Research Square

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Institutional Career Support Participation and Placement Outcomes among Final Year Undergraduates in South India

Manikandan Kannaiyan
New Prince Shri Bhavani College of Engineering and Technology
Catherene Julie Aarthy Charles
catherene.aarthy@sibmnagpur.edu.in

Symbiosis Institute of Business Management, Nagpur Symbiosis International (Deemed University)
Preeti Slathia
Symbiosis Institute of Business Management, Nagpur Symbiosis International (Deemed University)

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Abstract

Institutional career-support activities are widely used to support students' transition from higher education to employment, but evidence linking participation in such activities to observed placement outcomes is limited. This study examined the associations of participation in institutional engagement activities (career counselling, workshops, internships, networking and professional development programmes, analysed as one set), academic performance and attendance with placement status among final-year undergraduates of their final lap at a higher education institution in South India. A census-based cross-sectional survey yielded 500 responses (response rate 89.3%). Associations were examined using chi-square and Welch tests and nested binary logistic regression, supported by diagnostic and sensitivity analyses. Overall, 88.6% of students had participated, and 90.0% had secured a job. Placement was reported by 96.2% of participants and 42.1% of non-participants. In the adjusted model, participation (OR = 17.15, 95% CI 7.05–41.73) and CGPA band (OR = 3.68 per band, 95% CI 1.56–8.70) remained associated with placement. Attendance was strongly associated with placement in the bivariate analysis, but its adjusted association was not statistically significant (OR = 2.28 per 10 percentage points, 95% CI 0.88–5.91) and was inconsistent across sensitivity analyses, reflecting its strong correlation with CGPA (r = 0.87). Because participation was voluntary and the design was cross-sectional, the findings indicate associations rather than effects. They suggest that institutions examine barriers to participation and evaluate coordinated academic and career support using longitudinal designs.

1 Introduction

The transition from higher education to employment is a key stage of student development, and higher education institutions (HEIs) are increasingly expected to prepare students for it alongside their academic programmes [1]. Employability involves career management capabilities, professional identity and access to opportunities, not only subject knowledge [2, 3]. HEIs therefore offer career counselling, workshops and seminars, internships, networking events and professional-development programmes, which are intended to help students explore options, understand employer expectations and prepare for recruitment.

From an educational perspective, career support forms part of students' development rather than a service separate from learning. Activities such as workshops, internships and professional development programmes sit alongside the curriculum and may shape how students understand employer expectations and present their capabilities [4, 5]. How participation in such activities relates to students' academic profiles and to their transition into employment is therefore relevant to how institutions design and coordinate their educational provision, and not only to how they organise placement services.

Research on such provision is extensive but concerns mainly developmental outcomes. Meta-analytic and review evidence shows that career interventions for university students are usually evaluated through career decision-making self-efficacy, planning and exploration [6, 7]. Reviews of employability

programmes report that labour-market outcomes are examined less often, that the activities vary widely in purpose and format, and that much of the evidence comes from small-scale evaluations that cannot establish causal effects [8, 9]. The empirical studies reviewed here were also conducted mainly in the United Kingdom, continental Europe and Australia [5, 10, 11]. How participation in institutional career-support activities relates to students' observed employment outcomes, and how this relationship compares with that of their academic characteristics, is therefore less well documented.

Two issues complicate this question. First, participation is usually voluntary, so participants may differ from non-participants in academic performance, motivation or preparation, and differences in placement cannot be attributed to participation alone [8]. Second, academic characteristics such as grades and attendance may be related both to placement and to each other, so their associations need to be examined together rather than one at a time.

This study addresses these issues among final-year undergraduates at a higher education institution in South India. It examines (i) participation in institutional engagement activities and placement outcomes, (ii) the association between participation and placement status and (iii) the associations of academic performance and attendance with placement status when participation is taken into account. Institutional engagement activities are defined as the set of career-support activities organised by the institution; the study examines participation in this set as a whole and does not evaluate any single activity.

The study contributes to education research in three ways. It relates participation in career-support activities to an observed employment outcome rather than to developmental or perceived outcomes; it examines participation alongside academic characteristics, which shows how much of the unadjusted difference in placement reflects students' academic profiles; and it provides institution-level evidence from India with a transparent account of the analysis and its robustness. Because the design is cross-sectional, the study examines associations rather than effects, and its findings are intended to inform longitudinal evaluation of institutional career support rather than to substitute for it.

2 Literature review

2.1 Career support and the transition from education to employment

Employability and employment are related but distinct. Employment is an observable labour-market outcome, whereas employability refers to the capabilities, identity and resources that help graduates obtain and sustain work [12, 13]. Holmes [12] emphasises that employability develops through a process of social positioning and identity formation, and Tomlinson [13] describes graduates as drawing on several forms of capital human, social, cultural, identity and psychological when entering the labour market. From this perspective, institutional career support is one of several educational experiences through which students may acquire these resources. It includes individual counselling, workshops,

work-integrated learning, networking with employers and professional development activities, which differ in their aims and may relate differently to employment [2, 4].

2.2 Evidence on career interventions and employability activities

Evidence on career interventions for students has focused on developmental outcomes. Whiston et al. [6] reported positive effects of career-choice interventions, particularly on career decision-making self-efficacy, and a systematic review of 26 studies of university students found that interventions, mostly group-based and evaluated through pre–post designs, were associated with improvements in decision-making and related skills [7]. These outcomes are valuable, but they do not show whether students subsequently secure employment.

Studies of employability activities indicate that associations with labour-market outcomes depend on the type of activity. Using UK graduate data, Mason et al. [10] found that structured work experience and employer involvement in course design and delivery were positively associated with graduate-level employment, whereas explicit teaching of employability skills was not. Jackson and Bridgstock [4] compared the relative value of curricular, co-curricular and extra-curricular learning and paid work, and Jackson and Dean [5] found that different types of work-integrated learning were associated with different perceived skill and employability outcomes. Reviews reach similar conclusions: interventions offering practical experience show the most consistent positive results, whereas programmes focused on employability skills and career planning show mixed results with limited links to employment [9]; work-integrated learning varies in design, assessment and stakeholder involvement [11]; and much of the evidence is based on small-scale evaluations that cannot establish causal effects [8].

Two points from this literature shape the present study. First, because activities differ, a measure that groups them indicates exposure to institutional career support in general and cannot show which activity matters. Second, because participation is rarely randomised, differences in outcomes between participants and non-participants may reflect selection as well as participation [8, 10].

2.3 Theoretical framing and hypotheses

Three theoretical perspectives inform the study's expectations; the study examines the associations consistent or inconsistent with them but does not test their mechanisms. First, the graduate-capital perspective [13] suggests that institutional activities may give students access to social and cultural resources, such as employer contacts, information about recruitment and experience of professional settings that are relevant to securing employment. This provides the rationale for expecting participation to be associated with placement (H1). Second, human capital theory regards education and the capabilities it develops as investments rewarded in the labour market [14], and signalling theory adds that, when employers cannot observe productivity directly, academic credentials act as signals of capability [15]. In campus recruitment, CGPA is a readily observable indicator, which provides the rationale for expecting academic performance to be associated with placement (H2). Third, attendance

has a less direct theoretical link to employment; it is included as an indicator of engagement with the educational environment that is likely to overlap with academic performance (H3).

2.4 Research questions and hypotheses

Previous research has examined mainly developmental or perceived outcomes of career support, has distinguished poorly between participation and its correlates, and has rarely drawn on Indian institutional data. The study therefore addresses the following research questions and hypotheses.

RQ1

What are the participation patterns in institutional engagement activities, and what are the placement outcomes among final-year students?

RQ2

Is participation in institutional engagement activities significantly associated with placement status among final-year students?

RQ3

Are attendance and academic performance associated with placement status when participation in institutional engagement activities is taken into consideration?

H1

Participation in institutional engagement activities is significantly associated with placement status among final-year students.

H2

Academic performance is significantly associated with placement status among final-year students.

H3

Attendance is significantly associated with placement status among final-year students.

RQ1 is addressed descriptively, H1–H3 are first tested with bivariate analyses, and RQ3 is addressed with multivariable logistic regression. All hypotheses concern associations, not causal effects.

3 Methods

3.1 Design, setting and participants

The study used a cross-sectional survey at a higher education institution in South India with more than 3,000 students. The target population comprised final-year undergraduates in the final lap who were on

the verge of completing their course: fourth-year Engineering students and third-year students in Arts, Commerce, Science and Information Technology (IT), reflecting the different programme durations. All 560 eligible students were invited to participate (census approach). The questionnaire was administered online using an online survey between April and July 2025, and the link was circulated through group email IDs. Of those invited, 500 completed the questionnaire (response rate 89.3%), and all completed responses were retained. The sample comprised 171 Engineering and 329 other students; 273 (54.6%) were men and 227 (45.4%) women, and ages ranged from 20 to 23 years (mean 21.23, *SD* 0.87), so all respondents were adults.

3.2 Measures

The questionnaire was developed for this study and is reproduced in full in Supplementary Material 3. The instrument was pilot-tested with 30 students and reviewed by five subject experts for content validity. The reported Content Validity Index exceeded 0.80 for all items. The internal consistency of the 10-item Career Guidance Impact scale was also reported, with a Cronbach's alpha of 0.87. Table 1 summarises the variables analysed.

Table 1
Variables used in the analysis

Variable	Definition	Coding	Role
Participation in institutional engagement activities	Participation in institution-organised career-support activities (counselling, workshops and seminars, internships or cooperative education, networking, professional development)	Binary: 1 = yes, 0 = no	Predictor (RQ2, H1)
Placement status	Had secured a job at the time of the survey (self-reported)	Binary: 1 = yes, 0 = no	Outcome
Academic performance	CGPA band (ERP-referenced)	Ordinal: 1 = 5–6, 2 = 6–7, 3 = 7–8, 4 = 8–9, 5 = 9–10; modelled per band	Predictor (RQ3, H2)
Attendance	Cumulative attendance (ERP-referenced)	Percentage; modelled per 10 percentage points	Predictor (RQ3, H3)
Gender; field of study	Demographic and programme characteristics	Categorical	Descriptive; covariates in sensitivity analysis
Reason for non-participation	Main reason reported by non-participants	Lack of awareness; time constraints; lack of interest; other	Descriptive (RQ1)

Note. CGPA = cumulative grade point average; ERP = the institution's Enterprise Resource Planning system. Academic year was not modelled because it was fully determined by field of study. The complete questionnaire is provided in Supplementary Material 3.

Participation in institutional engagement activities was defined as students' involvement in career-support activities organised by the institution's Training and Development Department. These activities included career counselling, workshops and seminars, internships or cooperative education, networking events, and professional development programmes.

The activities were considered collectively because they were organised and recorded by the department as part of a broader career-support programme. Furthermore, the questionnaire assessed students' participation in this group of activities rather than measuring involvement in each activity separately.

Students who had participated in more than one activity were classified as participants (coded 1), while those who had not participated in any of them were classified as non-participants (coded 0). Since the questionnaire did not capture the frequency, duration, timing, or specific type of participation, the analysis focused on participation in the overall set of institutional engagement activities rather than on the effects of individual activities or levels of engagement.

Placement status was measured as a binary outcome variable. A student was classified as placed if they had secured employment with a company, irrespective of whether the employment was obtained through the university's placement process or independently through the student's own efforts. Students who had not secured employment at the time of data collection were classified as not placed. *Academic performance* was recorded as a cumulative grade point average (CGPA) band and *attendance* as a percentage; students answered both items, and the participation item, with reference to their records in the institution's Enterprise Resource Planning (ERP) system.

The questionnaire also contained five global career-guidance perception items and ten perceived-benefit ratings (Supplementary Table S3). The five global items were analysed separately using frequency and percentage distributions; their associations with placement were examined using chi-square tests.

3.3 Procedure

Before starting the questionnaire, students read an online consent statement describing the purpose of the study and the voluntary nature of participation, and they gave consent electronically; only those who consented could proceed. The survey was anonymous: no names, register numbers or other direct identifiers were recorded. The researcher who collected the data was Head of Training and Development at the institution. To minimise perceived pressure and protect students' privacy, participation in the study was voluntary, and responses were collected anonymously so that they could not be linked to individual students. Students were instructed to refer to their updated institutional ERP records when providing academic and participation-related information, rather than relying on personal judgements or estimates. Attendance at institutional activities was recorded on an event-wise basis by the Training and Development Department, and participation information was reflected in the ERP system. The research team did not access individual students' ERP records. The study used the responses submitted by students through the questionnaire, and the dataset prepared for analysis contained no identifying information. Formal ethical approval was obtained.

3.4 Data analysis

Proportions were reported with Wilson 95% confidence intervals (CIs) [16]. H1 was tested with Pearson's chi-square test, supported by Fisher's exact test, and its strength was expressed as Cramér's V with a bootstrap CI [17]. H2 was tested with a 5 × 2 chi-square test, the Cochran–Armitage trend test [18] and the Mann–Whitney U test with rank-biserial correlation [19]. H3 was tested with Welch's t-test [20], with Hedges' g as effect size [21]. The five career-guidance perception variables were summarised using frequencies and percentages, and their associations with placement were examined using Pearson's chi-square tests; Cramér's V was used to describe association strength.

RQ3 was addressed with nested binary logistic regression on all 500 observations. Participation, the predictor of primary interest, was entered alone (M1); CGPA band (M2) and attendance (M3) were then added separately, and both were entered together in the primary model (M4). This sequence was chosen because the two academic variables were expected to be correlated: entering them separately shows how each changes the participation estimate, and the joint model shows the association of each with

the other held constant. Collinearity was assessed with correlations, variance inflation factors (VIFs) and the condition index [22]. Results are reported as odds ratios (ORs) with Wald 95% CIs per one-band increase in CGPA and per 10-percentage-point increase in attendance; nested models were compared with likelihood-ratio tests. Treating CGPA band as an ordinal term assumes a constant OR for each one-band increase; this was checked with the Box–Tidwell test [23] and by entering CGPA as categories. The primary model had 16.7 events per predictor [24].

Model adequacy was assessed with the Hosmer–Lemeshow test, influence and residual statistics and checks for separation [25]. Sensitivity analyses comprised Firth's penalised likelihood [26, 27], bootstrap CIs [28], additional adjustment for gender and field of study, exclusion of four poorly fitted cases, categorical CGPA and replacement of CGPA and attendance by the mean of their standardised scores (a collinearity check, not a construct). The E-value [29] was calculated to indicate how strong unmeasured confounding would need to be to explain the adjusted participation association. Predictive statistics were not used to evaluate the hypotheses. Analyses used Python 3.12 with SciPy [30] and statsmodels [31]; $\alpha = 0.05$ (two-tailed). The code (Supplementary Material 2) reproduces every reported value from the dataset in Supplementary Material 1.

4 Results

4.1 Participation and placement (RQ1)

The dataset contained no missing, duplicate or out-of-range values (Supplementary Table S1). Of the 500 students, 443 (88.6%, 95% CI 85.5–91.1) had participated in institutional engagement activities, and 450 (90.0%, 95% CI 87.1–92.3) had secured a job (Table 2). Among the 57 non-participants, the most frequent reason for non-participation was lack of awareness (24; 42.1%), followed by time constraints (17; 29.8%), lack of interest (10; 17.5%) and other reasons (6; 10.5%). Mean attendance was 73.50% (*SD* 9.77), and the modal CGPA band was 7–8 (32.0%).

Table 2
Sample characteristics and placement rates (*N* = 500)

Gender	**Characteristic**	**n (%)**	**Placed, n (row %)**
	Male	**273 (54.6)**	**245 (89.7)**
	Female	227 (45.4)	205 (90.3)
Field of study	Engineering	171 (34.2)	157 (91.8)
	Commerce	129 (25.8)	120 (93.0)
	Arts	116 (23.2)	103 (88.8)
	IT	45 (9.0)	39 (86.7)
	Science	39 (7.8)	31 (79.5)
CGPA band	5–6	52 (10.4)	23 (44.2)
	6–7	76 (15.2)	59 (77.6)
	7–8	160 (32.0)	157 (98.1)
	8–9	145 (29.0)	144 (99.3)
	9–10	67 (13.4)	67 (100.0)
Participation in institutional engagement activities	Yes	443 (88.6)	426 (96.2)
	No	57 (11.4)	24 (42.1)
	Total	500 (100.0)	450 (90.0)

Note. Academic year is not shown separately because it corresponds to the field of study (Engineering = fourth year; other fields = third year). CGPA = cumulative grade point average.

4.2 Bivariate associations (H1–H3 and career-guidance perceptions)

Table 3 summarises the bivariate tests. Placement was more frequent among participants than non-participants (96.2% vs. 42.1%; difference 54.1 percentage points, 95% CI 41.1–67.0), a large association (Cramér's V = 0.57). Placement rates rose across CGPA bands from 44.2% (5–6) to 100% (9–10), with a significant linear trend, and 46 of the 50 non-placed students were in the two lowest bands. Placed students had higher mean attendance than non-placed students (75.03% vs. 59.70%; Hedges' g = 1.78). Placement was not associated with gender or field of study. H1, H2 and H3 were therefore supported at the bivariate level.

For the five career-guidance variables, 70.4% of students rated availability as excellent or good, and 70.4% rated impact as 4 or 5. Improvement choices varied: skill-development workshops (22.6%), career-

advisor availability (21.6%), networking events (20.6%), internship opportunities (18.2%) and other areas (17.0%). Each perception variable was associated with placement in the chi-square analysis ($p < .001$ for availability, support, effectiveness and impact; $p = .015$ for improvement area; Supplementary Table S17). The first four variables had identical response patterns and therefore yielded identical test statistics; these findings are not independent. The improvement-area variable showed a weaker association (Cramér's V = 0.16).

Table 3
Bivariate associations with placement status

Variable	Test statistic	*p*	Effect size [95% CI]
Participation (yes vs. no)	$\chi^2(1) = 163.97$	< 0.001	V = 0.57 [0.45, 0.69]
CGPA band (5 levels)	$\chi^2(4) = 167.10$; trend z = 10.75	< 0.001	V = 0.58 [0.48, 0.68]
Attendance (%)	Welch t(73.70) = 15.89	< 0.001	g = 1.78 [1.46, 2.09]
Gender	$\chi^2(1) = 0.04$	0.834	V = 0.01
Field of study	$\chi^2(4) = 7.47$	0.113	V = 0.12

Note. *V* = Cramér's *V* (bootstrap CI); *g* = Hedges' *g*. Fisher's exact test for participation and the Mann–Whitney tests for CGPA and attendance gave the same conclusions. For field of study, one expected cell frequency was below 5. Full cross-tabulations are given in Supplementary Table S16 and Supplementary Figs. S1–S3.

4.3 Collinearity

Attendance and CGPA band were strongly correlated ($r = 0.87$, 95% CI 0.85–0.89); mean attendance rose from 57.3% in the lowest band to 82.6% in the highest, with little overlap between adjacent bands (Fig. 1). Participation was moderately correlated with both (attendance $r = 0.37$; CGPA $r = 0.39$): participants had higher mean attendance (74.8% vs. 63.4%) and higher mean CGPA bands (3.36 vs. 1.93) than non-participants. The VIFs for CGPA (4.17) and attendance (4.10) and the condition index (4.03) were within conventional limits, but the two variables shared 75% of their variance.

4.4 Logistic regression (RQ3)

Table 4 presents the nested models. The OR for participation fell from 34.46 (M1) to 17.54 when CGPA was added (M2) and to 18.14 when attendance was added (M3). Each variable was associated with placement when entered without the other (CGPA OR 6.63 per band; attendance OR 7.41 per 10 percentage points). In the primary model (M4; likelihood-ratio $\chi^2(3) = 179.33$, $p < 0.001$; Nagelkerke $R^2 = 0.63$), participation (OR 17.15, 95% CI 7.05–41.73) and CGPA (OR 3.68 per band, 95% CI 1.56–8.70) remained associated with placement, whereas attendance did not (OR 2.28 per 10 percentage points, 95% CI 0.88–5.91, $p = 0.089$). Adding CGPA to the attendance model improved fit ($\chi^2(1) = 9.42$, $p =$

0.002), whereas adding attendance to the CGPA model did not ($\chi^2(1) = 2.95$, $p = 0.086$). Predicted probabilities from M4 are given in Supplementary Table S11.

Table 4
Nested binary logistic regression models of placement status ($N = 500$)

Predictor	M1	M2	M3	M4 (primary)
Participation (yes vs. no)	34.46 [16.85, 70.45] $p < 0.001$	17.54 [7.26, 42.37] $p < 0.001$	18.14 [7.71, 42.65] $p < 0.001$	17.15 [7.05, 41.73] $p < 0.001$
CGPA (per one-band increase)	—	6.63 [3.78, 11.62] $p < 0.001$	—	3.68 [1.56, 8.70] $p = 0.003$
Attendance (per 10-percentage-point increase)	—	—	7.41 [4.04, 13.58] $p < 0.001$	2.28 [0.88, 5.91] $p = 0.089$
Model statistics				
Likelihood-ratio χ^2 (df)	103.30 (1)	176.38 (2)	169.92 (2)	179.33 (3)
Nagelkerke R^2	0.39	0.62	0.60	0.63
AIC	225.78	154.70	161.17	153.75

Note. Outcome: 1 = secured a job (450), 0 = not placed (50). Cells show the odds ratio (OR), Wald 95% confidence interval and *p-value*. All models were significant against the intercept-only model ($p < 0.001$). AIC = Akaike information criterion. Coefficients and standard errors are given in Supplementary Table S6.

4.5 Diagnostics and sensitivity analyses

The primary model showed no evidence of lack of fit (Hosmer–Lemeshow $\chi^2(8) = 12.06$, $p = 0.149$), no departure from linearity in the logit for attendance ($p = 0.681$) or CGPA ($p = 0.405$), no separation and no observation with Cook's distance above 1; four observations had standardised residuals above 3 (Supplementary Tables S8, S9 and S15). With CGPA entered as categories, the ORs increased monotonically across categories (Supplementary Table S13), although only four non-placed students were in the bands from 7–8 upwards, so the constancy of the per-band OR in the upper bands could not be assessed precisely.

Figure 2 summarises the sensitivity analyses (full results in Supplementary Table S13). The participation OR ranged from 15.64 to 27.87 and the CGPA OR from 3.51 to 4.19, with all CIs excluding 1. The attendance OR was positive in every specification, but its CI included 1 in the primary model, under Firth

estimation (p = 0.096), in the bootstrap analysis, after adjustment for gender and field of study (p = 0.074) and with categorical CGPA (p = 0.079); it excluded 1 only when the four poorly fitted cases were removed (p = 0.016). The E-value for the adjusted participation OR was 7.75 (4.75 for the lower confidence limit; Supplementary Table S14).

In summary, H1 and H2 were supported in both the bivariate and adjusted analyses. H3 was supported at the bivariate level, but an association of attendance with placement independent of CGPA was not demonstrated.

5 Discussion

5.1 Participation and placement status

Participation in institutional engagement activities was the characteristic most strongly associated with placement, and the association remained after adjustment for CGPA and attendance. The halving of the OR after adjustment shows that part of the unadjusted difference reflected the stronger academic profiles of participants. The remaining association should be interpreted cautiously for three reasons.

First, participation was voluntary. Participants differed from non-participants on the characteristics that were measured, and they may also have differed on characteristics that were not, such as career motivation, confidence, prior work experience or access to family and social networks. Such characteristics could make students both more likely to participate and more likely to be placed; their actual influence in this sample is unknown. Second, participation and placement were recorded at the same time, so the study cannot establish that participation preceded placement. Third, the non-participant group was small (57 students), which is reflected in the wide CIs. The E-value indicates that an unmeasured confounder would need to be strongly associated with both participation and placement to explain the association fully, but it does not show that such confounding is absent, nor does it address temporal order. The findings therefore show that participation was associated with placement in this cohort; they do not show that participation caused students to secure employment.

Lack of awareness was the most common reason for non-participation. Although this was reported by a small group, it suggests that some non-participation may reflect access to information rather than lack of interest.

5.2 Academic performance and attendance

The strong correlation between attendance and CGPA (r = 0.87) may reflect the institution's strict attendance requirements and their role in academic progression. Students must meet minimum attendance thresholds to appear for end-semester examinations. Furthermore, academic credentials may influence eligibility for campus recruitment, consistent with human capital theory [14] and signalling theory [15].

Participation in institutional career-support activities may provide additional opportunities for professional exposure, networking and interview preparation. This is consistent with the graduate-capital perspective [13], which highlights the importance of various forms of capital in graduate employability. However, the present study establishes associations rather than the mechanisms through which these activities may influence placement.

Although attendance was associated with placement in the bivariate analysis, it was not statistically significant after adjustment for CGPA. This may reflect the strong correlation between the two variables and does not imply that attendance lacks educational value.

5.3 Comparison with previous research

Because previous studies differ in design, population, type of activity and outcome, the comparison here concerns the direction of findings rather than their magnitude. Studies of career interventions have mainly reported improvements in developmental outcomes such as career decision-making [6, 7], whereas the present study examined an employment outcome in a cross-sectional comparison. The association between participation and placement is broadly consistent with UK evidence linking work experience and employer involvement to graduate-level employment [10] and with review evidence that practical, employer-connected activities show the most consistent links with employment [9]. Unlike those studies, however, the present study could not distinguish between types of activity. It shares with much of the literature [8] the inability to establish causal effects.

5.4 Educational contribution and implications

For education research, the study shows that an observed employment outcome can be related to institutional career-support records and academic characteristics within one institution, and that doing so changes the interpretation of the participation–placement difference: the OR was about half as large once students' academic profiles were taken into account. It also shows that correlated academic indicators should be modelled jointly before conclusions are drawn about any one of them. These findings provide a basis for, but do not replace, longitudinal and multi-institutional evaluations that record the type, amount and timing of participation.

The practical implications are possibilities for institutions to consider and evaluate, not proven interventions. First, institutions could examine why some students do not participate, in particular whether information about activities reaches all students and whether improving access changes participation. Second, because non-placement was concentrated in the lower CGPA bands, institutions could consider coordinating academic support with career support for these students and evaluate whether this is associated with later outcomes. Third, institutions could record the type and timing of participation so that future evaluations can compare students with similar academic profiles over time. The findings do not support compulsory participation, and the regression model is not intended as a tool for predicting individual students' placement.

5.5 Limitations

The study has several limitations. It was conducted at a single South Indian institution with a high placement rate (90.0%), so the findings apply most directly to similar institutions with centrally organised career support and campus recruitment, and may differ in other settings. The cross-sectional design, voluntary participation and simultaneous measurement of participation and placement preclude causal inference. Participation was a binary measure without information on activity type, frequency, duration or timing. Placement was self-reported and did not capture job quality or salary. CGPA was measured in bands, and its strong correlation with attendance limited the ability to separate their associations. The non-placed (50) and non-participant (57) groups were small. The four global rating variables: availability, support, effectiveness and impact, had exactly corresponding response patterns, so their associations with placement are redundant rather than independent evidence. The impact item also duplicates the placement-effectiveness column in the supplied dataset; this should be checked against the administered questionnaire. Finally, the researcher's institutional role may have influenced participation or responses despite the safeguards described, and the 60 non-respondents may have differed from respondents.

6 Conclusions

Among final-year undergraduates in the final lap at one South Indian institution, participation in institutional engagement activities and CGPA were each associated with placement status after mutual adjustment, whereas attendance was associated with placement only in the bivariate analysis because of its close relationship with CGPA. Given voluntary participation and a cross-sectional design, these associations cannot be interpreted as effects. For higher education, the findings highlight the value of examining barriers to participation, coordinating academic and career support and evaluating institutional career-support activities with longitudinal designs.

Declarations

Ethics approval

and Accordance Statement. This study was conducted in accordance with applicable ethical guidelines and research procedures. Participation was voluntary, and informed consent was obtained electronically before participants proceeded with the online questionnaire. Participants' responses were treated confidentially and anonymised, with no direct personal identifiers recorded. Students were asked to refer to their institutional ERP records when reporting their academic performance and attendance; the research team did not directly access individual ERP records. The study used a structured, self-administered questionnaire to collect data from final-year undergraduate students at New Prince Shri Bhavani College of Engineering & Technology in South India.

Consent for publication.

Not applicable. The survey was anonymous, and no individually identifiable participant information or images are included in this manuscript.

Competing interests.

The authors declare that they have no known competing financial interests or personal relationships that could have influenced the work reported in this paper. The institutional role of the researcher who collected the data is described in Section 3.3.

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Author Contribution

K. M: Literature review, data collection, conceptualisation, project administration and final drafting. C.J.A.C (corresponding author): Methodology, data analysis, interpretation of the findings and results, implications, visualisation, substantive revision, response to reviewers and final approval. P.S: Research design formulation and refinement of the research questions; alignment of objectives, research questions and analytical structure; critical review for consistency with the research questions and design; substantive revision; and final approval.

Data Availability

The dataset is provided as Supplementary Material 1

Code availability.

The analysis code is provided as Supplementary Material 2.

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Figures

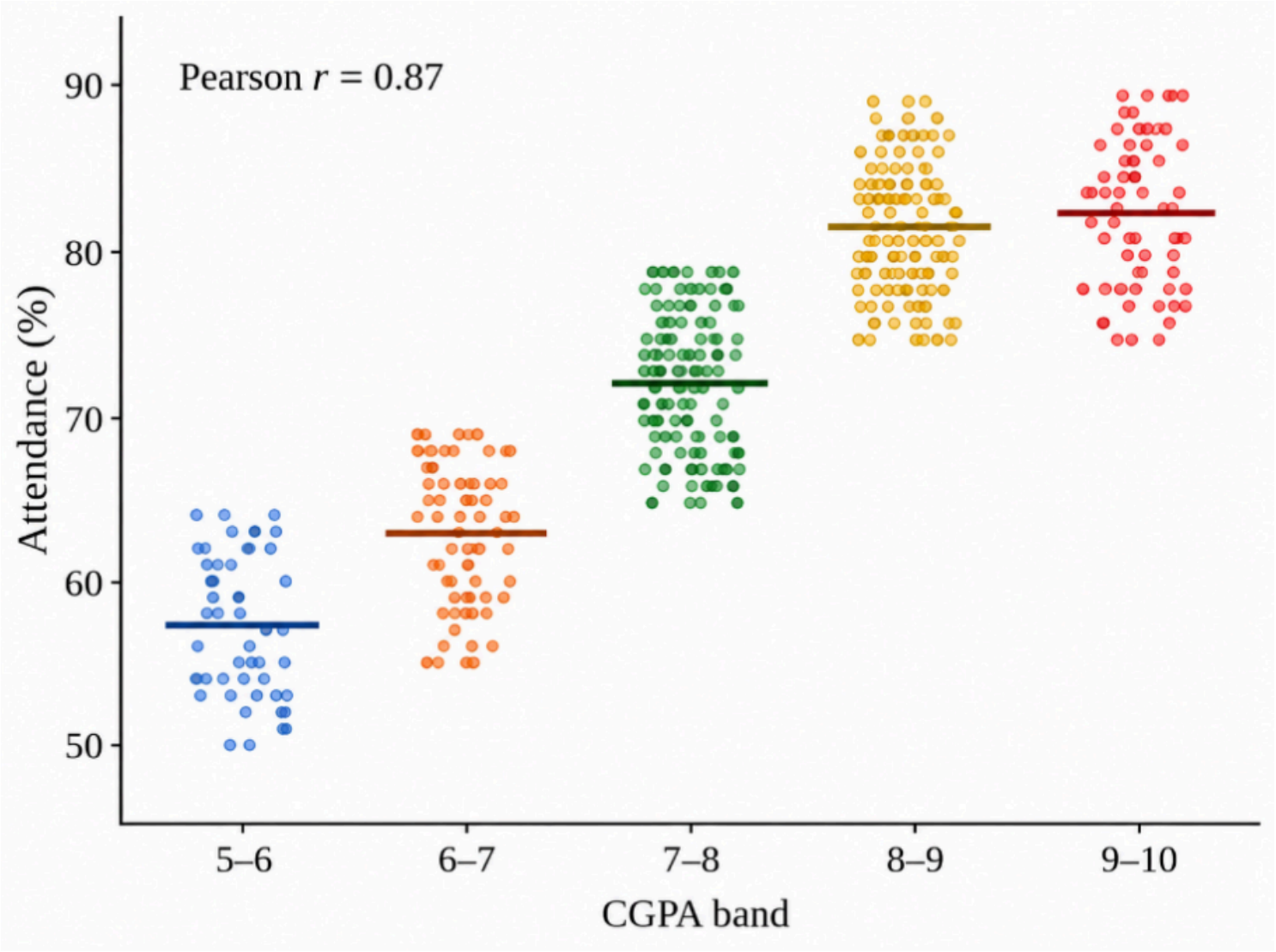


Figure 1

Attendance by CGPA band. Points show individual students and horizontal bars show band means (*r* = 0.87)

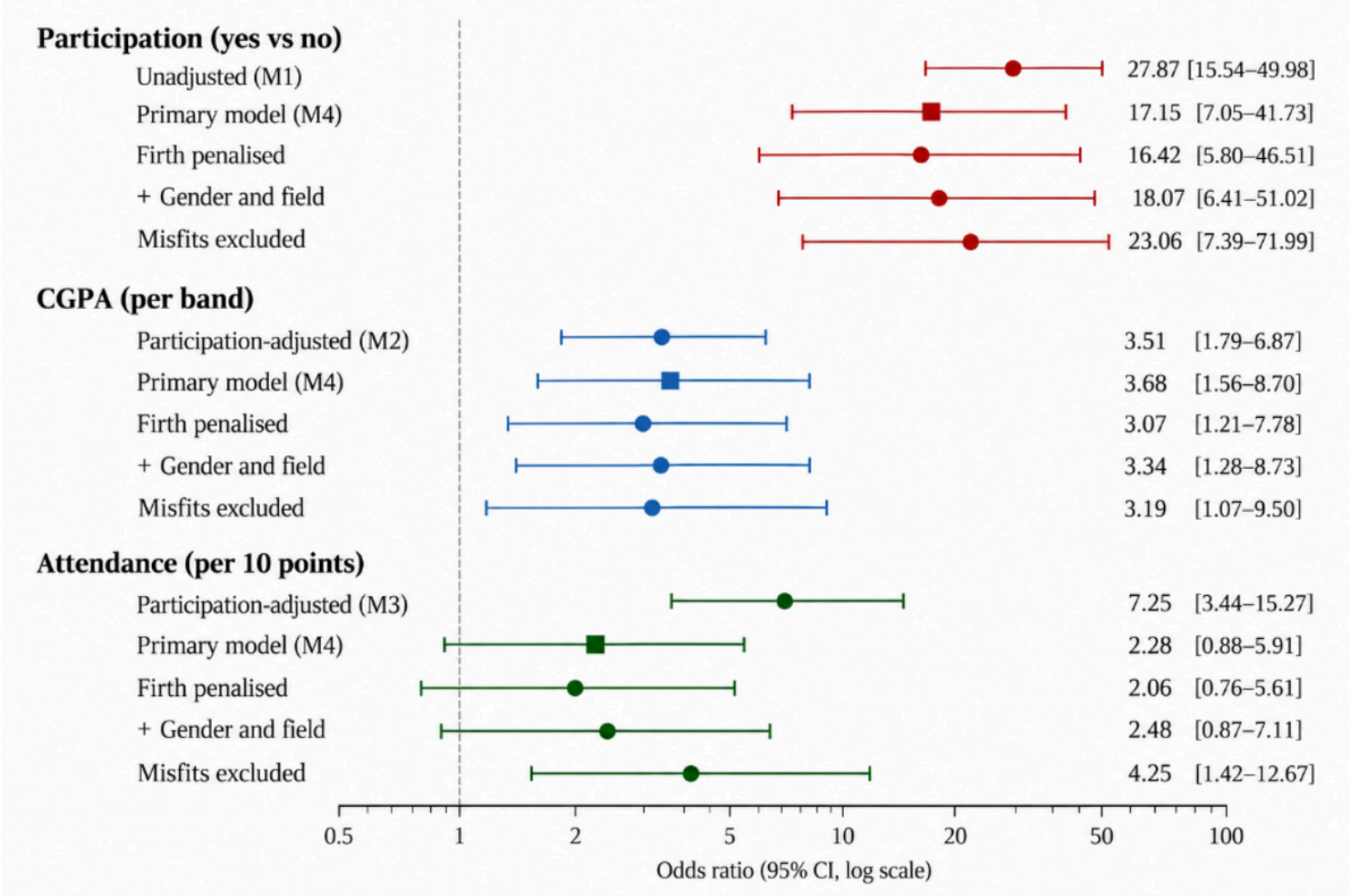


Figure 2

Odds ratios (log scale) with 95% confidence intervals for participation, CGPA and attendance across partially adjusted, primary and sensitivity models. Filled squares denote the primary model (M4); the dashed line marks OR = 1

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- SupplementaryMaterial3QuestionnairreFinal.docx
- SupplementaryFigureS2PlacementbyCGPABand.png
- SupplementaryMaterial1.xlsx
- SupplementaryFigureS1PlacementbyParticipation.png
- SupplementaryMaterial2AnalysisNotebookready.ipynb
- SupplementaryFigureS3AttendancebyPlacementStatus.png