., 2024; Huma, Ahmed, Mahmood, & Awan, 2025). During the pandemic, studies found disproportionate reductions in research time for female scientists and



researchers caring for young children (Myers et al., 2020), as well as widening inequities in some authorship positions (King & Frederickson, 2021). These are studies of an extraordinary phase in the history and cannot just be extrapolated to today's universities in Pakistan. However, they also demonstrate a constant analytical argument: that organisational expectations interact with unpaid work and can change the time available for activities that are then "counted" towards advancement (Mahmood et al., 2021).

This recent evidence from Pakistan warns against women being portrayed as a homogeneous group. Khalid et al. (2024) identified research experiences shaped by rank, institutional setting, and family arrangements. Sadaf et al. (2025) make a distinction between promotion trajectories based on varying combinations of career planning, workplace relations and promotion rules. According to Khalid et al. (2025), the negotiation of senior women for the second strand of opportunities in Balochistan involved education, networks, and institutional support. Collectively, these studies suggest a more relational perspective on progress: that the qualification of women is important, however, it is the institution that determines how qualifications are measured and what activities are materially rewarded. The first hypothesis in the current study is thus a negative correlation between the perception of gender inequality and the perception of academic career outcomes.

2.2 Social support as a resource rather than a replacement for fairness

Support includes information and emotional support, practical support and professional relationships. These materials might make academics easier to sustain while rearing children and working. They also can boost the chances of a faculty member applying for research collaboration or promotion. Khalid et al. (2024) mention that family, colleagues and universities are not interchangeable support providers but different in academic environment. In his study, Sadaf et al., (2022) also mentions that support from colleagues and relatives can allow women students to cope with the multiple roles they have to play. It is not only about women getting support, but about what kind of support they get, from whom, and what gets transferred to the activities which relate to promotion.

Formal mentoring is worthy of a separate discussion. In a review of research on mentoring in higher education, Nuis

et al. (2023) report that there is inconsistent definition and measurement of the construct. There is a gender component to mentoring that can differ based on the program design and the dynamics of the mentor/mentee relationship, as reported by Prats-Brugat et al. (2024). Women's experiences of mentoring in academia call for the need to acknowledge the systemic barriers to mentorship, to take into account interpersonal advice and mentoring (Maguire et al., 2024). A colleague might be able to impart publishing information but have no influence over opaque promotion criteria; a supervisor might be able to endorse a research proposal, but not control funding for the research. These differences are important when examining support using a wide range of survey items.

Social support can act as a buffer that does not necessarily address an organization's inequities. Running errands for the authors, supportive relatives can provide time for writing but cannot guarantee authorship recognition. Peer networks can spread great jobs but can't change the hiring process (Ahmed et al., 2026). Analysis of individual coping, interpersonal resources, and organizational rules should be carried out at each level since there is multi-level perspective provided by Khan et al. (2025). Thus, the current model incorporates perceived support as a distinguishable predictor in addition to inequality. It is assumed that there is a positive association, but the model does not statistically show that support buffers or even removes the negative association of inequality.

2.3 Digital opportunity and its limits

Digital tools can assist academics to access journal articles, organize teaching, disseminate research and collaborate in research networks outside their home campus. These can be especially valuable in situations where travel, timing, and/or access to institutions are limited. However, the UNESCO (2024) report states that digital access and skills continue to be gendered. In the study of digital equity among Pakistani University students, Amjad et al. (2024) indicate the significance of infrastructure and inclusion for participation. A study on teacher's digital competence in Punjab was conducted, but the population and outcomes are different from this study, and positive relations with teacher's effectiveness were found (Iqbal et al., 2024). Such evidence builds the case for reserving the use of technology as one aspect of academic



opportunity, and not assuming that technological adoption is equal opportunity.

Don't conflate the meaning of digital competence, digital access and digital empowerment. Access to a database does not equal the ability to use it, confidence does not equal institutional training and perceived usefulness does not equal objective career advancement (Huma et al., 2025). Scherer et al. (2023) show that teacher readiness measures differ on the various components. In addition, subsequent studies have shown that the making of valid comparisons between these components depends in profound ways on the quality of the measurement tools utilized (Mahmood & Akram, 2026 and Mahmood & Ismail, 2018; 2022). For women academics, the relevant process may involve several links: access enables participation; training develops skill; skill can broaden collaboration; collaboration may support research output; and the institution must still recognize the resulting work (Akram et al., 2024; Fauzee et al., 2026; Mahmood et al., 2024). A cross-sectional survey of all these perceptions cannot identify the temporal order of those mechanisms.

Digital empowerment is consequently included here as a descriptive contextual domain rather than declared a demonstrated mediator (Ahmed et al., 2025; Huma et al., 2025a; Huma et al., 2025b; Mahmood et al., 2026; Shaukat et al., 2026). This choice preserves an important distinction between a theoretically plausible mechanism and a statistically established indirect effect. Mediation requires estimates linking predictor, mediator, and outcome, together with an uncertainty interval for the indirect path; one cannot establish it by observing favorable digital responses or by interpreting two main-effect coefficients. Describing the digital results descriptively also helps to reduce the risk that a set of results presented as frequency tables are used to answer questions that necessitate summarizing individual level joint distributions. This more focused treatment is more informative than adding a complicated label to an unestimated model.

2.4 An integrated interpretation of academic outcomes

The conceptual assumptions of the study are that good developmental outcomes for children with disabilities require both early intervention in the institution and family resources. Familial support is defined in this account as engagement in both peer and supervisory and clinical contexts, and developmental outcomes are defined as the

child's progress over time (Zalli et al., 2026). In practice, these dimensions are not mutually exclusive, but in analysis they pose different types of questions. One asks if access is perceived as unfair; one asks if it is perceived that there is help available; and one asks if people perceive their situation as good in school. Even if there is a significant statistical link between the constructs it does not mean that there are not some items in the questionnaire which ask about the same practices in the organizations.

The resulting propositions are knowingly restricted. H1 suggests that perceived inequality will be negatively related to perceived academic outcomes. H2 thinks that there must be a positive relationship between support and outcomes while taking into account inequality. Variation by sector, age, rank and experience is of interest, but subgroup means, precise comparisons are necessary for credible subgroup inference; just a significant or nonsignificant test without group labels is not sufficient for subgroup inference. Similarly, digital perceptions are meaningful for institutional interpretation only and cannot be advanced towards mediation findings without model estimates. These boundaries align with the ideas of Flake and Fried (2020), which is that, "Strong analysis starts with clear measurement, not the complexity of the estimation technique."

3. METHODOLOGY

3.1 Design, setting, and participants

The research design was quantitative cross-sectional survey with academic female faculty of public and private universities of Pakistan. The unit of observation was not a single student, a department or institution, but a single female academic. The samples reported were 350. Recruitment involved "cold-calling" the academic and university sectors, relying on institutional directories and personal contacts, as well as the distribution of questionnaires, both electronically and in paper format, over a period of about six weeks. While it was mentioned that stratification by institutional type and academic position was an objective of the sampling, a full sampling frame and individual probabilities were not documented. The effective design thus should be regarded not as a valid national probability sample, but as a cross-sector survey.

Women who were surveyed included those in the lecturer, assistant professor, associate professor, professor, and other academic ranks. The ages of respondents reported



in each of the four bands were: 20-29, 30-39, 40-49 and 50 and over. Profile summaries were made by employment sector and length of service. The selection of these faculty respondents was determined by the substantive question, that is, undergraduate students do not have the same professional experiences to report on, such as hiring and promotion procedures, supervision, scholarly recognition, and administrative authority. Generalizations in the following sections therefore apply to women's reported faculty experiences within the survey and do not represent the academic motivation of female students.

3.2 Instrument and operationalization

A structured questionnaire used five ordered response categories from strongly disagree (1) to strongly agree (5). There were 25 substantive statements categorised under four domains. Perceived academic career outcomes consisted of six statements related to equal opportunity, recognition of teaching and research, satisfaction with career progress, leadership opportunities, encouragement for research and further study, and appraisal of achievement. Perceived gender inequality consisted of six items about the promotion barriers, restricted cultural beliefs, decline in offer of leadership role, administrative discouragement, preferential consideration of men's opinions and unequal promotion. Perceived social support consisted of six items concerning family encouragement and pride, supervisor behavior, colleague assistance, trusted supporter and university management support. Questions about digital empowerment included seven statements regarding access to resources online, how much they use the technology, confidence in using technology, training opportunities, reduced barriers, networking opportunities, and their perception of the technology's impact on their academic work.

The statements on the inequality items received higher ratings by participants who agreed with the items; the statements on the support and career outcome items received higher ratings by participants who had more favorable appraisals. Consideration of this direction of scoring is important because the sign of the coefficient has a simple interpretation when the construct has been decided upon in a consistent manner. The instruments do not focus on objective promotion activities, number of grants or papers published, personnel records, etc. There are career outcome items that also have substantive overlap with the inequality domain such as perceived opportunity and

fairness. Therefore, the dependent variable is called perceived academic career outcomes and not objective academic success. Such naming of levels displays the level of measurement, rather than assuming that the measure documents actual career performance.

The questionnaire was said to have been designed with reference to the literature available on the subject and was tested with 30 female academics before it was used. Developments were reported with expert review and internal consistency/factor checks; however, numerical alpha coefficients and item loadings, factor structure, item correlations, and model fit statistics were not available in the tabulated results. This evidence is needed to assess dimensionality and different levels of overlapping constructs. The reported composite regression results, therefore, are handled as supplied results, not as independent evidence of construct validity. This aligns with the concerns of Flake and Fried (2020) about transparency in measurements, and the challenges in measuring mentoring identified by Nuis et al. (2023).

3.3 Analytical strategy and reproducible calculations

The main association analyzes the correlation between perceived inequality and perceived academic outcomes using Pearson's correlation and then ordinary least-squares regressions. Model 1 is a model in which gender inequality is predicting perceived academic outcomes, and Model 2 is a model in which gender inequality and perceived social support predicts perceived academic outcomes simultaneously. Unstandardized coefficients (B), standard errors, standardized coefficients (beta), regression t statistics, omnibus F statistic and R-squared are reported. An intercept is included in each model. The models are additives and do not include interaction, a mediator, or demographic controls. Their interpretation does not refer to an estimated causal intervention effect, but to conditional statistical association.

Since greater accuracy in reporting can lead to fabrications of observations, uncertainty estimates were also obtained directly from the reported summary statistics. For the bivariate association, the 95% confidence interval used Fisher's z transformation with standard error ($\frac{1}{\sqrt{n-3}}$). For regression parameters, approximate two-sided 95% intervals were obtained as B plus or minus $(0.975, df)$ multiplied by the reported coefficient standard error. The additional explained variance associated with introducing



support was calculated as the difference between the two reported model R-squared values. Predictor-specific partial R-squared values were derived from $\frac{t^2}{t^2 + df}$. These calculations are mathematical consequences of the published estimates; rounding in the source coefficients means their values should be treated as approximate.

For descriptive analysis, each statement's five response frequencies were checked to total 350. The mean was independently recomputed by weighting categories 1 through 5 by their frequencies; category proportions were calculated from those same counts. The prevalence of agreement or disagreement refers to the pooled two categories on each side of the scale. The analysis reports carefully selected items rather than making unsupported statements about individual-level correlations among items. In the absence of individual response records, a new factor analysis, reliability analysis, heteroskedasticity test, robust regression, bootstrapped indirect effect, latent-variable model, or multigroup measurement-invariance analysis cannot be performed. These procedures are appropriate candidates for a future verified analysis, not methods to imply were completed here.

For supplementary algebraic analysis, conditional partial correlations were recovered as $\frac{t}{\sqrt{t^2 + df}}$, and squared semipartial contributions as $\frac{t^2(1-R^2)}{df}$. The nested-model F change was calculated as $\frac{R_{full}^2 - R_{reduced}^2}{\frac{1 - R_{full}^2}{347}}$. Model-level Cohen's f^2 was estimated as $\frac{R^2}{1 - R^2}$. These are transformations of published regression summary values and use rounded inputs; they are not independently refitted models. To calculate the construct-level item mean scores, each domain's verified item means was averaged together. They are not necessarily scale reliable nor do they provide the possibility of calculating confidence intervals for respondent-level composites, unless inter-item covariance data is provided.

3.4 Ethics and reporting considerations

Respondents were told that participation was voluntary and they could refuse to answer specific questions. Faculty were approached via online and paper administration in a variety of settings. Information provided for reporting did not contain the ethics-committee approval reference, list of

institutions involved, exact dates of the fieldwork or number of institutions invited and documented number of institutions who participated. These details will need to be confirmed by the research team prior to submission as it is not possible to independently determine the response rates, institutional coverage and formal ethics compliance without a final sample count. The analysis also assumes that no diagnostics are necessarily passed simply because the reported regression p values are small. The magnitude of quantitative inference needs to be commensurate with the strength and traceability of the evidence (Lakens, 2022).

4. RESULTS AND ANALYSIS

4.1 Participant profile

The sample contained 350 women faculty members. Age distributions were 102 aged 20-29 (29.1%), 87 aged 30-39 (24.9%), 81 aged 40-49 (23.1%), and 80 aged 50 or older (22.9%). The sector-specific faculty profiles yielded 183 respondents from private universities (52.3%) and 167 from public universities (47.7%). Collapsing sector-specific tables across ranks produced 71 lecturers (20.3%), 81 assistant professors (23.1%), 69 associate professors (19.7%), 70 professors (20.0%), and 59 respondents in an other-position category (16.9%). These are figures that define the participants and are not a measure of the representation of women nationally in the faculty workforce.

A small number of respondents chose not to report their marital status and the survey form of the questionnaire failed to show marital status as one of the demographic data. Additionally, the number of respondents with 5-10 years of experience in the respective sectors was also zero for both sector-specific profiles. This could be due to coding, omission or an unusual sample and cannot be explained from the tables reported. These anomalies will not be assumed to be data quality issues, but rather they will be handled as data quality questions. Claims of differences in gradients of experience, marital status, or other subgroup differences would be premature until rechecked original coding and subgroup records.

4.2 Descriptive profile of perceived opportunities and support

There were some significant differences among the responses to the career-outcome statements. The results



showed that only 27.4% agreed or strongly agreed that fair opportunities are available in their institution for leadership in academic projects, while 59.1% disagreed or strongly disagreed. 33.1% agreed that success was evaluated without any gender bias while 51.7% disagreed. Level of satisfaction with progress in relation to qualifications and effort had 34.3% agree and 49.1% disagree. These items refer to the respondents' perceptions of their work settings and do not report the percentage of institutions that had a personnel policy violation. However, their distribution suggests that this is why perceived opportunity is a major focus in the outcome measure for the study.

The inequality items should be read similarly. The opinion that men and women were treated unfairly in promotion and opportunity was 42.6% and that they were not treated unfairly 42.9%. The percentage that agreed that male colleagues' opinions were more important was 43.1% and the percentage that disagreed was 43.4%. These response distributions are "nears" balanced and reflect heterogeneity rather than universal agreement regarding discrimination. By contrast, 63.4% said they personally hadn't turned down any leadership positions for gender related reasons, though this does not rule out the possibility of other forms of perceived inequalities. This spread may not show up in group averages, particularly if experiential demands vary. Selected positive and negative responses are shown together in Table 1.

Table 1:. Selected response indicators for academic opportunity, support, and digital access

Indicator	Disagree (%)	Agree (%)	Mean
Fair leadership opportunities	207 (59.1)	96 (27.4)	2.40
Fair assessment without gender bias	181 (51.7)	116 (33.1)	2.66
Satisfied with academic progress	172 (49.1)	120 (34.3)	2.70
Unequal promotions/opportunities	150 (42.9)	149 (42.6)	2.96
Family supports academic career	122 (34.9)	186 (53.1)	3.27
Family proud of achievements	118 (33.7)	192 (54.9)	3.37
University management supportive	156 (44.6)	140 (40.0)	2.82
Access to digital resources	144 (41.1)	161 (46.0)	3.11
Institution provides digital training	194 (55.4)	122 (34.9)	2.52

Note. N = 350 per statement. Disagree and agree pool the two lowest and highest response categories, respectively. Reported refers to those who had been verified by recomputing the 5 category weighted averages.

Support responses distinguished private resources from institutional relationship. Respondents' family pride in their academic success was agreed by 54.9% and disagreed by 33.7%. There was 53.1% agreement on family support for career progression. 48.6% and 46.0% respectively perceived supervisory encouragement and colleague support positively. In contrast, 40.0% thought that University management supported women's academic contribution while 44.6% disagreed. These figures indicate that encouragement is different from within the university management. They do not show that when the family environment is supportive, individual respondents actually report better outcomes, rather the composite regression estimates represent a different individual-level relationship.

The results for digital products were also mixed. Access to academic digital resources received a 46.0% yes, and a 41.1% no. The percentage of agreement on the institutional training in digital tools was 34.9%, and the percentage of disagreement was 55.4%. Just 34.3% said they were

confident in their use of digital technologies to enhance their performance. At 44.9% each, there was a tie between those who agreed that digital empowerment made a significant difference to academic outcomes and those who disagreed. Access and training is a substantive difference: there may be platforms, but staff may not use them effectively, for example, if the university does not offer training. These frequencies do not mean that the one is causing the other or that one is the mechanism that produces the other.

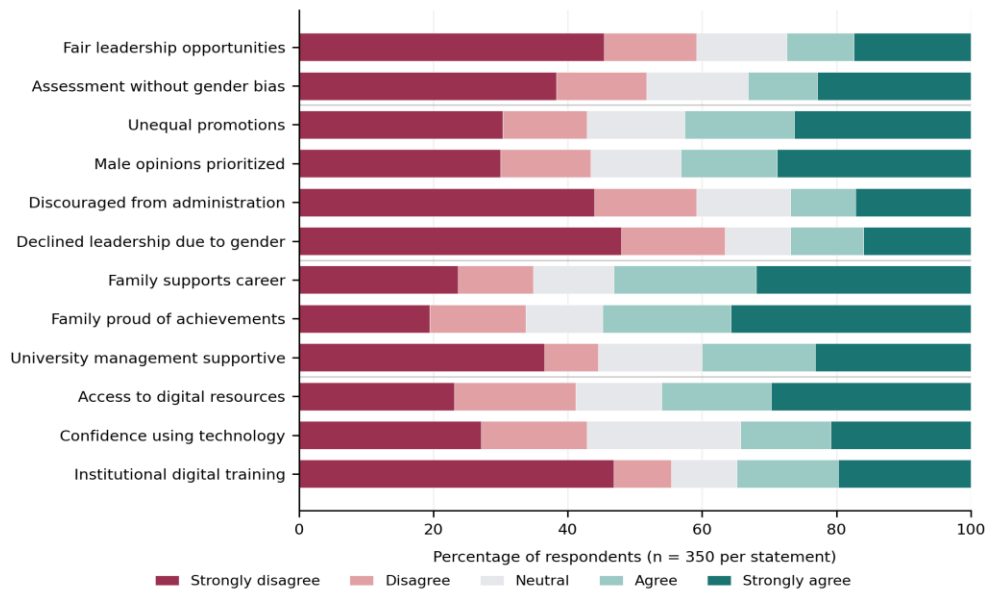


Figure 1:. Distribution of responses to selected indicators across the four research domains

Note. The response categories reflect the counts in the original report; there are 350 counts per row. Items are chosen for substantive contrasts and are not independent groups.

4.3 Item-level domain synthesis

In gender inequality, social support and digital empowerment, the equally weighted mean responses were 2.713, 3.108 and 2.848 on the five-point scale, respectively, across the six academic-outcome statements (Table 2). The reported counts of categories are sufficient to exactly reconstruct these values. They independently sum the endorsement intensity of statements within each domain, rather than four separately validated latent scales. More specifically, a negative score related to the mean inequality cannot be interpreted as evidence of the absence of institutional discrimination as respondents differed in their agreement with the barriers and on different items.

The profile also reveals why distributional presentation matters. Across the six perceived-support items, approximately 48.7% of item responses were agreement endorsements, compared with 38.4% disagreement; digital items displayed the opposite balance (40.0% agreement and 46.5% disagreement). These percentages pool item-response occasions, not independent participants, and therefore must not be treated as estimates of the proportion of women who experience all forms of support or disadvantage. Figure 1 displays the five categories for selected survey indicators, including contrasting family and institutional sources of support.

Table 2:. Reconstructed descriptive item profiles by domain

Domain	Items	Mean item score	Disagree (%)	Neutral (%)	Agree (%)
Academic outcomes	6	2.725	48.5	17.2	34.3
Gender inequality	6	2.713	50.5	13.9	35.6
Perceived social support	6	3.108	38.4	13.0	48.7
Digital empowerment	7	2.848	46.5	13.5	40.0

Note. The domain mean is the arithmetic average of its item means. Percentages derive from the responses of a group of items in a domain, not a group of different people; they do not have a respondent-level standard error or confidence interval.



4.4 Bivariate relationship and regression models

There was a significant negative correlation between perceived gender inequality and perceived academic career outcomes, $r = -.251$, $p < .001$, $n = 350$. The Fisher-transformed 95% confidence interval was approximately $[-.347, -.150]$. The influence means that the more inequality people perceived, the worse the academic situation they had reported. The correlation is statistically significant and different from 0 in the context of the correlation model, and the value of the correlation is moderate. Given that the two domains have similar fairness and opportunity items, it may be that this relationship is partly due to the similarity of the wording of the items rather than an independent institutional pathway.

The first ordinary least-squares model used only inequality as a predictor. It yielded $B = -.262$, $SE = .054$, $\beta = -.251$, $t = -4.830$, $p < .001$, with an approximate 95% coefficient interval of $[-.368, -.156]$. Model fit was $F(1,$

$348) = 23.33$, $R\text{-squared} = .063$, and adjusted $R\text{-squared} = .060$. This one predictor explains approximately 6.3% of the variance in the scale of perceived academic outcomes as reflected on an $R\text{-squared}$ value of .063. A statistically significant correlation is hence consistent with a large amount of unexplained variation that may be due to inequality.

The joint model retained a negative inequality coefficient, $B = -.273$, $SE = .051$, $\beta = -.261$, $t = -5.322$, $p < .001$. Perceived social support showed a positive coefficient, $B = .340$, $SE = .052$, $\beta = .319$, $t = 6.487$, $p < .001$. Approximate 95% intervals were $[-.373, -.173]$ for inequality and $[.238, .442]$ for social support. Model fit was $F(2, 347) = 34.08$, $p < .001$, $R\text{-squared} = .164$, and adjusted $R\text{-squared} = .159$. In practical terms, a one-unit increase on the support composite reported was linked to a .340 higher score on the outcome score, while the reported inequality score remained the same. A similar increase in inequality was correlated with a .273-unit decrease in predicted outcome score with support constant.

Table 3.: Regression estimates predicting perceived academic career outcomes

Predictor	B	SE	β	95% CI for B	p
Model 1: Inequality	-.262	.054	-.251	$[-.368, -.156]$	< .001
Model 2: Inequality	-.273	.051	-.261	$[-.373, -.173]$	< .001
Model 2: Social support	.340	.052	.319	$ [.238, .442]$	< .001

Note. $N = 350$. Model 1: $R^2 = .063$, adjusted $R^2 = .060$, $F(1, 348) = 23.33$, $p < .001$. Model 2: $R^2 = .164$, adjusted $R^2 = .159$, $F(2, 347) = 34.08$, $p < .001$. CI = confidence interval; intervals were reconstructed from reported B and SE and are approximate because inputs were rounded.

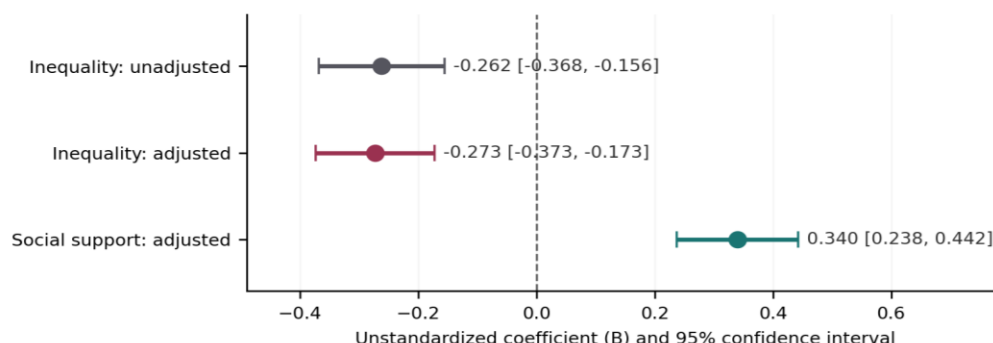


Figure 2.: Regression coefficients and reconstructed 95% confidence intervals

Note. Horizontal intervals use $B \pm t(0.975, df) \times SE$ from rounded regression output. The first estimate is unadjusted and the other two estimates are mutually adjusted. Zero means that there is no linear association.



The change in R^2 between the 1 predictor and 2 predictor model was .101, which is 10.1% of the outcome variance. Support thus added made a material contribution to the explanatory power of the additive model in comparison to inequality alone. The approximate values for the predictor-specific partial R -squared were .075 for inequality and .108 for support. These partial measures present each of the associations separately, considering the effect of the other predictor; they cannot simply be added together and interpreted as parts of the overall R -squared. Notably, 83.6% of variance observed in the second model was unexplained and there may be other organizational, biographical, disciplinary and measurement factors still to be considered.

4.5 Conditional effect sizes and nested-model fit

A rounded summary of the difference between the two model fits was a nested F change of about $F(1, 347) = 41.92$,

Table 4:. Derived incremental and conditional association statistics

Derived statistic	Inequality	Social support	Interpretation
Partial r	-.275	.329	Conditional association
Partial r^2	.075	.108	Fraction of residual variance conditional on the other predictor
Semipartial r^2	.068	.101	Unique share of total outcome variance
Model R^2	.063 (Model 1)	.164 (Model 2)	$\Delta R^2 = .101$ when support is added
Cohen's f^2	.067 (Model 1)	.196 (Model 2)	Incremental support $f^2 = .121$

Note. Values are algebraic reconstructions using rounded coefficients and fit indices. Nested-model F change ≈ 41.92 , $df = (1, 347)$, $p < .001$. Semipartial values need not sum to R^2 ; ordering matters for the increment.

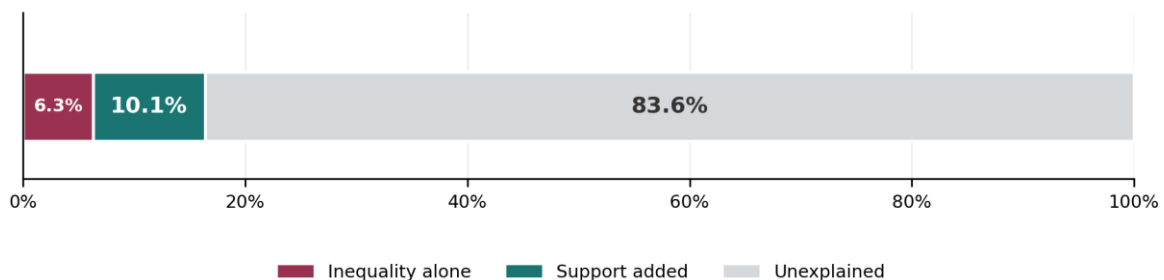


Figure 3:. Order-dependent decomposition of variance explained by the two-predictor regression

Note. The first segment is R^2 from inequality alone (.063), the second is the increment after adding support (.101), and the third is unexplained variance ($1 - .164$). This is a sequential fit description, not a causal decomposition.

The available t -test summary returned nonsignificant differences for the recorded comparison across all four composite constructs: perceived academic outcomes, $t(348) = -1.562$, $p = .119$, Cohen's $d = -.167$; inequality, $t(348) = .582$, $p = .561$, $d = .062$; support, $t(348) = -1.354$, $p = .177$, $d = -.145$; and digital empowerment, $t(348) = -1.101$, $p = .272$, $d = -.118$. However, the table did not label

the two groups compared. These results cannot therefore establish the absence of sector, age, marital-status, or rank differences. A two-group t test also cannot test a four-category age variable or a five-category academic rank variable without prior grouping. The sensible result is to regard demographic hypotheses as unresolved pending a reproducible subgroup analysis.



Table 5.: Reported two-group *t* tests with unidentified demographic contrast

Construct	t(348)	p	Cohen's d
Perceived academic outcomes	-1.562	.119	-.167
Gender inequality	.582	.561	.062
Perceived social support	-1.354	.177	-.145
Digital empowerment	-1.101	.272	-.118

Note. The original test summary did not name the two groups compared, so findings cannot be attributed to a specific demographic variable. A nonsignificant result is not evidence of equivalence.

4.6 Scope of statistical identification

H1 and H2 are consistent with the direction and statistical significance of the available regression estimates. The data do not identify the processes that produced these associations. Digital empowerment was measured, although there was no mediation claim as the reported conditional path coefficients and uncertainty estimates for indirect effects were not reported. Similarly, there was no interaction demonstrated that would show the relationship between inequality and outcomes is buffered by support. Confirmatory factor analysis, latent constructs, sector interactions, nonlinear terms, and multilevel models may be productive extensions if respondent-level observations and institutional identifiers are accessible. They cannot be generated validly from marginal item frequencies or a two-predictor regression summary, and they have not been represented as completed findings.

5. DISCUSSION

The results give empirical shape to a problem already visible in recent research on academic careers: institutional recognition and perceived access to opportunity are associated with the conditions under which women can maintain and develop academic work. Greater reported inequality corresponded to less favorable perceived academic outcomes, while higher social support corresponded to more favorable outcomes even when inequality was included in the model (Zalli et al., 2026). These patterns agree with accounts of Pakistani women academics whose research and progression are linked to promotion arrangements, family responsibilities, collegial relations, and institutional opportunity (Khalid et al., 2024; Sadaf et al., 2025). They also fit wider evidence that cumulative scientific outcomes depend partly on recognition and unequal career pathways, not simply

differences in scholarly capability (Huang et al., 2020; Ross et al., 2022).

The size of the association is informative as is its significance. A single-factor explanation of academic careers is not warranted by the bivariate correlation of -.251 and by the fact that inequality alone will explain only 6.3% of the reported outcome variation. The fuller model explains 16.4%, indicating that a lot of variables other than these two factors influence women's perception of academic achievement. This uncertainty is captured in the sequential decomposition of Figure 3. The 10.1 point increase from 'Adding social support' is not a causal effect on academic achievement and should not be interpreted as having a policy impact at a population level but rather was observed when the social support component was entered first in the regression. In this sense, results do not mean that bias does not exist or that addressing one type of bias is enough to bring about equality in results. Career outcomes are linked to other stages and organizational actors, Gould et al. (2025). That explanation is what makes it possible to have a small association at any one point and still have a lot of cumulative disadvantages over time.

The positive coefficient of social support calls for careful interpretation. Adding the perceived support increased explained variance 10.1 percentage points above model with only the inequality. Whilst it is substantively valuable in the context of the current model, this does not provide evidence that social support is a buffer against discrimination. An additive regression proves that support differences translate to outcome differences conditional on inequality; but it does not determine whether or not the strength of the inequality association varies at higher levels of support. A gender-inequality-by-support interaction would result in a buffering claim, but a mechanism claim would necessitate measurements and temporal ordering of the variables that match the indirect effect. That is a much more useful and accurate way to put the current result as a new positive relationship.

Results of the descriptive analysis indicate that support should not be viewed as an institutional asset only. There were more affirmations of family pride and family encouragement than of management of the university. This disparity aligns with qualitative findings about the interplay between family support and institutional barriers (Khalid et al., 2024; Sadaf et al., 2022). A woman might have an invitation to further study and not be given a research allowance or clear work allocation or be recognised. While



beneficial, mentorship can be made accessible through program design, the benefits of these relationships vary across programs based on the program's design and organizational power (Maguire et al., 2024; Prats-Brugat et al., 2024). It is crucial for university leaders, therefore, not to use a positive response in the family support area as a measure of the fairness of the operation of formal career structures.

There is one conceptual warning that arises out of the questionnaire. These academic career outcomes questions mostly focus on the aspects of fair opportunity, recognition, encouragement, and satisfaction. They are important experiences but not output or promotion. There are several items that have the content of the inequality scale: Is it fair that people have opportunities? Is it fair that people get promoted? The link between the measures is thus partly due to their nature. Flake and Fried (2020) detail how insufficient construct separation may lead to incorrect conclusions despite well-conducted statistical tests. Future research should investigate both discriminant validity and examine item wording, and if possible, link perception scales with publications, committee appointments, grant receipt and promotions.

The digital outcomes indicate a problem with implementation at the institutional level, but not an implemented technological solution. Approximately 46 % agreed that they had access to digital resources and 34.9 % agreed that there was adequate digital training. Almost half disagreed that digital access and skill increased networking, publishing, and collaboration opportunities. More than just platform procurement is required from these responses. UNESCO (2024) emphasizes that educational technology is not inherently fair, because the impacts and benefits that a technology may provide, are contingent upon skills, accessibility and power. Scherer et al., (2023) also indicate that preparedness for online teaching requires various capacities and conditions of support. Thus, it is essential to provide structured training, technical assistance, easy access to databases, and an appreciation of digital scholarly work for female faculty, and not to assume that having a work product online alone will positively impact career outcomes.

The study also questions variations in the population of women academics. Differences between public and private universities may include the following: promotion systems, employment conditions, workloads, research facilities, and governance. The support required by early-career scholars

may be different from that required by more senior professors, and support needs may also vary over the course of a life. Research examining change in professional productivity during and following pandemic restrictions reveals how home responsibilities and work arrangements can impact professional productivity (Ermiş-Mert, 2024; Gordon et al., 2024; Myers et al., 2020). Such differences cannot be discerned in the current sector and rank distributions. However, since the reported demographic t test do not identify the comparison groups it would not be possible to conclude that the groups were demographically equivalent. Future estimates should be made for well-defined groups, subgroup sizes, adjusted differences and uncertainty.

Such results must be interpreted within the context of organizational policies. One answer is to develop explicit, verifiable, and appealing processes and criteria in the areas of promotion, authorship credit and administrative appointment. A second is for equal access to time, research support, conferences and mentoring to be done in a transparent manner. This third is to develop channels for women to raise complaints of professional exclusion without being at risk of losing jobs. These are not necessarily reflected in the association estimates but are pragmatic responses based on association experiences, as reported, and detailed description of the academic world in Pakistan (Sadaf et al., 2025; Khalid et al., 2024; and Khan et al., 2025). Institutional records and follow up observations would be needed to assess their effectiveness.

One direction of special interest is overcoming the dichotomy between structural reform and personal support. Workload rules can be adapted to recognize caregiving needs, research-writing time can be granted, and there can be formal mentoring and accountability of senior faculty for equitable participation. While families and colleagues are an important source of support, they should not have to pick up the pieces of fuzzy policies at the university. Fairness and support are essentially components of the same policy package, and can only be assessed using different indicators in practical terms. A mentorship program could be evaluated based on participation and career guidance, a digital-access program could be evaluated based on demonstrated use and competence rather than on the number of licenses purchased, and a promotion reform program could be evaluated based on the timeliness, transparency and distribution of promotion decisions.



6. METHODOLOGICAL STRENGTHS AND LIMITATIONS

There were some points that enhanced the descriptive value of this research. This sample consists of women across various university ranks and university sectors, the questionnaire covers organizational, social and technological aspects and the regression analysis models simultaneous association between inequality and support. Reanalysis of grouped frequencies also allows for exact verification of item totals and weighted means, and the reconstructed confidence intervals put emphasis on estimated magnitudes and not p-values alone. These checks are minimal yet genuine. They do not require simulated participants or result data from unidentified statistical software and provide an opportunity for the researcher to determine which conclusions can be drawn from the numbers presented.

Limits are great and will affect interpretation. Cross-sectional self-reports cannot demonstrate the temporal direction of associations, and there is the possibility of shared response tendencies. There are no data on the sampling frame, nor on the nonresponse profile, which makes a nation wide assessment of representativeness difficult. No institution level clustering data are available. The item sets were reported as pilot-tested and numerical reliability and factor-validity evidence was not available for inspection. The situation needs to be audited using raw data, as the experience coding and untraceable demographic comparison is abnormal. No independent measure of objective academic outcomes, no demographic-adjusted association model, no reported diagnostic evidence with regards to outliers, linearity, residual distributions or homoskedasticity. These are not issues that will be fixed with a rewrite of the prose, but material constraints for an article for a selective journal.

The next analytical phase should be in the context of clearly stated questions not in the context of a need for elaborate statistical analyses. A measurement model, with verified respondent level data, could then examine the empirical (non)distinctness of the measurement of perceived opportunity and inequality, either with the use of ordinal indicators or with the use of robust estimators depending on the type of data available. In turn, reliable scales could be used in regressions to control for age, rank, sector, experience and institutional clustering. What is more, interactions could be used to assess whether an support change in connection to the inequality-outcome

association, and a well-specified indirect-effect model could be used to examine whether digital resources are included in an association and with bootstrap intervals and sensitivity analysis. Even so, those methods would only suggest causality on the basis of one wave. A Longitudinal Design that tracks promotions, publications, mentoring, and digital engagement would be better suited to determining impacts of institutional contexts on academic pathways.

7. CONCLUSION

Higher perceived gender inequality among female faculty members in Pakistani universities was related to lower perceived academic career outcomes, and after accounting for gender inequality, higher perceived social support was related to more favorable academic career outcomes among 350 women faculty. The joint regression accounted for 16.4% of the variance on the outcome scale that was reported. These results align with the idea of academic success being influenced at both the institutional and relationship level, but do not account for most of the variance and cannot demonstrate causal relationships. These associations are complemented by descriptive evidence that provides an institutional dimension. Family support was also reported more consistently than support from university management, with responses to questions on leadership fairness and training on digital use suggesting focus areas. These findings do not imply that all institutions practice the same; there were significant variations among the responses. They do signal clear goals for university governance: clear promotion procedures, equitable distribution of opportunities to study, accountable mentoring and effective digital training. These changes should be considered in light of actual career outcomes, and faculty experience. The greater contribution is analytical restraint. We must not conclude that somebody is successful in school setting from perceptions of fairness, nor can an indirect mechanism be concluded from a series of appropriate survey questions. Even a well-defined association may draw conclusions for research and policy. For stronger claims, sampling and research ethics will need to be documented, a confirmation of the validity of questionnaires, repetitive individual-level estimates and ideally multiple measures over time of the advancement of the career will be expected. Until those conditions are fulfilled, the evidence suggests a link between perceived inequality, support, and the reported academic experience,



but does not provide evidence of a specific cause/effect process.

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