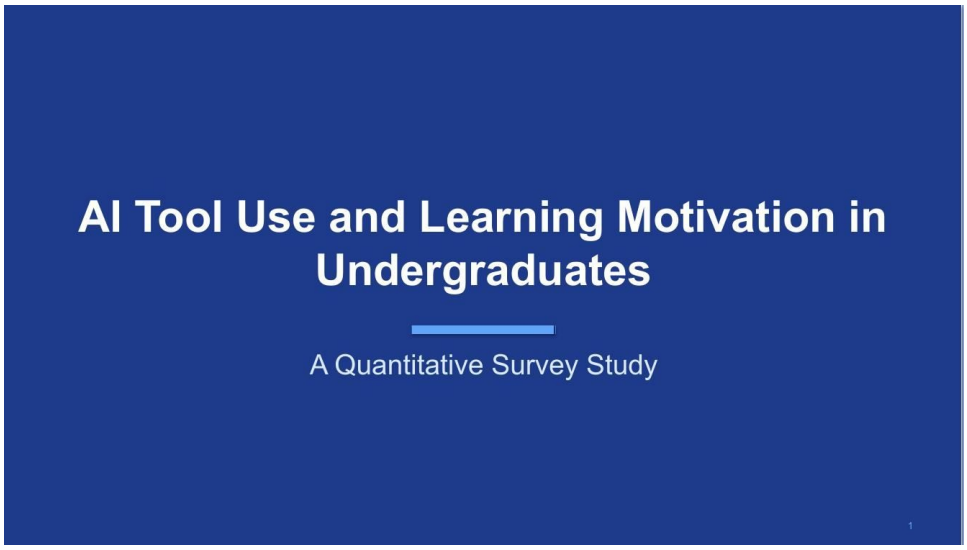
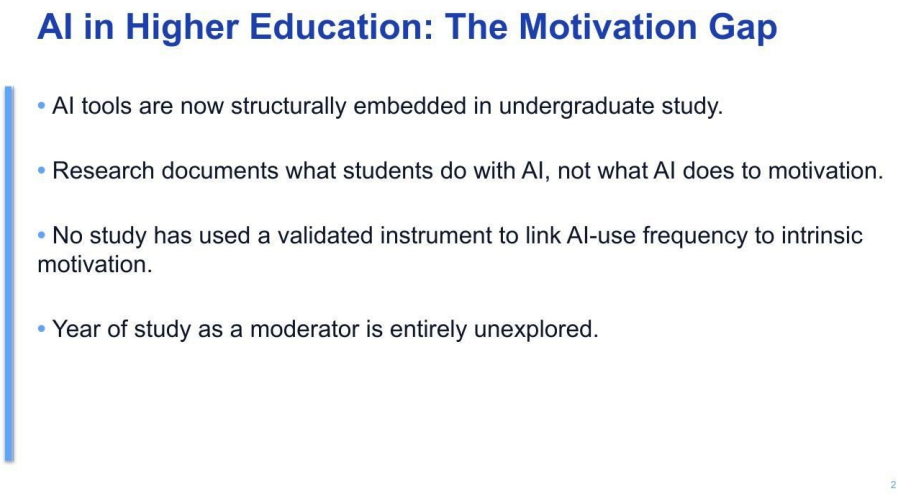
Handout — Use of artificial-intelligence tools and learning motivation among undergraduate students: a quantitative survey study

Slide 1: AI Tool Use and Learning Motivation in Undergraduates



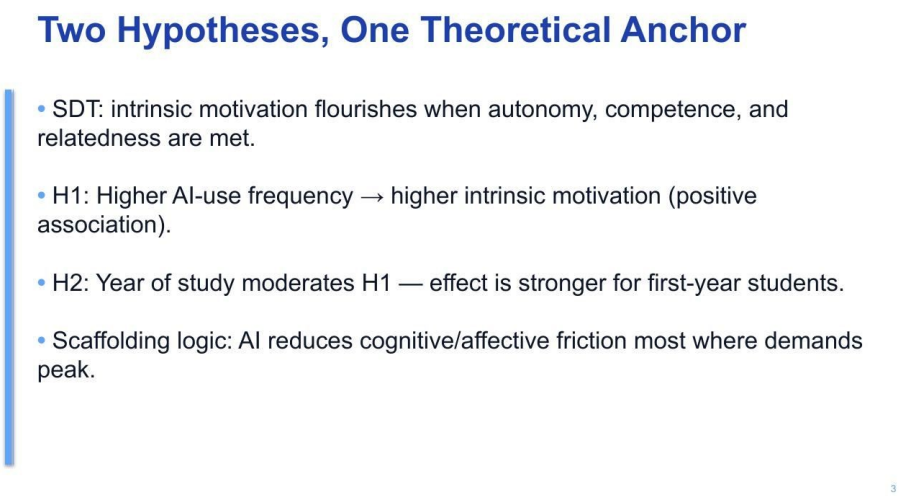
Slide 2: AI in Higher Education: The Motivation Gap



- AI tools are now structurally embedded in undergraduate study.
- Research documents what students do with AI, not what AI does to motivation.
- No study has used a validated instrument to link AI-use frequency to intrinsic motivation.

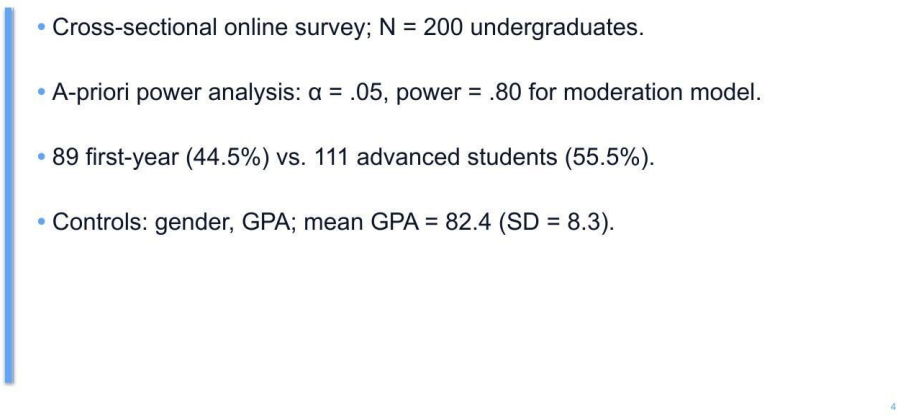
- Year of study as a moderator is entirely unexplored.

Slide 3: Two Hypotheses, One Theoretical Anchor



- SDT: intrinsic motivation flourishes when autonomy, competence, and relatedness are met.
- H1: Higher AI-use frequency → higher intrinsic motivation (positive association).
- H2: Year of study moderates H1 — effect is stronger for first-year students.
- Scaffolding logic: AI reduces cognitive/affective friction most where demands peak.

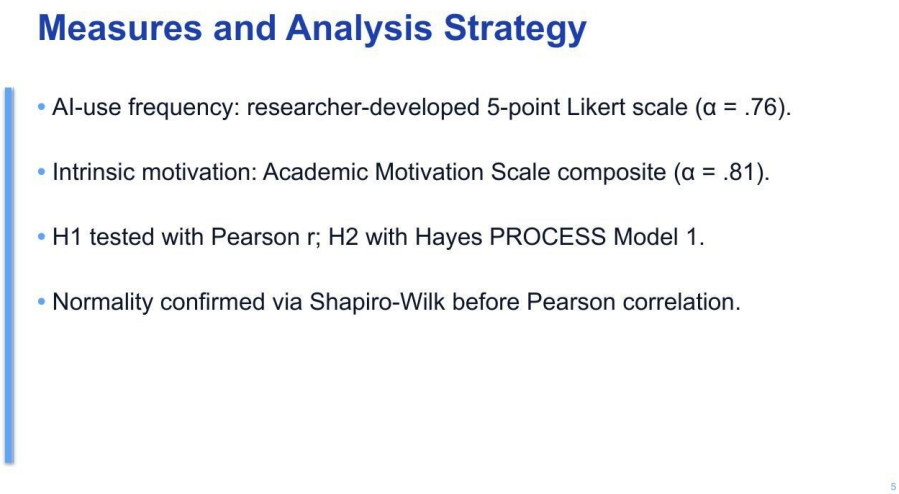
Slide 4: Study Design and Sample



- Cross-sectional online survey; N = 200 undergraduates.
- A-priori power analysis: α = .05, power = .80 for moderation model.
- 89 first-year (44.5%) vs. 111 advanced students (55.5%).

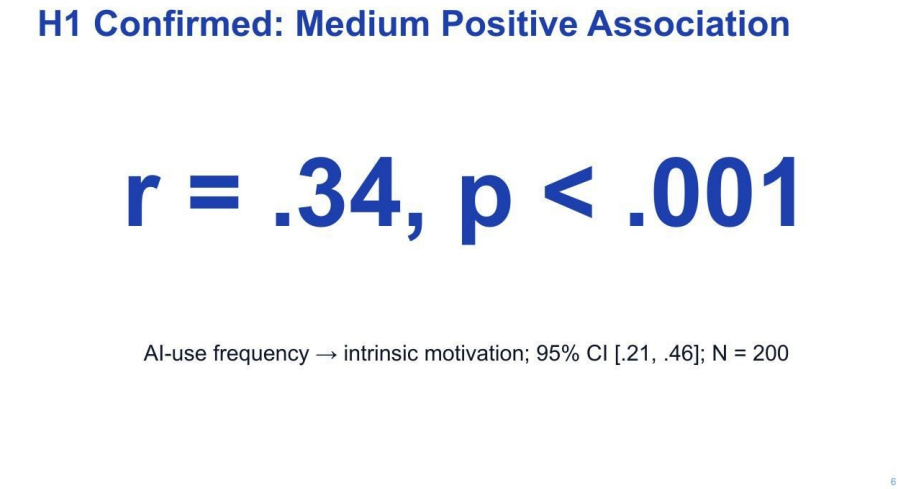
- Controls: gender, GPA; mean GPA = 82.4 (SD = 8.3).

Slide 5: Measures and Analysis Strategy



- AI-use frequency: researcher-developed 5-point Likert scale (α = .76).
- Intrinsic motivation: Academic Motivation Scale composite (α = .81).
- H1 tested with Pearson r; H2 with Hayes PROCESS Model 1.
- Normality confirmed via Shapiro-Wilk before Pearson correlation.

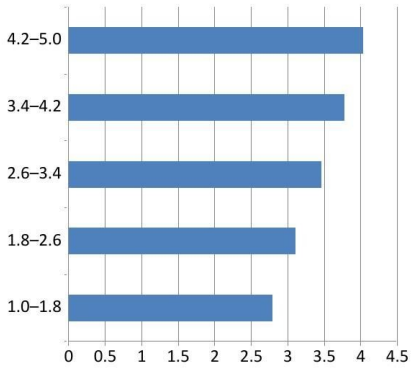
Slide 6: H1 Confirmed: Medium Positive Association



Slide 7: Intrinsic Motivation Rises with AI-Use Frequency

Intrinsic Motivation Rises with AI-Use Frequency

- Mean intrinsic motivation increases across frequency bands.
- Lowest-frequency band: M = 2.81; highest: M = 4.05.
- Trend is monotonic — no ceiling or floor effect visible.



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Slide 8: H2 Confirmed: Year of Study Moderates the Effect

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$\Delta R^2 = .043$, $p = .015$

Interaction: AI-use × year of study; overall model $R^2 = .189$, $F(4,195) = 11.37$, $p < .001$

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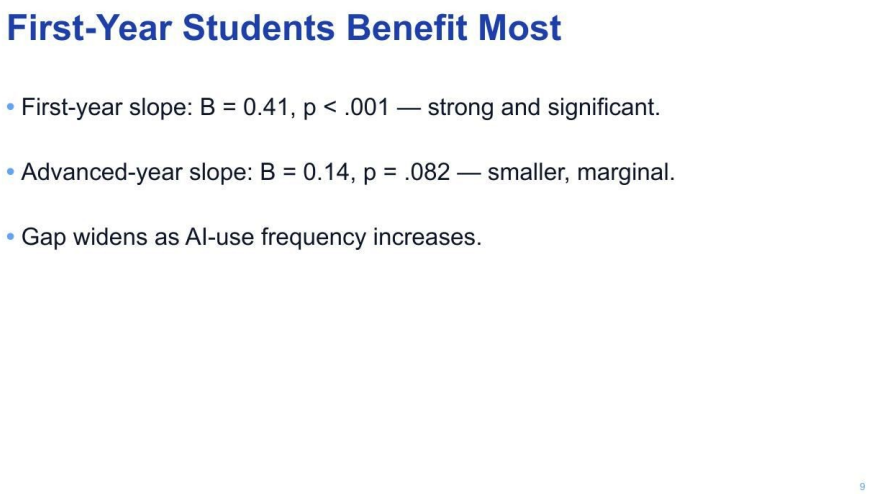
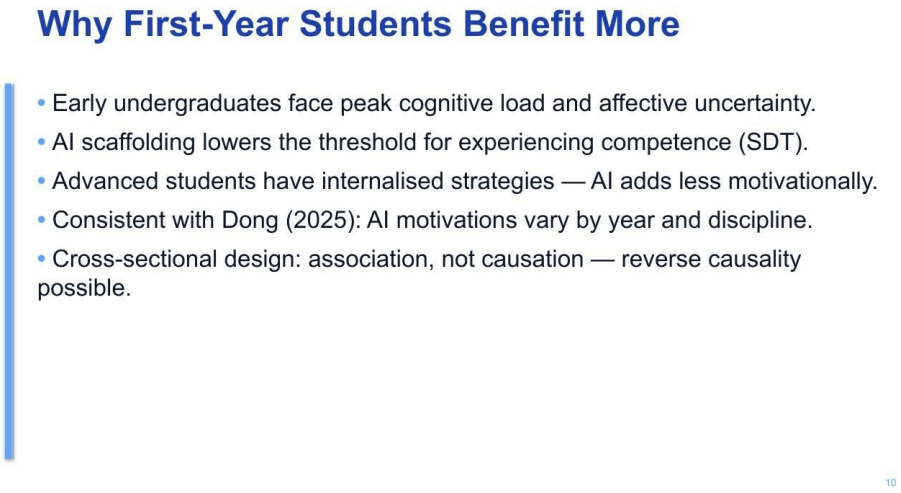
Slide 9: First-Year Students Benefit Most



- First-year slope: B = 0.41, p < .001 — strong and significant.
- Advanced-year slope: B = 0.14, p = .082 — smaller, marginal.
- Gap widens as AI-use frequency increases.

Slide 10: Why First-Year Students Benefit More

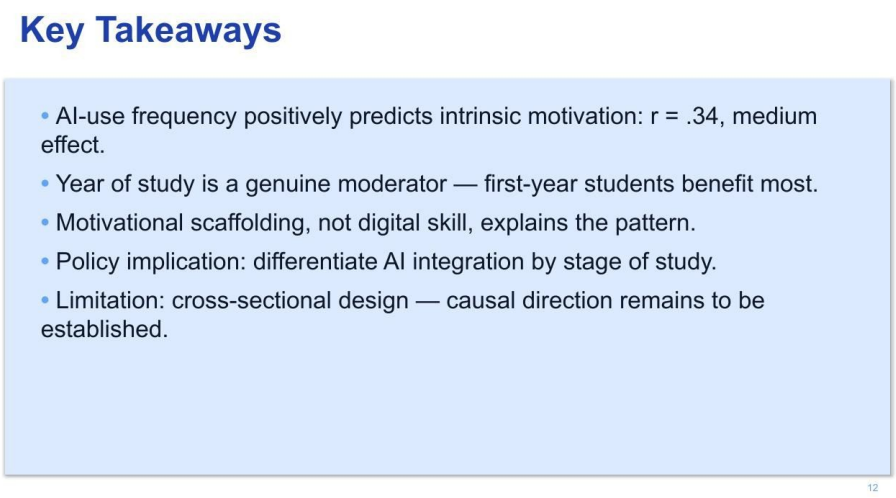


- Early undergraduates face peak cognitive load and affective uncertainty.
- AI scaffolding lowers the threshold for experiencing competence (SDT).
- Advanced students have internalised strategies — AI adds less motivationally.
- Consistent with Dong (2025): AI motivations vary by year and discipline.
- Cross-sectional design: association, not causation — reverse causality possible.

Slide 11: Implications and Future Directions

- Integrate AI tools intentionally into first-year curricula, not uniformly.
- Frame AI as an inquiry scaffold, not a production shortcut.
- Disaggregate evaluation data by year of study — aggregate metrics mislead.
- Future work: longitudinal design, mediation via self-efficacy, multi-institution samples.

Slide 12: Key Takeaways



- AI-use frequency positively predicts intrinsic motivation: r = .34, medium effect.
- Year of study is a genuine moderator — first-year students benefit most.
- Motivational scaffolding, not digital skill, explains the pattern.
- Policy implication: differentiate AI integration by stage of study.

- Limitation: cross-sectional design — causal direction remains to be established.