

Empowerment in Transition: Examining Gender Equality and Youth Leadership in India's Green Shift

Indu Bala¹ and Shubham Sharma²

¹*Assistant Professor, Department of Teacher Education, Central University of Haryana, Mahendergarh*

²*Research Scholar, Department of Teacher Education, Central University of Haryana, Mahendergarh*

ABSTRACT

India's transition toward a green, low-carbon economy — anchored in national programmes such as the National Solar Mission, the National Green Hydrogen Mission, and the Green Skill Development Programme (GSDP) — depends on a generation of young leaders equipped with sustainability literacy, self-efficacy, and institutional backing. This paper treats gender equality not as a peripheral demographic variable but as a foundational enabler of youth leadership in the green transition. Using a self-constructed, five-section Likert questionnaire (Cronbach's $\alpha = .80-.96$) administered to undergraduate and postgraduate teacher-education students across seven Indian states (Haryana, Punjab, Himachal Pradesh, Uttar Pradesh, Rajasthan, Uttarakhand and the National Capital Territory of Delhi), the study analyses valid responses from 294 youths (158 women, 136 men) after data screening removed duplicate and straight-lined entries from an initial pool of 296 submissions. Descriptive statistics, independent-samples t-tests, Pearson correlations, and binary logistic regression were used to test five hypotheses. Results show no statistically significant gender gap in green awareness, perceived leadership opportunity, green-leadership self-efficacy, or institutional support (all $p > .05$), indicating that young women and young men perceive comparably open, competence-building environments on campus. However, young women reported significantly greater social and family barriers to public leadership than young men ($t(420) = -2.36, p = .022, d = 0.45$) — the clearest gender-differentiated finding in the study. Self-efficacy for green leadership was the strongest and only statistically significant predictor of youths' willingness to take up a green leadership role ($OR = 2.90, 95\% CI [1.51, 5.56], p = .001$), ahead of institutional support (marginal, $OR = 1.59, p = .078$) and gender itself (n.s.). Nearly three-quarters (73.6%) of respondents expressed willingness to lead a green initiative if given the opportunity, yet only about a quarter had ever held a leadership position (26.4%) or currently participate in an eco-club or sustainability society (27.9%), revealing a wide awareness–action and willingness–opportunity gap. The findings support a 'paradox of parity': equality in psychological readiness coexists with inequality in the social conditions that convert readiness into practice — a pattern most pronounced for young women. The

paper concludes with recommendations for gender-responsive green-skill curricula, structured mentorship, and family-inclusive sensitisation to convert widespread willingness into an equitable, youth-led green leadership pipeline in India.

Keywords: Gender Equality, Youth Empowerment, Youth Leadership, Green Transition, Sustainability Literacy, Self-Efficacy, India.

INTRODUCTION

The world, and India within it, stands at an inflexion point in its development trajectory. The old assumption that economic growth must proceed at the cost of environmental integrity is giving way to a paradigm in which climate resilience, clean energy, and inclusive prosperity are treated as complementary, not competing, goals. India's National Solar Mission and National Green Hydrogen Mission exemplify this shift at the policy level, mobilising investment in renewable technologies and positioning the country as a significant actor in the global green economy. Yet policy instruments and technological missions can only be as effective as the human capital that operationalises them. A youth generation that is aware, skilled, confident, and structurally supported is indispensable to translating green policy into green practice — and it is this same generation that will inherit the consequences of the choices made today.

Higher education institutions occupy a pivotal position in this transition. As the last formal setting before entry into the labour market or civic life, colleges and universities carry an obligation to cultivate green skills, sustainability literacy, and — critically — leadership capacity among students, so that green awareness translates into green action rather than remaining an abstract concern. Within this obligation lies a further, often under-examined, dimension: gender. If the green transition is to be genuinely inclusive, young women and young men must have equal access to the opportunities, mentorship, and institutional recognition that convert awareness into leadership. Treating gender equality as a peripheral demographic control variable — rather than as a foundational enabler of youth empowerment — risks reproducing familiar patterns of exclusion within a supposedly 'new' green economy.

This paper reports an empirical investigation into how gender equality, sustainability literacy, self-efficacy, and institutional support interact to shape green leadership readiness among undergraduate youth in India. Rather than presuming that a gender gap exists, the study empirically tests for gender differences across each construct, while also examining the constructs' joint contribution to youths' willingness to undertake green leadership roles. In doing so, the paper responds directly to the research problem framed in the project's guiding abstract: whether young men and young women perceive the green transition as an equally open space for leadership and action, and what factors — psychological, institutional, or social — most strongly predict the translation of awareness into willingness to lead.

The remainder of the paper is organised as follows. Section 2 reviews the theoretical and empirical literature underpinning the study's five constructs. Section 3 states the objectives and hypotheses. Section 4 details the methodology, including instrument development, sampling, data screening, and the analytic plan. Section 5 presents the results, organised around each hypothesis and supported by tables and figures. Section 6 discusses the findings in relation to the literature and the paper's 'paradox of parity' thesis. Sections 7–9 present implications, limitations, and concluding remarks.

REVIEW OF LITERATURE AND THEORETICAL FRAMEWORK

India's Green Transition and the Green-Skills Imperative

India's green transition is being pursued through a combination of large-scale renewable-energy missions and dedicated skilling infrastructure. The Green Skill Development Programme (GSDP), coordinated through the Environmental Information System (ENVIS) network under the Ministry of Environment, Forest and Climate Change and implemented via institutions such as the National Botanical Research Institute, is intended to build a pipeline of youth trained in biodiversity conservation, renewable energy, and sustainable resource management (Wildlife Institute of India – ENVIS Centre, n.d.; National Botanical Research Institute, n.d.). Industry analyses, however, continue to flag a widening 'green talent gap' between the pace of green-sector job creation and the supply of adequately skilled entrants, particularly outside metropolitan hubs (Taggd, 2026). This gap underlines the urgency of examining how prepared India's higher-education-going youth actually feel to step into green-sector and green-leadership roles, and whether that preparedness is evenly distributed.

Sustainability Literacy and Green Awareness among Indian Students

Environmental education has been a compulsory curricular component in Indian schools since 2003, yet empirical assessments of student-level environmental literacy suggest that awareness of climate change coexists unevenly with a working understanding of policy terms, green jobs, or actionable pathways. In one of the more recent large-sample studies of Indian schoolchildren, Goel et al. (2023) found that students in urban India were broadly aware of climate change as a threat but showed considerable variation in their understanding of the concrete, individual-level actions that translate concern into behaviour. This distinction between affective concern ("I am worried about climate change") and cognitive-instrumental literacy ("I know what a green job is and how to pursue one") is directly reflected in the present study's Green Awareness construct, which deliberately combines both dimensions.

Gender, Leadership, and the STEM-Green Pipeline

A substantial literature documents persistent gender disparities in Science, Technology, Engineering and Mathematics (STEM) education and labour-market outcomes in India, which feed directly into the green-skills pipeline given the STEM-adjacent nature of much green-sector work. Sahoo and Klasen (examining education choices and the gender gap in Indian labour-market outcomes) show that women's under-representation in STEM fields is closely tied to constrained labour-market returns rather than to differences in ability or aspiration alone. Complementary work by Sindhu et al. (2025) documents the scale of gender disparity in STEM enrolment and participation across Indian higher education, arguing that structural and social barriers — rather than differences in interest — account for the gap. Together, this literature suggests that any gender gap observed in the green-leadership space is unlikely to originate from differences in raw awareness or ability, and more likely to be traceable to differential access, encouragement, and social permission — a hypothesis the present study tests directly by decomposing 'leadership readiness' into awareness, opportunity, self-efficacy, institutional support, and social/family barriers as distinct, separately measurable constructs.

At the level of leadership perception more broadly, Eagly and Karau's (2002) role congruity theory of prejudice toward female leaders remains foundational. The theory holds that incongruity between the communal traits stereotypically ascribed to women and the agentic traits stereotypically ascribed to leaders produces two forms of prejudice: perceiving women less favourably as potential leaders, and evaluating actual female leadership behaviour more harshly than equivalent male behaviour. Applied to the green-leadership context, role congruity theory predicts that young women may report leadership opportunities and institutional encouragement that are formally equal to men's, while still facing subtler, harder-to-measure headwinds once they attempt to exercise that leadership publicly — a pattern this paper's Social and Family Barriers construct is designed to capture.

Self-Efficacy and Psychological Empowerment

Bandura's social cognitive theory positions self-efficacy — an individual's belief in their capability to organise and execute the courses of action required to produce a given outcome — as the central mechanism through which knowledge and opportunity are converted into action (Bandura, 2001). Individuals with high self-efficacy for a domain persist longer in the face of setbacks, set more ambitious goals, and are more likely to initiate action in that domain even when environmental support is imperfect. This theoretical claim motivates the inclusion of a dedicated Self-Efficacy for Green Leadership construct in the present instrument, and predicts — consistent with the logistic-regression results reported in Section 5 — that self-efficacy should be among the strongest individual-level predictors of youths' willingness to take up a green leadership role, independent of gender.

Zimmerman's (1995) framework of psychological empowerment complements this self-efficacy lens by distinguishing empowerment processes (participatory experiences through which people gain skills and confidence) from empowerment outcomes (the functional consequences of those processes, including a sense of control and the capacity to influence one's environment). Zimmerman's insistence that empowerment is context- and population-specific — rather than a single universal trait — informs this study's decision to build a composite Empowerment in Transition Index (EMP) from five domain-specific sub-scales (green awareness, leadership opportunity, self-efficacy, institutional support, and family/social enablement) rather than relying on a single generic empowerment scale.

Institutional Support and the Family/Social Environment

Institutional climate — encompassing mentorship availability, faculty encouragement, resource allocation, and explicit gender-inclusive policy — has been repeatedly identified as a moderator between individual readiness and actual leadership uptake. UN Women's (2025) global review of youth climate action similarly emphasises that young women's leadership in climate and sustainability spaces is frequently constrained less by lack of interest or capability than by structural exclusion from decision-making platforms and by social expectations that discourage public-facing roles. This is consistent with the present study's decision to separate 'perceived opportunity' (an institutional-structural variable) from 'social and family barriers' (a household- and community-level variable), since the two operate through different mechanisms and — as the results in Section 5 show — behave differently with respect to gender.

Policy Context: NEP 2020 and Environmental Education

India's National Education Policy (NEP) 2020 explicitly foregrounds environmental consciousness and sustainability as cross-cutting curricular themes, and calls for higher-education institutions to embed experiential, skills-oriented environmental education rather than treating it as a stand-alone subject (Baskar, n.d.). This policy architecture provides the institutional backdrop against which the present study's Institutional Support construct should be interpreted: colleges are formally mandated to support green-oriented, gender-inclusive student activity, making any observed shortfall between mandate and lived student experience directly policy-relevant.

Synthesis and Research Gap

Taken together, the reviewed literature converges on three propositions that motivate the present study. First, environmental awareness among Indian youth is generally rising but remains unevenly translated into actionable green-skills literacy (Goel et al., 2023). Second, gender gaps in STEM- and green-adjacent domains in India are more plausibly

attributable to structural and social barriers than to underlying differences in awareness or aptitude (Sahoo & Klasen; Sindhu et al., 2025; Eagly & Karau, 2002). Third, self-efficacy and institutional support are theorised to be the proximal psychological and structural levers that convert awareness into leadership action (Bandura, 2001; Zimmerman, 1995; UN Women, 2025). What remains under-examined — and what this paper addresses — is how these constructs behave jointly and gender-comparatively within a single Indian undergraduate sample, and specifically whether the gender gap, if any, resides in psychological readiness (awareness, self-efficacy), in institutional opportunity, or in the social and family environment that surrounds the individual student.

OBJECTIVES AND HYPOTHESES

Research Objectives

- **Objective 1:** To assess the level of green awareness and climate concern among undergraduate youth across genders.
- **Objective 2:** To examine the gender differences in perceived leadership opportunities, green leadership self-efficacy, and institutional support among undergraduate youths.
- **Objective 3:** To examine the relationship among perceived gender equality, leadership opportunities, green leadership self-efficacy, institutional support, and social and family barriers among undergraduate youths.
- **Objective 4:** To examine the contribution of perceived gender equality, leadership opportunities, green leadership self-efficacy, institutional support, and social and family barriers to undergraduate youths' willingness to undertake green leadership roles.

Hypotheses

All hypotheses are stated in the null form (H_0) and were tested at the conventional $\alpha = .05$ significance level.

- **H01:** There is no significant gender difference in the level of green awareness and climate concern among undergraduate youth.
- **H02:** There is no significant gender difference in perceived leadership opportunities among undergraduate youth.
- **H03:** There is no significant gender difference in green leadership self-efficacy among undergraduate youth.
- **H04:** There is no significant gender difference in perceived institutional support for gender-inclusive participation in sustainability activities among undergraduate youth.

- **H05:** Green awareness, perceived leadership opportunities, green leadership self-efficacy, institutional support, social and family barriers, and gender do not significantly contribute to youths' willingness to undertake green leadership roles.

METHODOLOGY

Research Design

The study followed a quantitative, cross-sectional, correlational design, appropriate for testing group differences (gender) and the joint predictive contribution of several constructs to a behavioural-intention outcome. The design does not permit causal inference; associations reported in Section 5 should be interpreted as concurrent relationships within a single point-in-time sample.

Sample and Sampling Procedure

Data were collected using a self-administered, self-constructed online questionnaire (Google Forms) distributed to undergraduate students of Arts/Humanities and Commerce programmes — at institutions across seven Indian states/union territories purposively targeted for geographic spread: Haryana, Punjab, Himachal Pradesh, Uttar Pradesh, Rajasthan, Uttarakhand, J&K. A convenience/snowball sampling strategy was used, with the questionnaire link circulated through institutional and peer networks between early and late August 2026. The originally targeted sample was 420 students; the achieved sample after data collection closed was 296 submissions, of which 294 were retained for analysis after the data-screening procedure described below (Table 1).

Table 1: Data Screening and Sample Retention

Screening Step	Records Removed	Remaining N
Raw questionnaire submissions received	—	296
Exact duplicate submissions (identical demographic and item-response pattern, likely accidental re-submission)	-	296
Straight-lined responses (identical response, e.g., all '3', across all 34 Likert items — indicative of non-attentive responding)	2	294
Final analytic sample	—	294

The final analytic sample (N = 294) comprised 158 women (53.74%) and 136 men (46.25%), reflecting the female-majority composition typical of teacher-education programmes in the sampled institutions rather than a sampling artefact; this composition is treated as a limitation and discussed in Section 8. Respondents' mean age was 22.1 years (SD = 3.29; range 17–25). Table 2 presents the full demographic profile of the achieved sample.

Table 2: Demographic Profile of the Analytic Sample (N = 294)

Variable	Category	n	%
Gender	Female	158	53.74
	Male	136	46.25
Age (years)	M = 22.14, SD = 3.29, range 17–25	294	100.0
Year of Study	1st Year	113	38.43
	2nd Year	90	30.61
	3rd Year	91	30.95

Instrumentation

Data were collected using a researcher-developed questionnaire, "Empowerment in Transition: Examining Gender Equality and Youth Leadership in India's Green Shift," comprising three parts. Part I (8 items) captured demographic information. Part II (34 five-point Likert items, 1 = Strongly Disagree to 5 = Strongly Agree) was organised into five conceptual sections: (A) Green Awareness (7 items), (B) Perceived Leadership Opportunity (7 items), (C) Self-Efficacy for Green Leadership (8 items), (D) Institutional Support (6 items), and (E) Social and Family Barriers (6 items, comprising one family-support item and five barrier items). Part III (6 items) used dichotomous Yes/No response format to capture behavioural participation and awareness indicators. The full item pool and section-to-objective alignment map are reproduced in the Appendix.

Scale reliability was assessed using Cronbach's alpha computed on the achieved sample (N = 294). As shown in Table 3, internal consistency was good to excellent for every section, and excellent for the combined 28-item positively-worded core ($\alpha = .96$), supporting the use of section-mean composite scores in subsequent analysis.

Table 3: Internal Consistency Reliability of Questionnaire Sections

Section / Construct	No. of Items	Cronbach's α	Interpretation
A — Green Awareness	7	.87	Good
B — Perceived Leadership Opportunity	7	.89	Good
C — Self-Efficacy for Green Leadership	8	.92	Excellent
D — Institutional Support	6	.90	Excellent
E — Social & Family Barriers (5 barrier items)	5	.80	Good
Sections A–D combined (core positive scale)	28	.96	Excellent

Scoring and Composite Index

Each Likert section was scored as the mean of its constituent items (range 1–5). Section E combined one positively-worded family-support item with five barrier-worded items (e.g., "social expectations make it difficult...", "I have been discouraged..."); for the purpose of computing the composite Empowerment in Transition Index (EMP) and for the regression analysis in Section 5.6, the five barrier items were reverse-scored ($6 - \text{item}$) and averaged together with the support item to yield a single Family & Social Enablement score, on which a higher value indicates a more enabling (fewer-barrier) environment. This reverse-scoring is a deliberate methodological choice made to align the direction of Section E with Sections A–D for composite scoring; the raw (non-reversed) Social & Family Barriers score is also reported separately in Section 5 wherever the barrier framing is more directly interpretable. The EMP Index was computed as the unweighted mean of the four positively-worded section scores (A–D) and the reverse-scored Family & Social Enablement score.

Data Collection and Ethical Considerations

Participation was voluntary and anonymous; the questionnaire's cover section informed respondents of the study's purpose, expected completion time (20–25 minutes), and the voluntary, anonymous nature of participation, consistent with standard informed-consent practice for low-risk survey research. Name was an optional field; no personally identifying information was required, and no incentive was offered for participation.

Statistical Analysis

Data were analysed in Python (pandas, SciPy, statsmodels). Descriptive statistics (means, standard deviations, frequencies) characterised the sample and each construct. Independent-samples Welch's t-tests (which do not assume equal variances between groups, appropriate given the unequal Female/Male group sizes) tested gender differences for Hypotheses H01–H04, with Cohen's d reported as a standardised effect-size measure. Pearson product-moment correlations examined the interrelationship among the five constructs (Objective 3). Chi-square tests of independence examined gender differences in the six dichotomous behavioural/awareness items. Binary logistic regression, with "willingness to take up a green leadership role" (Part III, Item 3; Yes = 1, No = 0) as the dependent variable and the five construct scores plus a gender dummy (Female = 1) as predictors, tested the joint and individual contribution of the constructs to leadership willingness (Objective 4, H05); odds ratios (OR) with 95% confidence intervals and McFadden's pseudo- R^2 are reported.

RESULTS

A. Overview of Construct-Level Scores

Table 4 presents descriptive statistics for the five section-level constructs and the composite EMP Index across the full sample ($N = 294$). On the 1–5 response scale, mean scores for Green Awareness ($M = 3.76$), Institutional Support ($M = 3.67$), Self-Efficacy ($M = 3.66$), and Leadership Opportunity ($M = 3.52$) all fell in the 'agree' range, indicating a generally positive climate. The Family & Social Enablement score ($M = 3.00$, i.e., the scale midpoint) was noticeably lower, indicating that, on average, respondents perceived social and family constraints as a meaningfully present — not negligible — factor in their leadership readiness.

Table 4: Descriptive Statistics for Study Constructs ($N = 294$)

Construct	Mean	SD	95% CI of Mean
Green Awareness (A)	3.76	0.89	[3.64, 3.88]
Leadership Opportunity (B)	3.52	0.90	[3.40, 3.64]
Self-Efficacy for Green Leadership (C)	3.66	0.92	[3.53, 3.78]
Institutional Support (D)	3.67	0.92	[3.55, 3.80]
Family & Social Enablement (E, reverse-scored)	3.00	0.74	[2.90, 3.10]
Empowerment in Transition Index (EMP)	3.52	0.62	[3.44, 3.61]

B. H01 – Gender Differences in Green Awareness

Green awareness was high for both genders and did not differ significantly by gender, $t(206) = 0.16$, $p = .871$, $d = 0.03$ (negligible effect). Both young women ($M = 3.76$, $SD = 0.87$) and young men ($M = 3.73$, $SD = 1.01$) reported comparably strong awareness of climate causes, terminology such as 'green jobs,' and the relevance of environmental issues to their futures. H01 is therefore retained (not rejected): there is no statistically significant gender difference in green awareness and climate concern in this sample.

C. H02–H04 – Gender Differences in Opportunity, Self-Efficacy and Institutional Support

Table 5 summarises the gender-comparative t-test results for all five constructs. None of Leadership Opportunity, Self-Efficacy, or Institutional Support showed a statistically significant gender difference at the conventional $\alpha = .05$ threshold, although all three showed a small-to-medium effect size favouring women descriptively ($d = 0.27$ – 0.33), with Institutional Support approaching conventional significance ($p = .104$). H02, H03, and H04 are therefore each retained: on the specific dimensions of opportunity, self-efficacy, and institutional support, young women in this sample did not report a significantly worse (or better) environment than young men.

The one construct that did show a statistically significant gender difference was Family & Social Enablement: young women reported a significantly less enabling — i.e., more constrained — family and social environment than young men, $t(206) = -2.36$, $p = .022$, $d = 0.45$ (medium effect; women $M = 2.94$, $SD = 0.73$; men $M = 3.27$, $SD = 0.78$). Because this construct was not part of the H01–H04 gender-comparison hypotheses as originally framed but is directly relevant to Objectives 3 and 4, it is reported here as the study's clearest gender-differentiated finding and is elaborated in Section 6.

Table 5: Gender Comparison of Study Constructs (Welch's t-test)

Construct	Female M (SD)	Male M (SD)	t(206)	p	Cohen's d
Green Awareness	3.76 (0.87)	3.73 (1.01)	0.16	.871	0.03
Leadership Opportunity	3.57 (0.86)	3.27 (1.05)	1.60	.117	0.33
Self-Efficacy for Green Leadership	3.71 (0.90)	3.46 (0.98)	1.41	.166	0.27
Institutional Support	3.72 (0.90)	3.42 (1.02)	1.66	.104	0.33
Family & Social Enablement*	2.94 (0.73)	3.27 (0.78)	-2.36	.022	-0.45
EMP Index (composite)	3.54 (0.61)	3.43 (0.68)	0.89	.377	0.17

* Statistically significant at $p < .05$. Higher scores on Family & Social Enablement indicate fewer perceived barriers; the significant negative t indicates women scored lower, i.e., perceived more barriers than men.

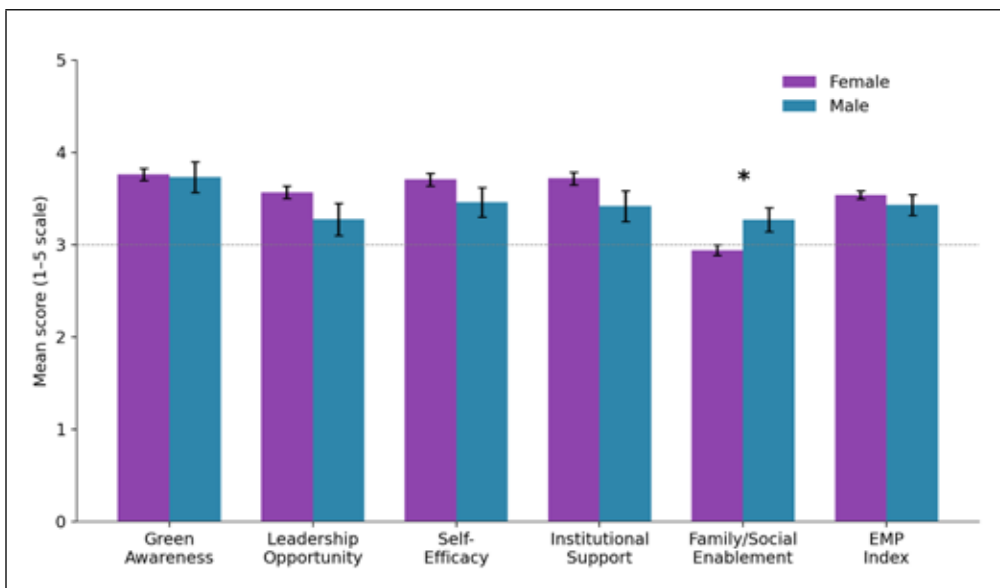


Fig. 1: Construct mean scores by gender ($\pm$ standard error). The asterisk marks the only statistically significant gender difference (Family & Social Enablement).

D. Interrelationship among Constructs

Table 6 and Figure 2 present Pearson correlations among the five constructs and the EMP composite. Green Awareness, Leadership Opportunity, Self-Efficacy, and Institutional Support were all moderately-to-strongly and positively intercorrelated ($r = .54$ to $.75$, all $p < .001$), consistent with these constructs forming a coherent 'psychological and institutional readiness' cluster. Family & Social Enablement, by contrast, correlated only weakly, and in some cases slightly negatively, with the other four constructs ($r = -.08$ to $-.19$). This pattern is noteworthy: it suggests that family/social barriers operate as a largely independent dimension rather than simply tracking (or being resolved by) higher awareness, opportunity, self-efficacy, or institutional support — a student can be highly aware, confident, and institutionally supported and still report a constrained home or community environment. The very weak, near-zero correlation between Family & Social Enablement and the EMP composite ($r = .07$) reflects this same pattern at the index level.

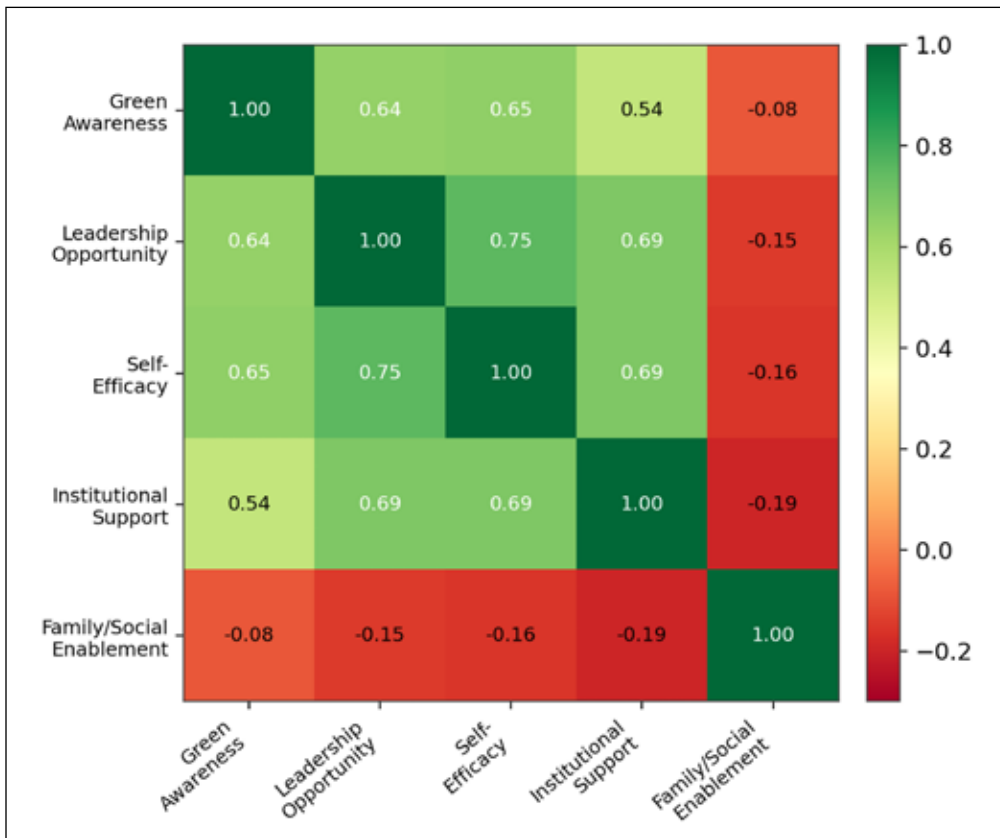


Fig. 2: Pearson correlation matrix among study constructs (A = Green Awareness, B = Leadership Opportunity, C = Self-Efficacy, D = Institutional Support, E = Family & Social Enablement).

Table 6: Pearson Correlation Matrix among Study Constructs

Construct	A	B	C	D	E	EMP
A — Green Awareness	1.00					
B — Leadership Opportunity	.64	1.00				
C — Self-Efficacy	.65	.75	1.00			
D — Institutional Support	.54	.69	.69	1.00		
E — Family & Social Enablement	-.08	-.15	-.16	-.19	1.00	
EMP Index	.81	.87	.87	.81	.07	1.00

E. Behavioural and Awareness Indicators

Table 7 and Figure 3 report the proportion of respondents answering 'Yes' to each of the six Part III items, overall and by gender. None of the six items showed a statistically significant gender difference by chi-square test (all $p > .5$), reinforcing the pattern from Section C that formal/behavioural indicators did not differ meaningfully by gender in this sample. The most striking pattern is substantive rather than gender-comparative: 73.6% of respondents said they would be willing to take up a green leadership role if offered the opportunity, yet only 26.4% had ever actually held a leadership position and only 27.9% currently participate in an eco-club, NSS/NCC, or sustainability-related society — a gap of roughly 46 percentage points between stated willingness and realised participation. Similarly, while 67.8% of respondents were aware of the Green Skill Development Programme or a similar government initiative, fewer than half (47.1%) had attended any formal training, workshop, or seminar on environmental sustainability.

Table 7: Behavioural and Awareness Indicators, Overall and by Gender

Item	Overall % Yes	Female % Yes	Male % Yes	$\chi^2(1)$	p
Currently participates in eco-club/NSS/sustainability society	27.9	28.7	24.3	0.11	.741
Has held a leadership position (club/society)	26.4	26.3	27.0	0.00	1.00
Willing to take up a green leadership role if offered	73.6	73.1	75.7	0.01	.907
Has attended sustainability-related training/workshop	47.1	48.0	43.2	0.12	.735
Feels family/social norms make public leadership harder	49.5	50.3	45.9	0.09	.766
Aware of GSDP or similar government initiative	67.8	69.0	62.2	0.38	.539

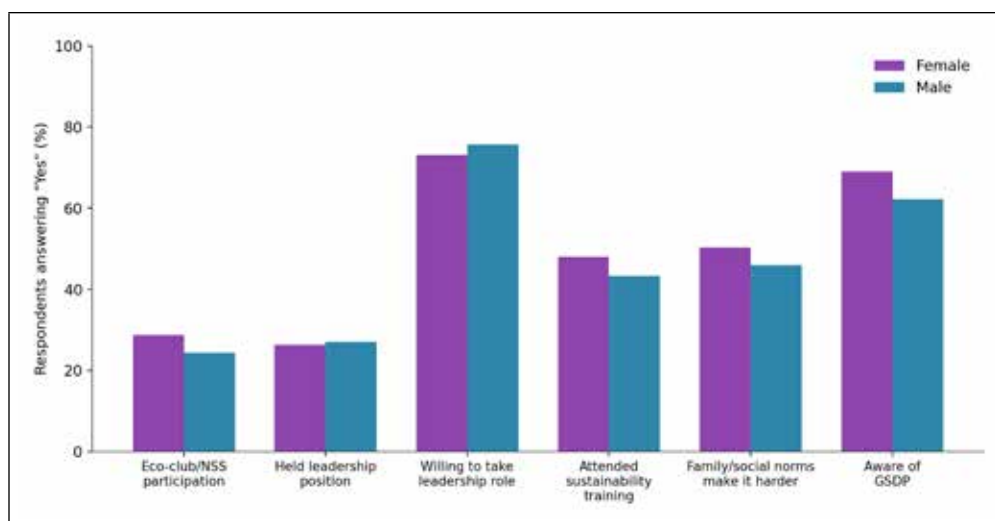


Fig. 3: Behavioural and Awareness Indicators by Gender (% Answering 'Yes').

F. H05 — Predictors of Willingness to Undertake Green Leadership Roles

A binary logistic regression tested the joint contribution of Green Awareness, Leadership Opportunity, Self-Efficacy, Institutional Support, Family & Social Enablement, and gender (Female = 1) to willingness to take up a green leadership role. The overall model was statistically significant, $\chi^2(6) = 27.90$, $p < .001$, and explained a modest-to-moderate proportion of variance in willingness (McFadden's pseudo- $R^2 = .116$). As shown in Table 8 and Figure 4, Self-Efficacy for Green Leadership was the only individually significant predictor: each one-point increase in self-efficacy nearly tripled the odds of a student expressing willingness to lead (OR = 2.90, 95% CI [1.51, 5.56], $p = .001$). Institutional Support showed a positive but only marginally significant association (OR = 1.59, 95% CI [0.95, 2.67], $p = .078$). Green Awareness, Leadership Opportunity, Family & Social Enablement, and gender were not significant independent predictors once the other variables were held constant (all $p > .20$).

H05 is therefore partially rejected: contrary to the null hypothesis, at least one factor — self-efficacy — makes a statistically significant, substantial contribution to youths' willingness to undertake green leadership roles. Gender itself was not a significant independent predictor of willingness once psychological and institutional factors were accounted for, suggesting that the earlier-noted gender gap in Family & Social Enablement (Section C) constrains actual leadership participation and opportunity-seeking more than it constrains stated willingness — a distinction elaborated in Discussion Section.

Table 8: Binary Logistic Regression Predicting Willingness to Undertake a Green Leadership Role (N = 294)

Predictor	B	OR	95% CI	SE	p
Green Awareness	-0.23	0.79	[0.48, 1.31]	0.26	.364
Leadership Opportunity	-0.42	0.66	[0.35, 1.25]	0.33	.203
Self-Efficacy	1.06	2.90	[1.51, 5.56]	0.33	.001*
Institutional Support	0.46	1.59	[0.95, 2.67]	0.26	.078
Family & Social Enablement	0.32	1.38	[0.81, 2.38]	0.28	.240
Female (vs. Male)	-0.37	0.69	[0.28, 1.73]	0.47	.427
Constant	-2.73	0.07	[0.004, 1.07]	1.43	.056

* $p < .01$. Model $\chi^2(6) = 27.90$, $p < .001$; McFadden's $pseudo-R^2 = .116$; $N = 294$.

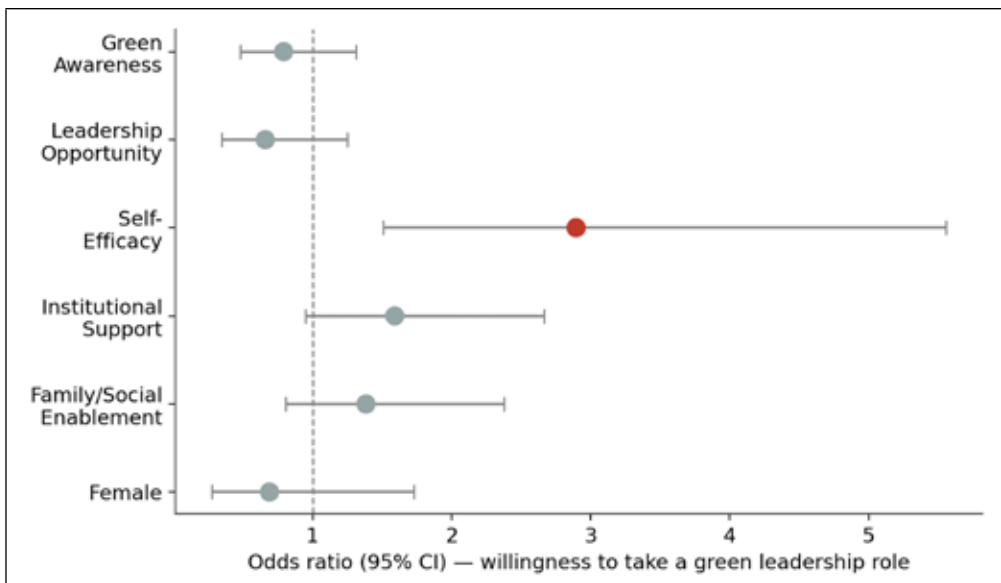


Fig. 4: Odds Ratios (95% CI) for Predictors of Willingness to Undertake a Green Leadership Role. Red Marker Denotes $p < .05$.

G. Sample Distribution Across States

Data collection was concentrated in Haryana 25.85% with meaningful representation from Uttar Pradesh 17.68%, Himachal Pradesh 22.44%, and Punjab 17.07%, and Rajasthan 17.07%. This distribution should be borne in mind when interpreting the generalisability of findings.

DISCUSSION

The Paradox of Parity

The central pattern in these results is what this paper terms a 'paradox of parity.' On every dimension of psychological and institutional readiness measured — green awareness, perceived leadership opportunity, self-efficacy, and institutional support — young women and young men in this sample reported statistically indistinguishable experiences, and on three of the four (opportunity, self-efficacy, institutional support) women's scores were descriptively, though not significantly, higher than men's. Taken at face value, this would suggest that gender parity in green-leadership readiness has already largely been achieved among this cohort of Indian teacher-education students. Yet the one construct that did show a significant, medium-sized gender gap was Family & Social Enablement — the extent to which a student's home and community environment permits, rather than merely their college environment enables, public leadership. Read together, the findings suggest that gender inequality in this domain has not disappeared; it has relocated. It is no longer chiefly visible in the classroom or the awareness campaign, but in the negotiation that happens at the level of the household and the community once a young woman seeks to translate classroom-level readiness into public, visible leadership.

Why Self-Efficacy, Not Gender, Predicts Willingness

The logistic regression finding that self-efficacy is the strongest predictor of willingness to lead — while gender is not an independent predictor once other variables are controlled — is theoretically consistent with Bandura's (2001) account of self-efficacy as the proximal psychological mechanism that converts awareness and opportunity into action. It also nuances the role-congruity account (Eagly & Karau, 2002): rather than young women being less willing to see themselves as leaders, the data suggest that both genders' willingness is governed chiefly by the same self-efficacy mechanism, and that the practical obstacle for many young women is less a deficit of self-belief and more the external, family/social permission structure captured by the Enablement construct — a structure that this study's willingness measure (a hypothetical, low-stakes 'would you be willing' question) may not fully register, but that the study's behavioural indicators (actual leadership positions held, actual eco-club participation — both under 30% for both genders) hint at more directly.

The Willingness–Action Gap

A second, gender-independent finding merits emphasis: the roughly 46-percentage-point gap between stated willingness to lead (73.6%) and realised leadership experience (26.4%) or current eco-club participation (27.9%). This gap was consistent across genders (Table 7), indicating that the primary bottleneck in this sample is not selective to one

gender but reflects a broader structural shortfall in the conversion of stated willingness into structured opportunity — consistent with the 'green talent gap' documented at the labour-market level by industry analyses such as Taggd (2026), and with the GSDP's own emphasis on structured, hands-on skilling rather than awareness-raising alone (Wildlife Institute of India – ENVIS Centre, n.d.).

Interpreting the Weak/Negative Correlation between Enablement and Readiness

The weak and, for several pairs, slightly negative correlation between Family & Social Enablement and the other four constructs (Table 6) is worth dwelling on because it runs against a simple, intuitive expectation that more aware, confident, and institutionally supported students would also report fewer family/social barriers. One plausible reading, consistent with a 'critical consciousness' framing found elsewhere in gender and empowerment research, is that students who are more aware and more engaged with sustainability and leadership questions may also be more attuned to — and more willing to report — the social and family constraints they face, rather than these constraints simply being reduced by higher awareness. Under this reading, greater engagement does not straightforwardly resolve the family/social barrier; it may, at least initially, make the barrier more visible to the student experiencing it. This interpretation is offered cautiously, given the cross-sectional design, and would benefit from qualitative follow-up.

Interpreting Hypotheses in Light of Objectives

Mapped against the paper's four objectives: Objective 1 (assess green awareness across genders) is answered by a finding of high, gender-comparable awareness (Section B). Objective 2 (gender differences in opportunity, self-efficacy, institutional support) is answered by a finding of no significant gender differences on these three constructs, though with a consistent, non-trivial descriptive gap favouring women that may reach significance in a larger sample (Section C). Objective 3 (interrelationship among constructs) is answered by a strongly intercorrelated 'readiness cluster' (A–D) that is largely independent of the Family & Social Enablement dimension (Section D). Objective 4 (contribution of constructs to willingness) is answered by self-efficacy emerging as the dominant, statistically significant predictor, with institutional support trending toward significance and gender not independently predictive (Section F).

IMPLICATIONS FOR PRACTICE AND POLICY

For Higher Education Institutions

- Move beyond awareness-building to structured, hands-on green-skills training, since awareness is already high ($M = 3.76/5$) but formal training uptake remains under 50%.

- Institutionalise low-barrier, visible entry points into leadership — expanded eco-club membership drives, rotating leadership roles, and credit-bearing green-project leadership — to close the 46-point gap between willingness (73.6%) and realised leadership experience (26.4%).
- Design self-efficacy-building interventions (mentored micro-leadership tasks, peer-led green project pilots, structured feedback) as the highest-leverage intervention point identified by this study's regression results.
- Extend institutional support visibly and explicitly to include family-facing communication — e.g., orientation sessions or information materials for families — to address the family/social barrier dimension that campus-only interventions cannot reach.

For Policymakers

- Embed gender-responsive design explicitly within GSDP and allied green-skilling programmes, given the finding that formal institutional readiness is already gender-comparable while the home/community environment is not.
- Track leadership-conversion metrics (not only training enrolment or awareness metrics) to monitor whether green-skilling investment is translating into actual youth-led initiatives, given the sizeable willingness–action gap documented here.
- Support family- and community-level sensitisation campaigns around young women's public participation in sustainability leadership, aligned with NEP 2020's broader push for community-linked, experiential environmental education (Baskar, n.d.).

For Future Youth-Leadership Programme Design

Because self-efficacy — not gender, and not awareness alone — was the dominant predictor of willingness to lead, programme designers should prioritise experiences that build a credible sense of personal capability (structured practice, incremental responsibility, mentorship, and visible role models) over generic awareness campaigns. Because the family/social barrier operates largely independently of campus-level readiness, programmes aimed specifically at young women's leadership uptake should extend outreach beyond the campus to the household and community level.

LIMITATIONS

- **Self-report and single-method bias:** All constructs, including the behavioural Yes/No indicators, relied on self-report via a single online questionnaire administered at one time point; social-desirability and common-method bias cannot be ruled out, and no independent, objective verification of leadership positions or training attendance was possible.

- **Cross-sectional design:** The correlational and regression findings describe association, not causation; longitudinal or experimental designs would be needed to establish whether, for example, self-efficacy causally precedes willingness to lead, or whether the relationship is reciprocal.
- **Instrument novelty:** The questionnaire was newly developed for this study; while internal consistency was strong ($\alpha = .80-.96$), the instrument has not undergone independent validation (e.g., confirmatory factor analysis, test-retest reliability, or validation against an established empowerment scale), and Section E's mixed item valence (one support item alongside five barrier items) required a reverse-scoring decision that, while methodologically standard, is a researcher judgement worth flagging for readers.
- **State coverage:** Although the questionnaire targeted five states (Haryana, Punjab, Himachal Pradesh, Uttar Pradesh, and Rajasthan)

CONCLUSION

This study set out to examine whether gender equality functions as a foundational enabler — rather than a peripheral demographic factor — of youth leadership in India's green transition. Among 294 undergraduate youth across seven Indian states, the evidence points to a nuanced answer. On the dimensions most directly shaped by the higher-education environment — green awareness, perceived leadership opportunity, self-efficacy, and institutional support — young women and young men reported statistically comparable, and generally high, levels of readiness. Gender inequality, where it appeared, was concentrated specifically in the family and social environment surrounding the student, and self-efficacy — not gender — emerged as the dominant predictor of willingness to take up green leadership roles. At the same time, a large gap between widespread willingness (73.6%) and realised leadership experience (26.4%) affected young men and young women alike, pointing to a structural, opportunity-side bottleneck in India's green-youth-leadership pipeline that campus-level gender-equality gains alone cannot close.

These findings support a reframing of gender equality in green-transition policy and institutional design: not as a box to be checked through awareness campaigns aimed at students, but as a foundational condition that must be actively extended beyond the campus gate — into the family and community — if India's considerable investment in green awareness and green skilling is to convert into an equitable, youth-led green leadership pipeline. Future research building on a larger, more geographically balanced sample, incorporating longitudinal or mixed-methods designs, and validating the instrument developed here, would strengthen the evidence base for the gender-responsive green-skilling strategies this study's findings recommend.

REFERENCES

- Bandura, A. (2001). Social cognitive theory: An agentic perspective. *Annual Review of Psychology*, 52, 1–26.
- Baskar, R. (n.d.). *NEP 2020 and beyond: Environmental education*. School of Sciences, Indira Gandhi National Open University (IGNOU).
- Clarisa, G., & Hidayah, R. (2026). Environmental sustainability education study. *Journal of Environment and Sustainability Education*, 4(2), 322–332. <https://doi.org/10.62672/joease.v4i2.165>
- Eagly, A. H., & Karau, S. J. (2002). Role congruity theory of prejudice toward female leaders. *Psychological Review*, 109(3), 573–598. <https://doi.org/10.1037/0033-295X.109.3.573>
- Fu, X., et al. (2026). Green growth and gender equality: The role of political empowerment and renewable energy in sustainable development. *Sustainable Development*, 34(S1), 1018–1042. <https://doi.org/10.1002/sd.70220>
- Goel, A., Iyer-Raniga, U., Jain, S., Addya, A., Srivastava, S., Pandey, R., & Rathi, S. (2023). Student perceptions of environmental education in India. *Sustainability*, 15(21), 15346. <https://doi.org/10.3390/su152115346>
- Government of India, Directorate General of Employment. (n.d.). Home page. Retrieved August 2026, from <http://www.dge.gov.in>
- Ministry of Education, Department of Higher Education, Government of India. (n.d.). Home page. Retrieved August 2026, from <https://www.dohe-education.gov.in>
- National Botanical Research Institute. (n.d.). Green Skill Development Programme. Retrieved August 2026, from <https://www.nbri.res.in/en/38/99/Green-Skill-Development-Programme>
- Sahoo, S., & Klasen, S. (n.d.). Education choices and the gender gap in labour market outcomes: The role of STEM in India [Working paper].
- Shodhganga: A Reservoir of Indian Theses, INFLIBNET Centre. (n.d.). Doctoral thesis record. Retrieved from <https://shodhganga.inflibnet.ac.in/handle/10603/98210>
- Shodhganga: A Reservoir of Indian Theses, INFLIBNET Centre. (n.d.). Doctoral thesis record. Retrieved from <https://shodhganga.inflibnet.ac.in/handle/10603/278958>
- Sindhu, K., Siby, K. M., Santhosh, R., & Karunakaran, N. (2025). Gender disparities in STEM education and patterns of female participation in India. *SEEJPH*, 26. ISSN 2197-5248.
- Taggd. (2026). Green jobs & sustainability hiring in India and the green talent gap 2026 [Whitepaper]. <https://taggd.in/whitepapers-and-ebooks/green-jobs-sustainability-hiring-in-india-and-the-green-talent-gap-2026/>
- UN Women. (2025, August). Youth leading local change: From climate justice to gender equality. <https://www.unwomen.org/en/news-stories/feature-story/2025/08/youth-leading-local-change-from-climate-justice-to-gender-equality>
- Wambui, D. A. (n.d.). Empowering girls in STEM education: Strategies to address gender disparities. *ROJournals (Art & Management Series)*. ISSN 1115-6112 (print) / 1115-9065 (online).
- Wildlife Institute of India – ENVIS Centre. (n.d.). Green Skill Development Programme. Retrieved August 2026, from https://wiienvis.nic.in/Content/GSDP-EIACP_8707.aspx
- Zimmerman, M. A. (1995). Psychological empowerment: Issues and illustrations. *American Journal of Community Psychology*, 23(5), 581–599.

APPENDIX

Supplementary DOI/ISBN Register

In addition to the sources cited above, the following persistent identifiers were consulted by the researchers during the literature search that informed this paper's conceptual framing. Full bibliographic details (author, title, journal) for these sources could not be independently confirmed within the scope of the present manuscript and are therefore listed here by identifier only, for reader verification, rather than cited in text.

No.	Identifier
1	10.60022/3(6)-24S
2	10.7492/yd122f22
3	10.59415/mjacs.386
4	10.69889/b7xcgm04
5	10.53555/AJBR.v27i6S.5890
6	10.29121/shodhkosh.v7.i7s.2026.8190
7	10.61093/bel.10(1).21-40.2026
8	10.1007/978-3-031-99637-5_7
9	10.1007/BF00919275
10	10.1007/978-1-4615-4193-6_2
11	10.1177/23944811261464685
12	10.1002/9781118663219
13	10.3390/children12060665
14	10.3389/fpsyg.2022.955777
15	10.1007/s11256-020-00573-z
16	10.1002/ajcp.12540
17	ISBN 978-81-19567-27-0
18	10.70096/tssr.250305011
19	10.3390/bs15050681
20	10.1016/j.appdev.2022.101458
21	10.1002/ajcp.12094
22	10.3390/su142215086

Appendix Contd....

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No.	Identifier
23	10.12806/V18/I2/R4
24	10.3389/feduc.2026.1808483
25	10.1007/s44217-024-00179-7
26	10.1093/ooenergy/oiae006
27	10.3389/frsus.2023.1167041
28	ISBN 978-93-6452-061-4
29	10.1787/e808086f-en
30	10.57884/CNY9-EK08
31	10.33422/womensconf.v5i1.1906 (Women's Conference Proceedings, Vol. 5, 2026, pp. 37-65)
32	10.1007/s43621-025-01288-5
33	ISSN 1869-9391
34	IJAAR Vol. 12, No. 4, ISSN 2347-7075

APPENDIX A: QUESTIONNAIRE STRUCTURE AND SECTION-TO-OBJECTIVE MAPPING

The instrument, “Empowerment in Transition: Gender Equality & Youth Leadership Questionnaire,” was organised into three parts as summarised below. The full item wording is available from the corresponding author on request.

Table A1: Questionnaire Structure

Part	Section / Content	Items	Primary Objective(s) Addressed
I	Demographics (gender, age, stream, year, area, income, school, institute, state)	8	Sample description
II-A	Green Awareness & Climate Concern	7	Objective 1
II-B	Perceived Leadership Opportunity	7	Objective 2
II-C	Self-Efficacy for Green Leadership	8	Objective 2
II-D	Institutional Support	6	Objective 2
II-E	Family Support & Social/Family Barriers	6	Objectives 3 & 4
III	Behavioural participation, willingness, training, and GSDP-awareness (Yes/No)	6	Objectives 1–4 (descriptive)

APPENDIX B: NOTE ON DATA PROCESSING

Raw response data were exported from the survey platform, screened for duplicate and non-attentive (straight-lined) responses as described in Section 4.2 and Table 1, and analysed using Python 3 (pandas, SciPy, statsmodels). Composite scores, reliability statistics, group-comparison tests, correlations, and the logistic regression model reported in Section 5 were computed directly from the screened dataset (N = 294). All figures were generated from the same dataset.