

Confidence at the crossroads: A systematic review of AI literacy, parental influence, and self-confidence in students' career choice

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Abstract

Artificial intelligence is reshaping labour markets, positioning AI literacy as an understudied antecedent of students' career choice alongside established influences such as parental support and self-confidence. This systematic review mapped the trends, theoretical frameworks, measurement instruments, and analytical methods linking these constructs and asked whether they had been examined jointly. Following PRISMA 2020 and a retrospectively registered protocol (Open Science Framework; registration pending), a single Scopus search in July 2026, limited to English-language articles and reviews, returned 107 records; independent dual screening with third-reviewer adjudication of disagreements yielded 79 studies, each appraised for methodological quality (AXIS/JBI). Because the query required an explicit self-efficacy, self-confidence, or self-esteem term, all coverage findings were limited to studies that measured self-confidence. The evidence base was dominated by Social Cognitive Career Theory (43 of 79 studies, 54.4%; 55 of 79, 69.6%, for the wider social-cognitive family) and by structural equation modelling; self-confidence, chiefly career decision self-efficacy, mediated contextual effects in 33 of the 41 studies that specified a mediator. Parental influence appeared in 74 studies but AI literacy in only six, all from 2025–2026, and just one measured all four constructs together. Within this corpus, no study modelled AI literacy and parental influence jointly through self-confidence. The review consolidated the framework, validated instruments, and methods needed to test such an integrative model and delineated the specific gap it would fill, offering a foundation for confirmatory research and AI-literacy instruction in vocational (SMK/TVET) science and engineering education.

Keywords: AI literacy; Career choice; Career decision self-efficacy; Parental influence; PRISMA 2020 systematic review; Vocational education (TVET)

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INTRODUCTION

The rapid diffusion of artificial intelligence (AI) is reshaping the skills that labour markets demand and, with them, the career prospects of students now preparing to enter the workforce (Cheng et al., 2025). As AI becomes embedded across occupations, the capacity to understand, use, and critically evaluate it—AI literacy—is increasingly framed as a foundational twenty-first-century competency rather than a specialist concern (S. Zhang et al., 2025), and knowledge of AI is beginning to be theorised as a determinant of career sustainability and person–job fit (Ahmad & Bilal, 2025). Yet AI literacy remains conceptually and psychometrically unsettled, with competing definitions and a proliferation of newly constructed measures (B. Wang et al., 2023; S. Zhang et al., 2025). For students, and especially for those in vocational and technical education, whose training is tightly coupled to specific occupations, how such AI-era competencies bear on career choice is a pressing but largely unanswered question.

Recent syntheses of AI literacy have themselves taken review form. S. Zhang et al. (2025) provide a systematic review of reviews on AI literacy, mapping how the construct is defined, taught, and assessed across education. That work, however, concentrates on AI literacy as an educational outcome in its own right and does not examine how AI literacy relates to career development, nor how it might combine with established career antecedents such as parental influence and self-confidence. The present review is positioned precisely at that intersection: rather than reviewing AI literacy as a competency, it asks how AI literacy sits within the evidence on students' career choice.

Career choice is a consequential developmental task, particularly at the vocational secondary level, where young people commit early to occupational pathways and where mismatch carries tangible costs for employability (Adha et al., 2026; Guo, 2025; Jiang et al., 2022; Timan et al., 2024). A substantial body of research grounded in Social Cognitive Career Theory (SCCT) explains such choices through the interplay of contextual supports and

cognitive-personal beliefs: distal and proximal supports shape self-efficacy and outcome expectations, which in turn drive career goals and actions (Lent et al., 1994, 2000). Within this framework, two antecedents are especially well established. The first is parental (family) influence, whose positive association with career development and adaptability has been confirmed repeatedly in recent meta-analyses (Uygun Karakuş et al., 2026; Z. Wang & Dong, 2024), in longitudinal and transactional studies (Neuenschwander & Hofmann, 2022; Zhou et al., 2024), and specifically among vocational students (Zeng et al., 2024); it is typically measured with validated instruments such as the Career-Related Parent Support Scale (Turner et al., 2003) and, in Asian contexts, the Adolescent–Parent Career Congruence Scale (Sawitri et al., 2014). The second is self-confidence, operationalised as career decision self-efficacy or self-esteem, which recurrently functions as the mechanism transmitting contextual effects onto career outcomes (Alexander & Harris, 2022; Chen et al., 2025; Koçak et al., 2021; Shu et al., 2024; Situmorang & Salim, 2021; Stead et al., 2026; T. Wang et al., 2024), a mediating role corroborated across cultures and designs (S. Guan et al., 2025; Son et al., 2025).

Against this mature backdrop, AI literacy is only just entering career research. The few studies that connect AI to career outcomes have appeared almost exclusively in 2025–2026 and, notably, tend to channel AI’s influence on employability, career expectations, or job-seeking anxiety through self-efficacy or employability confidence (Duan et al., 2026; El-Sayed et al., 2025; Ho & Le, 2026; R. Li et al., 2025; J. Zhang et al., 2026). This convergence is theoretically suggestive: it hints that self-confidence may be a common conduit through which both a long-standing antecedent (parental influence) and a novel one (AI literacy) reach career decisions. The two antecedent families have nevertheless developed in separate literatures. Within the reviewed evidence, only a single exploratory study has measured AI literacy, parental support, self-confidence, and a career construct together, and it did so within a family-based intervention for children rather than within a structural model of student career choice (Ding & Holland, 2025). Whether AI literacy and parental influence can be integrated within one self-efficacy-mediated model of vocational students’ career choice therefore remains unknown.

This gap motivates a systematic review. Before an integrative empirical model can be specified and tested, it is necessary to establish, on the basis of accumulated evidence rather than assumption, how research on these constructs has developed, which theoretical frameworks and validated instruments are available to operationalise them, how the mediating role of self-confidence has typically been analysed, and whether the four constructs have in fact been examined jointly. A systematic review is the appropriate vehicle for this stocktaking because it maps the field transparently and locates the precise point at which a new contribution is warranted.

This stocktaking is directly relevant to science and engineering education. In Indonesia, vocational secondary schools (Sekolah Menengah Kejuruan [SMK]) and the broader technical and vocational education and training (TVET) sector prepare students for science-, technology-, and engineering-intensive occupations, and AI literacy is fast becoming a core component of science and engineering curricula rather than an optional add-on. How students’ developing competence with AI, an increasingly central science-and-technology skill, interacts with their confidence and their families to shape entry into science and engineering pathways is therefore a science-education question as much as a career-psychology one. Mapping the evidence that links these constructs speaks directly to curriculum design and instructional practice for AI literacy in science and engineering education, which is the concern of this journal.

Accordingly, this review synthesises the peer-reviewed evidence linking AI literacy, parental influence, self-confidence, and career choice among students, guided by five questions: (RQ1) the trends in publication volume and distribution; (RQ2) the dominant theoretical frameworks; (RQ3) the measurement instruments used for each construct; (RQ4) the analytical methods applied to test the mediating role of self-confidence; and (RQ5) the extent to which the four constructs have been studied together within the reviewed corpus. In answering these questions, the review aims to consolidate the theoretical and methodological foundations for an integrative model, one in which AI literacy and parental influence predict vocational students’ career choice through the mediation of self-confidence, and to establish, within this corpus, the novelty of such a model.

METHODS

Reporting Standard and Protocol

This systematic review was conducted and reported in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA 2020) statement (Page et al., 2021). An a priori protocol

specifying the review questions, eligibility criteria, search strategy, and data extraction template was defined before screening and retained in the project repository. Five questions guided the review: publication trends (RQ1); dominant theoretical frameworks (RQ2); measurement instruments per construct (RQ3); analytical methods used to test mediation (RQ4); and the extent to which the four target constructs—AI literacy, parental influence, self-confidence (operationalised as self-efficacy or self-esteem), and career choice—have been examined jointly (RQ5).

Information Source and Search Strategy

Scopus (Elsevier) served as the single bibliographic source, reflecting the database licensed to the research team; reliance on one database, and the requirement that every record contain a self-confidence term (see below), are acknowledged as limitations that narrowed the review's scope. One Boolean search was conducted in July 2026 using the TITLE-ABS-KEY field (title, abstract, and author/index keywords). The query combined three conceptual blocks with the AND operator—career outcomes, self-confidence, and antecedents (parental influence OR AI literacy)—each expanded with domain synonyms, and was restricted to journal articles and reviews written in English (Table 1). No date limit was applied; the span 2002–2026 reflects the earliest and latest retrieved records rather than an imposed restriction. The search returned 107 records, which were exported with complete metadata (authors, year, source, abstract, keywords, DOI, and document type). A direct consequence of anchoring the query on a self-confidence term is that studies linking AI literacy to career outcomes through other mechanisms (e.g., career adaptability, outcome expectations, or occupational aspirations) without an explicit self-efficacy, self-confidence, or self-esteem term were not retrievable by design. All coverage findings for RQ5 are therefore limited to studies that operationalise self-confidence and should be read accordingly.

Eligibility Criteria

Records were eligible when they (i) were Scopus-indexed articles or reviews; (ii) reported an empirical study (quantitative, qualitative, or mixed methods) or a review addressing a career-related construct (choice, decision, development, maturity, aspiration, identity, adaptability, indecision, or exploration); (iii) measured at least one target antecedent or mediator, namely self-efficacy, self-confidence, self-esteem, parental or family influence, and/or AI literacy; (iv) sampled students or learners (secondary, vocational, or tertiary) or an education-to-career transition population; and (v) reported an explicit research model and/or a measurement instrument. Records were excluded when the career outcome was peripheral, the population fell outside scope, the topic was unrelated, the report was non-empirical without a framework, or the full text could not be retrieved (Table 1).

Table 1
Search Strategy and Eligibility Criteria

Element	Specification
Database (source)	Scopus (Elsevier), single bibliographic source
Search field	TITLE-ABS-KEY (title, abstract, author/index keywords)
Search date	July 2026
Date limit	None applied; retrieved records span 2002–2026
Document type / language	Journal articles and reviews; English only
Boolean query	("career choice" OR "career decision*" OR "career development" OR "career maturity" OR "career readiness" OR "career aspiration*" OR "vocational choice" OR "occupational choice") AND ("self-efficacy" OR "self-confidence" OR "self-esteem") AND ("parental influence" OR "parental support" OR "parental involvement" OR "family influence" OR "family support" OR "parenting style" OR "parental encouragement" OR "AI literacy" OR "artificial intelligence literacy" OR "AI competenc*")
Inclusion criteria	(i) Scopus-indexed article/review; (ii) empirical or review study on a career construct; (iii) measures self-efficacy, self-confidence, self-esteem and/or parental–family influence and/or AI literacy; (iv) student/learner or education-to-career population; (v) reports a research model and/or a measurement instrument
Exclusion criteria	Career outcome peripheral; population out of scope; topic unrelated; non-empirical without a framework; full text not retrievable
Records identified	107 (→ 96 after title/abstract screening → 81 retrieved → 79 included)

Study Selection

Study selection followed the PRISMA 2020 flow (Figure 1). All 107 titles and abstracts were screened independently by two reviewers against the eligibility criteria, and disagreements were resolved by a third senior reviewer. Inter-rater reliability was quantified with Cohen's κ (Cohen, 1960) and interpreted using the benchmarks of Landis and Koch (1977). Title and abstract screening excluded 11 records ($\kappa = .41$, indicating "moderate" agreement on the Landis and Koch benchmarks; percentage agreement = 88.8%), yielding 96 reports for full-text retrieval. Fifteen of these 96 reports (15.6%) could not be retrieved in full text despite searches of Scopus-linked full text, publisher websites, Google Scholar, and institutional and interlibrary channels; they are characterised by publication year and journal in Supplementary Appendix E. The remaining 81 full texts were assessed against the same criteria through the same dual-reviewer procedure; two were excluded ($\kappa = .32$, indicating "fair" agreement; percentage agreement = 95.1%): one because the career outcome was peripheral and no measurement instrument was reported, and one because the sample comprised working adults rather than students. Because inclusion prevalence was high, κ is strongly attenuated under the skewed marginal distributions; the 2×2 agreement tables, prevalence and bias indices, and the prevalence-adjusted bias-adjusted kappa (PABAK = .78 for title/abstract and .90 for full-text screening) are reported in Supplementary Appendix D. Seventy-nine studies were retained for synthesis.

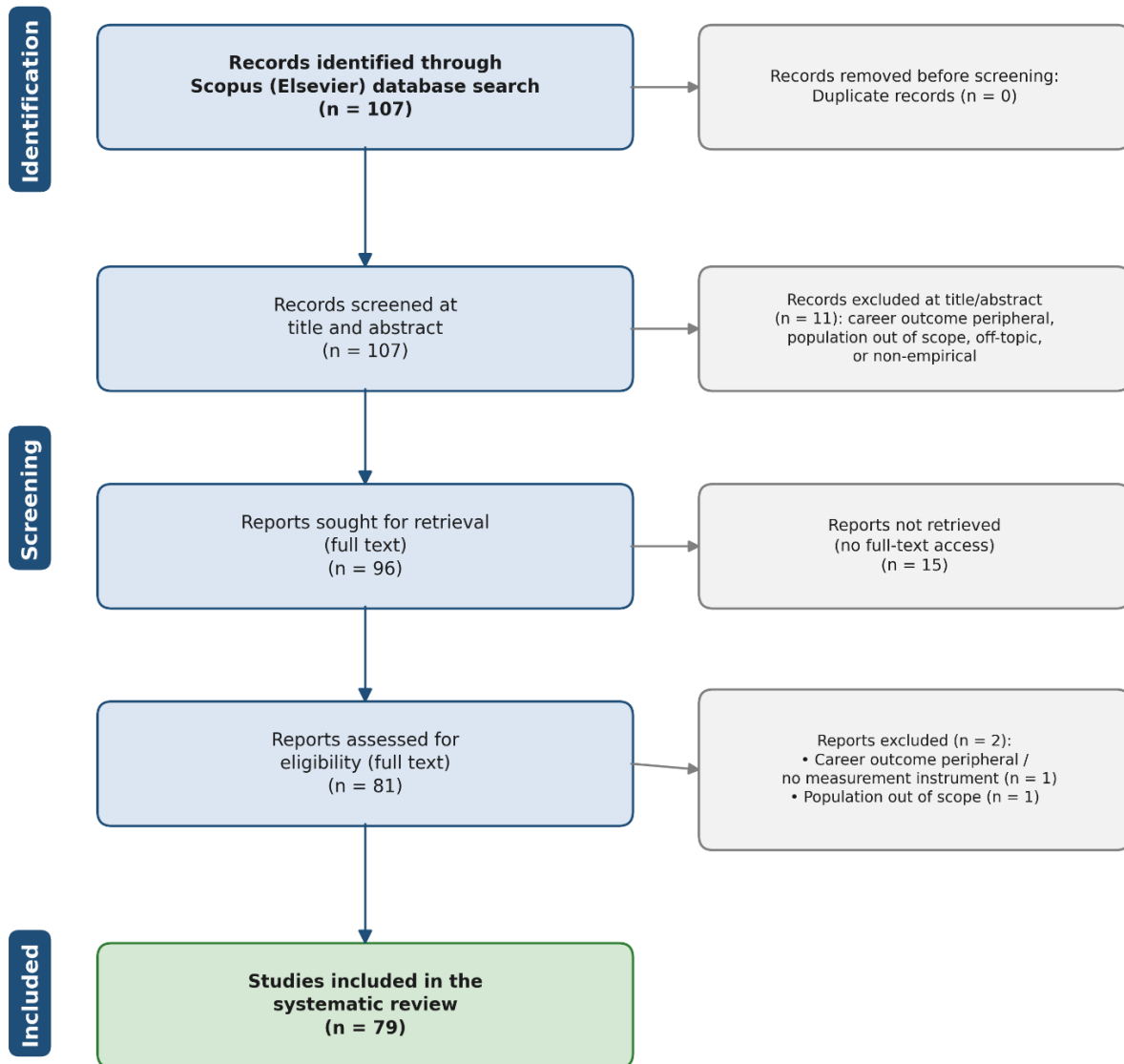
Data Extraction and Synthesis

Retrieved PDFs were converted to plain text, and a standardised template was applied to each study to extract authorship and year; country and educational context; design (quantitative, qualitative, or mixed; cross-sectional or longitudinal); population and sample size; theoretical framework; variables (independent, mediator, moderator, dependent); measurement instruments with reported internal consistency (Cronbach's α); analytical method; and key mediation findings. Two reviewers independently extracted data from all 79 studies using the shared template, and every field was verified against the source text by a second reviewer; discrepancies were reconciled by discussion, with a third senior reviewer consulted where necessary. Information not reported in a study was labelled as such rather than inferred. The complete extraction for all 79 studies is provided in Supplementary Appendix A, so that every count reported below can be traced to its source studies. Evidence was synthesised both narratively and quantitatively (frequency tabulation) around the five review questions, and instrument frequencies with usage counts and reliability (Cronbach's α) ranges were compiled into a register to address RQ3 (Table 4). Given the heterogeneity of designs, constructs, and outcomes, no effect-size meta-analysis was performed.

Risk-of-Bias (Methodological-Quality) Appraisal

The methodological quality of each included study was appraised to inform the strength of the review's conclusions (PRISMA 2020, items 11 and 18). Because the corpus is dominated by cross-sectional survey research, the primary appraisal tool was the AXIS tool for cross-sectional studies (Downes et al., 2016), applied to the 59 cross-sectional and, with the longitudinal items emphasised, the 12 longitudinal studies. The single qualitative study was appraised with the Joanna Briggs Institute (JBI) checklist for qualitative research, the three mixed-methods studies with the Mixed Methods Appraisal Tool (MMAT; Hong et al., 2018), and the four reviews/meta-analyses were treated as secondary syntheses and judged on the transparency and appropriateness of their own methods. Appraisal drew on the extracted study characteristics: design; sampling and sample size; the validity and reported internal consistency of the instruments; and the appropriateness of the statistical and mediation analyses, supplemented by the study reports. Items that could not be verified from the available information (for example, non-response characteristics or funding/ethics reporting) were recorded as unclear rather than assumed. Each study was assigned an overall level of methodological concern (low, moderate, or high). Consistent with the mapping purpose of the review, the appraisal is used to qualify the evidence, not to weight or exclude studies.

Figure 1
PRISMA 2020 Flow Diagram of the Study Selection Process



RESULTS

Overview and Characteristics of the Included Studies

The review synthesised 79 studies published between 2002 and 2026 (Figure 2). Quantitative designs overwhelmingly predominated: 59 studies (74.7%) were cross-sectional and 12 (15.2%) longitudinal, complemented by four reviews or meta-analyses (5.1%), three mixed-methods studies (3.8%), and one qualitative study (1.3%). Participants were predominantly adolescents and emerging adults. Classified by educational level, university and college samples were the most common (41 studies, 51.9%), followed by high-school samples (22, 27.8%) and middle/junior-secondary samples (8, 10.1%); five studies (6.3%) sampled secondary-vocational and technical (TVET) students specifically (e.g., Adha et al., 2026; Jiang et al., 2022; Timan et al., 2024), and three (3.8%) drew on mixed or cross-level populations (Table 2). Data were collected almost exclusively through self-report Likert questionnaires. Several studies deliberately targeted specific or under-represented populations, such as nursing and medical students (Alboliteh et al., 2022; Yu et al., 2023), STEM and computing majors, pre-service teachers (P. Li, 2026), first-generation and low-income students (Kantamneni et al., 2018), deaf and hard-of-hearing adolescents (Michael et al., 2013), and secondary-vocational trainees in school-to-work transition (Neuenschwander & Hofmann, 2022), broadening the evidence base beyond majority samples. Reported internal-consistency reliabilities were generally strong: among the 39 studies for which Cronbach's α could be extracted,

coefficients ranged from .63 to .97 (median .87), and 96% of the extracted coefficients met or exceeded the conventional .70 criterion. Sample sizes ranged from a small qualitative sample of 14 learners (Seabi et al., 2010) to a three-wave panel of 4,187 adolescents (Lim & You, 2019) and an 18-study meta-analysis pooling 61,201 participants (Son et al., 2025); the median sample size across the 69 primary studies reporting one was 381. The corpus was distributed across 34 journals but concentrated in established vocational-psychology outlets: the *Journal of Career Assessment* (13 studies), *Journal of Career Development* (8), *Career Development Quarterly* (8), *International Journal for Educational and Vocational Guidance* (7), and *Journal of Vocational Behavior* (6) together contributed 42 studies (53.2%). Samples were drawn from 22 national contexts, dominated by the United States (24) and China (17); five studies were conducted in Indonesia (Adha et al., 2026; Sawitri et al., 2014, 2015; Situmorang & Salim, 2021; Timan et al., 2024), including vocational-school samples directly comparable to the target population of this review. Table 2 summarises these characteristics.

Figure 2

Annual Distribution of the 79 Included Studies (2002–2026), With AI-Related Studies Highlighted

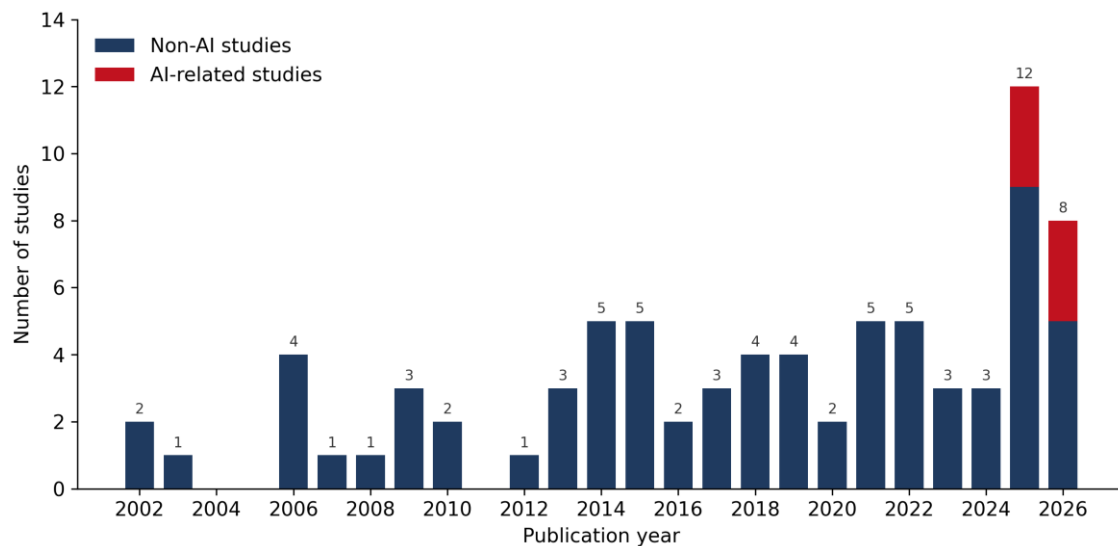


Table 2

Characteristics of the 79 Included Studies

Characteristic	Categories (n; %)
Design	Cross-sectional 59 (74.7); longitudinal 12 (15.2); review/meta-analysis 4 (5.1); mixed-methods 3 (3.8); qualitative 1 (1.3)
Educational level	University/college 41 (51.9); high-school 22 (27.8); middle/junior-secondary 8 (10.1); secondary-vocational/TVET 5 (6.3); mixed/cross-level 3 (3.8)
Publication period	2002–2009: 12 (15.2); 2010–2019: 29 (36.7); 2020–2026: 38 (48.1), of which 20 in 2025–2026
Geographic context (top)	USA 24; China 17; Indonesia 5; South Korea 4; Israel 4; remaining 25 across 17 further contexts (22 in total)
Leading journals	<i>Journal of Career Assessment</i> 13; <i>Journal of Career Development</i> 8; <i>The Career Development Quarterly</i> 8; <i>International Journal for Educational and Vocational Guidance</i> 7; <i>Journal of Vocational Behavior</i> 6
Sample size	Median 381 (range 14–4,187 across 69 primary studies reporting <i>N</i>); one meta-analysis pooled 61,201 participants
Reliability (Cronbach's α)	.63–.97 (median .87); 96% of extracted coefficients $\geq$.70 (39 studies with extractable α)

Publication and Geographic Trends (RQ1)

Scholarly output was sparse and intermittent through the 2000s but accelerated sharply over the past decade: only 12 studies (15.2%) appeared in 2002–2009 and 29 (36.7%) in 2010–2019, whereas 38 (48.1%) were published from 2020 onward, of which 20 studies, approximately one quarter of the entire corpus, appeared in

2025–2026 alone (Figure 2). Across this period, three thematic sub-streams are discernible. The first and largest is a long-standing core on parental support and career self-efficacy among adolescents and college students. The second is a STEM- and entrepreneurship-oriented stream that reframes the outcome as career or entrepreneurial intention (e.g., Aggarwal & Shrivastava, 2021; Timan et al., 2024). The third, and newest, is the AI stream: all six studies engaging AI-related constructs (AI literacy, AI awareness, AI attitudes, or AI anxiety) were published in 2025–2026. These studies comprised Duan et al. (2026; AI anxiety and career decisions), J. Zhang et al. (2026; AI awareness and employability), R. Li et al. (2025; AI attitudes and AI literacy with job-seeking anxiety), Ho and Le (2026; AI literacy and career expectations), El-Sayed et al. (2025; AI literacy and career-and-talent self-efficacy), and the family-based AI-literacy intervention of Ding and Holland (2025).

The dependent variable itself diversified over time. The earliest studies framed the outcome as career maturity or career aspirations, for instance, career role models and self-confidence in British adolescents (Flouri & Buchanan, 2002) and social-cognitive predictors of Mexican American women's career choices (Flores & O'Brien, 2002). From the mid-2010s, career decision-making, career adaptability, and career identity became increasingly common outcomes, mirroring the ascendancy of Career Construction Theory, before employability and AI-related career expectations entered the newest cohort (Ho & Le, 2026; J. Zhang et al., 2026). Geographically, the base broadened from predominantly North American samples in the 2000s to a pronounced rise in East- and Southeast Asian samples, particularly China, after 2015, alongside large cross-national assessments such as a PISA-based analysis spanning 78 education systems (Guo, 2025). Even so, the field remained anchored in two national contexts: together the United States and China accounted for 41 studies (51.9%), underscoring the comparative scarcity of evidence from Southeast Asian vocational settings and the value of the five Indonesian studies for this review.

Theoretical Frameworks (RQ2)

A single tradition dominated the corpus. Social Cognitive Career Theory (SCCT) was the primary framework in 43 studies (54.4%), and the broader social-cognitive family—SCCT together with Bandura's social-cognitive theory—accounted for 55 studies (69.6%) (Table 3). Consistent with SCCT's causal logic, parental influence entered these models predominantly as a distal or proximal contextual support that shapes Bandura's sources of self-efficacy (mastery experience, vicarious learning, verbal persuasion, and affective states) and, through them, outcome expectations, career goals, and actions (Ginevra et al., 2015; Kantamneni et al., 2018). In collectivist settings, this contextual role was frequently refined through culturally specific constructs—adolescent–parent career congruence and filial piety—which condition how parental expectations are internalised (S. Guan et al., 2025; Sawitri et al., 2014). Career Construction Theory was the next most common framework (4 studies), typically positioning career adaptability alongside self-efficacy as a mediator (Jiang et al., 2022; P. Li, 2026). Remaining frameworks were sparse: Bronfenbrenner's ecological systems model (3 studies; e.g., Aggarwal & Shrivastava, 2021), the Theory of Planned Behavior (2 studies, in entrepreneurship-career contexts; Adha et al., 2026; Timan et al., 2024), and single applications of Self-Determination Theory and Relational Career Theory; 13 studies (16.5%) used study-specific models without a single named theory.

Across SCCT applications, two modelling strategies recurred: fully or partially mediated models in which contextual supports predicted career goals only indirectly, through self-efficacy and outcome expectations (Ginevra et al., 2015; Kim et al., 2016), and moderated-mediation models that tested whether cultural or dispositional variables conditioned these indirect paths (M. Guan et al., 2016; Y. Wang, 2023). A minority of studies complicated the canonical direction, reporting reciprocal parent–child effects or configural interactions, signalling that the parental-influence pathway, while robust, is not strictly unidirectional. Crucially, the emerging AI-and-career studies did not propose a new paradigm but extended existing ones, integrating the Technology Acceptance Model with SCCT (Ho & Le, 2026) or applying social-cognitive theory to AI awareness (J. Zhang et al., 2026), indicating that AI literacy can be incorporated within the SCCT architecture rather than requiring a separate theoretical apparatus. This convergence provides a defensible theoretical scaffold for the proposed model; it also implies that AI literacy is most parsimoniously modelled as an additional learning experience feeding self-efficacy, rather than as a competing direct predictor of career choice.

Table 3
Primary Theoretical Framework of the 79 Included Studies

Theoretical framework	Studies (n)	% of 79
Social Cognitive Career Theory (SCCT)	43	54.4
Social-cognitive theory (Bandura)	12	15.2
Social-cognitive family subtotal (SCCT + SCT)	55	69.6
Career Construction Theory	4	5.1
Bronfenbrenner ecological-systems model	3	3.8
Theory of Planned Behavior	2	2.5
Self-Determination Theory	1	1.3
Relational Career Theory	1	1.3
Study-specific / no single named theory	13	16.5
Total	79	100

Measurement Instruments (RQ3)

The maturity of measurement differed markedly across the four target constructs (Table 4). Career self-confidence was the most standardised: the Career Decision-Making/Decision Self-Efficacy Scale (CDMSE/CDSE), most often in its 25-item short form, was by a wide margin the most frequently employed instrument, applied across educational levels and cultures (Alexander & Harris, 2022; Mao et al., 2017; Stringer & Kerpelman, 2014), with reported internal-consistency coefficients typically in the .85–.95 range. Where self-confidence was operationalised more dispositionally as self-esteem, the 10-item Rosenberg Self-Esteem Scale was standard (Lim & You, 2019; Marcionetti & Rossier, 2017); a general self-efficacy scale was preferred where the outcome was a broad career decision such as willingness to enter a profession (Yu et al., 2023). Parental influence was likewise well served by validated multidimensional tools, chiefly the Career-Related Parent Support Scale, which distinguishes instrumental assistance, career-related modelling, verbal encouragement, and emotional support (M. Guan et al., 2016; Michael et al., 2013; Olle & Fouad, 2015), and the Family Influence Scale, which captures informational and financial support, family expectations, and family values/beliefs (Kim et al., 2016; Koçak et al., 2021; Michael, 2026). Of particular relevance to vocational settings in Indonesia, the Adolescent–Parent Career Congruence Scale, developed in Indonesia and distinguishing supplementary from complementary congruence, was adopted across several national settings (Sawitri et al., 2014; Wen et al., 2026).

Table 4
Measurement Instruments by Target Construct, With Usage Frequency and Reliability

Target construct	Predominant instrument(s)	Studies (n) [†]	Reported α range [‡]
Self-confidence (career)	Career Decision(-Making) Self-Efficacy Scale (CDMSE/CDSE)	54	.69–.97
Self-confidence (general)	General Self-Efficacy Scale (Sherer/Schwarzer)	8	.77–.91
Self-esteem	Rosenberg Self-Esteem Scale	3	.86–.95
Parental influence	Career-Related Parent Support Scale (Turner et al., 2003)	23	.73–.94
Parental influence	Family Influence Scale (Fouad et al., 2010)	9	.81–.97
Parental congruence	Adolescent–Parent Career Congruence Scale (Sawitri et al., 2014)	10	.71–.95
Parenting style	Parental Authority Questionnaire (Buri, 1991)	4	.78–.94
Career adaptability	Career Adapt-Abilities Scale (Savickas & Porfeli, 2012)	35	.90–.97
Career maturity	Career Maturity Inventory/Scale	4	.72–.93
Career exploration	Career Exploration Survey (Stumpf et al., 1983)	4	.69–.94

Target construct	Predominant instrument(s)	Studies (<i>n</i>) [†]	Reported α range [‡]
AI literacy	Heterogeneous, newly constructed AI-literacy/AI-awareness scales	6	.89–.93

Note. [†]*n* = number of the 79 full texts in which the instrument appears (instrument register; some studies used more than one instrument). [‡]Range of reported Cronbach's α across those studies, from the data extraction (Supplementary Appendix A); some coefficients are subscale-level.

Career outcomes were operationalised heterogeneously, encompassing career choice and decision-making, career maturity (Lim & You, 2019), career adaptability (T. Wang et al., 2024), career identity (Stringer & Kerpelman, 2014), and career indecision (Y. Wang, 2023); these were captured by dedicated tools such as the Career Maturity Inventory, the Career Adapt-Abilities Scale, the Vocational Identity Measure, and the Career Exploration Survey. By contrast, AI literacy had no established measure: the six AI-related studies each relied on a different, recently constructed scale (2023–2026), ranging from a four-item AI-awareness scale (J. Zhang et al., 2026) and a purpose-built AI-literacy test embedded in an intervention (Ding & Holland, 2025) to AI-literacy scales adapted for higher-education and nursing samples, the latter reporting strong reliability ($\alpha = .93$; El-Sayed et al., 2025; Ho & Le, 2026; R. Li et al., 2025). This fragmentation identifies AI-literacy measurement as the principal instrument-development challenge for subsequent empirical work.

Analytical Methods and the Mediating Role of Self-Confidence (RQ4)

Analytical practice was strongly model-based (Table 5). Covariance-based structural equation modelling or path analysis was used in 44 studies and partial least squares structural equation modelling (PLS-SEM) in a further five, while 24 studies employed hierarchical or multiple regression and three used logistic regression for dichotomous career outcomes (Yu et al., 2023). Indirect (mediating) effects were most commonly evaluated by bootstrapping (21 studies), supplemented by the PROCESS macro (4) and the Sobel test (3). Because studies frequently applied more than one method, these counts exceed 79; each is expressed relative to the 79-study denominator in Table 5. This methodological profile aligns closely with the SEM-based analytical plan envisaged for confirmatory work.

Table 5
Analytical Approaches Across the 79 Studies

Analytical approach	Studies (<i>n</i>)	% of 79
CB-SEM / path analysis	44	55.7
Regression (hierarchical/multiple)	24	30.4
Bootstrapping (indirect effects)	21	26.6
Correlation	9	11.4
PLS-SEM	5	6.3
PROCESS macro	4	5.1
Qualitative / thematic analysis	4	5.1
Sobel test	3	3.8
Logistic regression	3	3.8
Meta-analysis	1	1.3

Note. Studies may apply more than one method; counts therefore exceed 79.

Most importantly for the mediation logic under investigation, 41 of the 79 studies explicitly specified a mediator, and in 33 of these (80.5%) the mediator was a self-confidence construct (career decision self-efficacy, general self-efficacy, self-esteem, or psychological capital). Self-confidence repeatedly transmitted the effect of parental influence onto career outcomes: parental support operated on adolescents' career choices through perceived support and career self-efficacy (Ginevra et al., 2015); parental authority mediated the self-efficacy–career-choice link among nursing students (Alboliteeh et al., 2022); career decision self-efficacy mediated social-support effects on career adaptability (T. Wang et al., 2024); thinking styles carried parenting-style effects onto

career decision self-efficacy in an Indonesian sample (Situmorang & Salim, 2021); and, in a collectivist model, self-efficacy influenced the discrepancy between individual- and parent-set career goals via filial piety (S. Guan et al., 2025). Beyond the parental pathway, career adaptability accounted for a substantial share of the AI-anxiety effect on career decisions (Duan et al., 2026), and vocational outcome expectations partially mediated the self-efficacy–career-identity link among medical students (Chen et al., 2025).

The magnitude and shape of these effects were often developmentally contingent and moderated. Longitudinal designs corroborated the temporal ordering from support to self-efficacy to outcomes (Chang et al., 2024), and a meta-analysis confirmed self-esteem and social support as robust developmental predictors of career maturity (Son et al., 2025), while the single qualitative study reached convergent conclusions regarding parental verbal encouragement (Seabi et al., 2010). Moderators included traditionality beliefs (M. Guan et al., 2016), parent–adolescent expectation congruence under overparenting (Y. Wang, 2023), and parental support itself, which attenuated the relationship between self-efficacy and person–job fit among Swiss vocational trainees (Neuenschwander & Hofmann, 2022). The evidence was not uniform: some studies reported that career decision self-efficacy did not mediate the parental-support–indecision link in most respects (Mao et al., 2017), that parental support predicted outcome expectations rather than self-efficacy directly (Olle & Fouad, 2015), and even that parental support correlated negatively with career-exploration behaviours among middle-school students (Şen-Baz, 2026). On balance, and for the studies that operationalise self-confidence, the corpus provides reasonably consistent, though not invariant, support of moderate methodological certainty (see the risk-of-bias appraisal in Methods) for positioning self-confidence as the mediator between parental influence and career choice. The recurrence of partial rather than full mediation across many of these studies further suggests that parental influence retains a direct effect on career outcomes alongside its indirect, self-efficacy-mediated pathway, an ordering that confirmatory work can test explicitly.

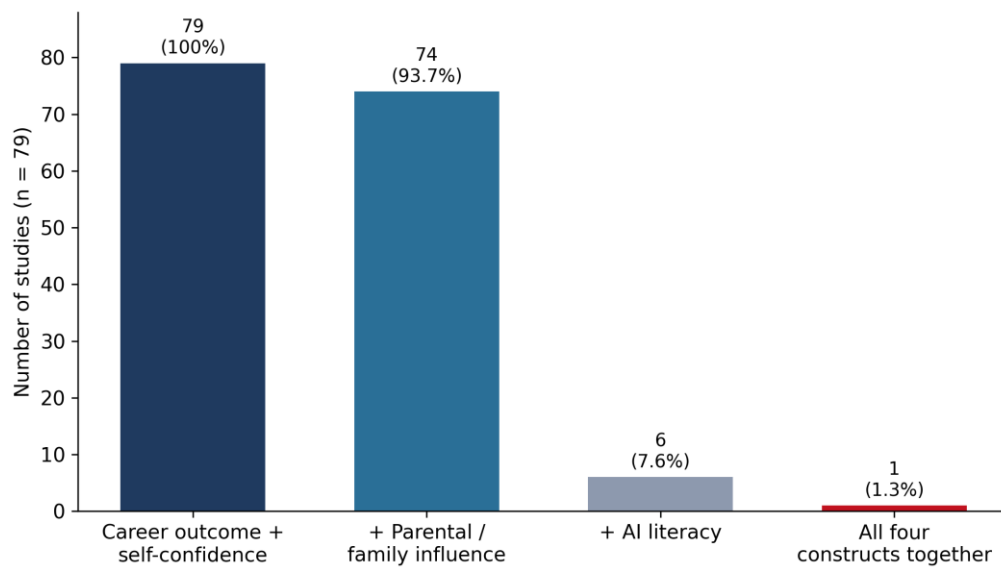
Joint Coverage of the Four Constructs and the Research Gap (RQ5)

Mapping the four target constructs across the corpus revealed a pronounced imbalance (Figure 3, Table 6). A career outcome combined with self-confidence formed the empirical core of the field, present in all 79 studies, and 74 studies (93.7%) additionally incorporated parental or family influence, confirming the maturity of the parental-influence → self-confidence → career pathway. AI literacy (or a closely related AI construct), by contrast, was examined in only six studies (7.6%), and its intersection with parental influence occurred in just one. The six AI-related studies illustrate both the variety and the limited depth of current AI-related research: two modelled AI awareness or attitudes together with career education as predictors of employability or job-seeking anxiety through self-efficacy (R. Li et al., 2025; J. Zhang et al., 2026); two linked AI literacy to career and talent self-efficacy or to career expectations (El-Sayed et al., 2025; Ho & Le, 2026); one examined AI anxiety and career decisions via career adaptability (Duan et al., 2026); and one delivered a family-based AI-literacy intervention (Ding & Holland, 2025).

Table 6
Coverage of the Four Target Constructs Across the 79 Studies

Construct combination	Studies (<i>n</i>)	% of 79
Career outcome + self-confidence (core dyad)	79	100
+ Parental / family influence (no AI)	74	93.7
+ AI literacy (no parental influence)	6	7.6
All four constructs together (target model)	1	1.3

Note. The single all-four study (Ding & Holland, 2025) measured a career-related construct, children’s career interest, rather than career choice as defined in this review, and did so within a family-based board-game intervention rather than a structural model. It is counted in the all-four cell on the basis of that career-interest measure; this coding decision, together with its intervention design, is precisely why it is treated throughout as illustrating rather than closing the gap. Excluding it leaves zero studies measuring all four constructs, which strengthens rather than weakens the coverage finding.

Figure 3*Coverage of the Four Target Constructs Across the 79 Included Studies*

Notably, even within these six studies, self-confidence, operationalised as self-efficacy or employability confidence, consistently served as the linking mechanism between AI constructs and career outcomes (Ho & Le, 2026; R. Li et al., 2025; J. Zhang et al., 2026), which is precisely the mediating role posited for the proposed model; what remains absent is the simultaneous inclusion of parental influence as a second antecedent within that AI-era model. Within this corpus, no study modelled AI literacy and parental influence jointly as antecedents of career choice with self-confidence as the mediator. Indeed, the sole study to measure all four constructs together (Ding & Holland, 2025) did so through an exploratory family-based AI-literacy board game for children rather than a structural model of student career choice. This distribution, summarised in Table 6 and visualised in Figure 3, delineates a narrowly defined but important research gap that the proposed model is designed to address. It must be emphasised that this gap is established within the reviewed corpus and among studies that explicitly measure self-confidence; because the search anchored on a self-confidence term and drew on a single database, the finding bounds, rather than proves, the absence of such models in the wider literature (see Limitations and Future Research). Framed against the four-construct model, the corpus is therefore mature on the parental and self-confidence dimensions, nascent on the AI dimension, and lacks evidence on their joint operation, an evidentiary pattern that both motivates the model's novelty and supplies the validated instruments and social-cognitive scaffold on which an empirical model can be built.

DISCUSSION

This review set out to map the research trends, theoretical frameworks, measurement instruments, and analytical methods linking AI literacy, parental influence, and self-confidence to students' career choices, and to establish whether the four constructs have been examined jointly within the reviewed evidence. Three principal findings emerged: the literature on parental influence and self-confidence as antecedents of career outcomes is relatively established and theoretically consolidated; AI literacy is a very recent and still-fragmented addition to this field; and within this corpus no study has yet integrated the two antecedent families within a single mediation model. Each finding is discussed below against the wider, most recent evidence, before the theoretical and practical implications are drawn.

The Parental Influence–Self-Confidence–Career Pathway

The dominance of self-confidence as the mediating mechanism, identified in 33 of the 41 studies that specified a mediator, aligns with the wider contemporary literature: recent meta-analyses confirm that family support is robustly associated with career adaptability (Uygun Karakuş et al., 2026; Z. Wang & Dong, 2024) and that social support predicts adaptability across cultures (Stead et al., 2026), consistent with SCCT's prediction that contextual supports influence career goals chiefly by shaping self-efficacy and outcome expectations (Lent et al., 1994,

2000). What matters for interpretation, however, is not the modal finding but its boundary conditions. Several studies reported only partial mediation, non-significant mediation, or culturally moderated effects: self-efficacy operating through filial piety in a collectivist sample (S. Guan et al., 2025), thinking styles transmitting parenting-style effects in Indonesia (Situmorang & Salim, 2021), and, most strikingly, parental support correlating negatively with career exploration among middle-school students (Şen-Baz, 2026) or predicting outcome expectations rather than self-efficacy directly (Olle & Fouad, 2015). This heterogeneity implies that parental influence retains a direct effect on career outcomes alongside its self-efficacy-mediated pathway, and that the pathway is context-sensitive rather than universal. For a study situated in Indonesian vocational (SMK) education, where career-related parental support predicts vocational students' life satisfaction and proactive behaviour (Zeng et al., 2024), this argues for a model that retains direct paths and tests cultural moderators rather than assuming full mediation, supporting the need for confirmatory modelling rather than further exploratory description.

AI Literacy as an Emergent Career Antecedent

In sharp contrast, AI literacy is a nascent career antecedent: all six AI-related studies identified in this corpus were published in 2025–2026, tracking the broader labour-market context in which AI is reshaping the skills demanded of graduates (Cheng et al., 2025) and positioning AI competence as a component of career sustainability and person–job fit (Ahmad & Bilal, 2025). Two features bear on interpretation. First, its measurement base is unsettled: each of the six studies used a different, recently constructed instrument, and the wider field offers further competing scales (B. Wang et al., 2023), so any empirical extension must treat AI-literacy measurement as a design problem in its own right rather than adopting an off-the-shelf standard. Second, and more consequentially, these studies independently route the effect of AI constructs on career outcomes through self-efficacy or employability confidence (Duan et al., 2026; El-Sayed et al., 2025; Ho & Le, 2026; R. Li et al., 2025; J. Zhang et al., 2026). That an emerging literature converges on the same mediating mechanism identified for the mature parental pathway is a substantive, not incidental, finding: it suggests that self-confidence is a common conduit through which heterogeneous antecedents, old and new, reach career decisions, and it is the empirical warrant for treating the two antecedent families within one mediation model.

Theoretical Implications: An Integrative SCCT-Based Model

Taken together, these patterns support a specific theoretical move: incorporating AI literacy into the SCCT architecture as an additional learning experience that feeds self-efficacy, rather than treating it as a rival, stand-alone predictor of career choice. Because SCCT already accommodates contextual supports and learning experiences as distal inputs to self-efficacy (Lent et al., 1994, 2000), and because both the parental and AI streams empirically transmit their effects through self-confidence, the theory can absorb the AI-era antecedent without structural revision.

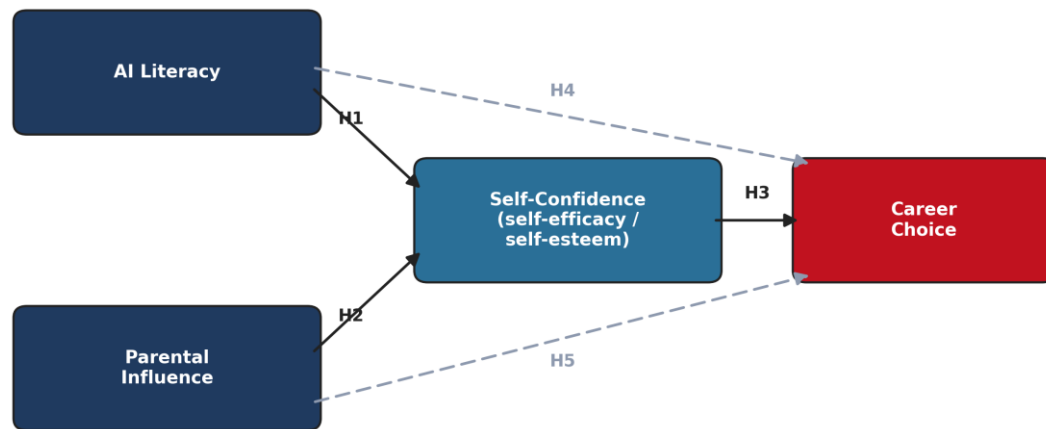
This synthesis motivates a specific, testable framework rather than a tested model. Figure 4 presents a conceptual framework, proposed for future confirmatory testing, comprising five hypothesised paths: AI literacy is positively associated with self-confidence (H1); parental influence is positively associated with self-confidence (H2); self-confidence is positively associated with career choice (H3); and, consistent with the recurrent partial-mediation evidence, AI literacy (H4) and parental influence (H5) retain direct associations with career choice alongside their indirect, self-confidence-mediated paths. The framework is offered as a hypothesis-generating device; no data are presented here to test it, and the H1–H5 labels denote proposed rather than tested relationships.

The place of AI literacy within this architecture is theoretically non-trivial and admits at least three readings. Modelled as a distal learning experience, AI literacy would feed self-efficacy in the classic SCCT manner (H1); this is the most parsimonious reading and the one that the reviewed AI studies support. Alternatively, AI literacy may operate as a proximal contextual affordance: an environmental resource acting close to the decision point that shapes outcome expectations and career choice more directly (strengthening H4). A third possibility is that AI literacy functions as a moderator, conditioning how other supports translate into confidence (e.g., by amplifying the self-efficacy returns to parental encouragement in technology-intensive fields). These readings are not mutually exclusive, and adjudicating among them—input versus affordance versus moderator—is itself a worthwhile empirical contribution that the proposed framework makes tractable.

This framework is the review's principal conceptual contribution: it unifies a mature and an emergent antecedent under one well-validated theory and specifies the mechanism—self-confidence—that the corpus most

consistently supports, while responding to the bounded research gap identified under Joint Coverage of the Four Constructs and the Research Gap. Consistent with career-construction accounts that pair adaptability with self-efficacy (Savickas & Porfeli, 2012) and with congruence-based models of vocational identity in Asian samples (Wen et al., 2026), it provides a defensible starting point for confirmatory testing within this corpus's evidentiary boundaries.

Figure 4
Conceptual Framework Proposed for Future Confirmatory Testing



Solid arrows = hypothesised indirect (mediated) paths; dashed arrows = hypothesised direct paths

Note. AI literacy and parental influence → career choice, mediated by self-confidence. H1–H5 denote proposed, not tested, paths.

Practical Implications

Three implications follow for science and engineering education in vocational settings. First, because self-confidence is the pivotal mechanism, AI-literacy instruction within science, technology, and engineering subjects in SMK/TVET should be designed to build students' confidence in using AI, through mastery experiences, scaffolded projects, structured career planning, and formative feedback, rather than merely transmitting technical content, since it is the confidence-building function, not exposure alone, that the evidence links to career outcomes (Duan et al., 2026; Shu et al., 2024; Zeng et al., 2024). Second, embedding AI literacy in science and engineering curricula is a career-development lever, not only a technical upgrade: framed to raise students' confidence rather than to amplify AI anxiety (Duan et al., 2026), AI-literacy instruction can support entry into science- and engineering-intensive pathways, consistent with evidence that supportive learning environments raise vocational and entrepreneurial career intentions among vocational students (Adha et al., 2026; Aggarwal & Shrivastava, 2021; Timan et al., 2024). Third, for measurement and curriculum evaluation, the review provides a ready toolkit of validated instruments for self-confidence (career decision self-efficacy measures) and parental influence (the Career-Related Parent Support Scale of Turner et al., 2003; the Adolescent–Parent Career Congruence Scale of Sawitri et al., 2014), whereas AI literacy will require careful adaptation and local validation of a recent instrument for science-and-engineering vocational samples (B. Wang et al., 2023). Engaging families alongside AI-literacy instruction, for instance through family-facing activities of the kind piloted by Ding and Holland (2025), may further strengthen the confidence pathway into science and engineering careers. The prominence of an Indonesian-developed congruence scale (Sawitri et al., 2014) is particularly convenient for SMK settings.

Limitations and Future Research

Several limitations qualify these conclusions, the most important of which concerns the review's central coverage finding (RQ5). Because the Boolean query required a self-confidence term in every record and drew on a single database (Scopus), studies that link AI literacy to career outcomes through other mechanisms, or that are indexed elsewhere, were excluded by construction. The conclusion that AI literacy and parental influence have not been jointly modelled is therefore established within this corpus and among studies that explicitly measure self-confidence, and should be read as bounded rather than as proof of absence in the wider literature. A second,

separate query without the self-confidence block, run across at least two databases (e.g., Scopus with Web of Science, ERIC, or PsycINFO) and supplemented by backward and forward citation chasing on the six AI studies, is a priority for confirmatory work and would test the robustness of this gap. Reliance on English-language records may also have excluded relevant work published in other languages, and 15 eligible reports (15.6% of those sought) could not be retrieved; the resulting corpus, while sufficient to map the field, is not exhaustive. Because inclusion prevalence was high, inter-rater agreement is better represented by percentage agreement and PABAK than by the prevalence-attenuated kappa. Finally, the review is a descriptive mapping review with methodological-quality appraisal, not a quantitative meta-analysis, so it characterises the shape and quality of the evidence but not pooled effect sizes. These limitations point to a clear research agenda. The immediate priority is a confirmatory, SEM-based test of the framework in Figure 4 among vocational (SMK) students, incorporating a locally validated AI-literacy measure and modelling both indirect and direct effects. Subsequent work could extend the model longitudinally, consistent with the transactional dynamics reported by Zhou et al. (2024), and cross-culturally, to establish whether the self-confidence mechanism generalises as the AI-and-career literature matures beyond its current early stage.

CONCLUSIONS

This systematic review synthesised 79 Scopus-indexed studies (2002–2026) on the links between AI literacy, parental influence, self-confidence, and students' career choice, each appraised for methodological quality. It reveals a relatively established and theoretically consolidated literature on parental influence and self-confidence as antecedents of career outcomes. The field is dominated by the social-cognitive family of theories, with Social Cognitive Career Theory adopted in 43 of the 79 studies and the broader social-cognitive tradition, including Bandura's social-cognitive theory, appearing in 55 studies. Methodologically, structural equation modelling is the predominant analytical approach, and self-confidence, particularly career decision self-efficacy, emerges as the most recurrent mediating mechanism, identified in 33 of the 41 studies that specified a mediator.

Against this backdrop, AI literacy is a nascent antecedent: it appears only in studies published in 2025–2026 and is measured with heterogeneous, non-standardised instruments, yet these emerging studies converge on the same self-confidence mechanism. Within this corpus, although parental influence and self-confidence co-occur in 74 of the 79 studies, only one study measured all four constructs together, and none modelled AI literacy and parental influence jointly as antecedents of career choice through self-confidence. The review's contribution is therefore to consolidate the theoretical framework (SCCT), the validated instruments, and the analytical approach (SEM with bootstrapped indirect effects) needed to test such an integrative model, and to locate, within the bounds of this corpus, the precise gap it would fill. This provides an evidence-based foundation for confirmatory research and for AI-literacy instruction in science and engineering vocational education, for the students most exposed to AI-driven labour-market change.

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