Psychological Capital as a Mediator Between Social Support and Perceived Employability in Technology-Enhanced Higher Education: Empirical Evidence from Chinese Graduates

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Manuscript received August 11, 2025; revised September 1, 2025; accepted September 24, 2025; published February 5, 2026

***Abstract*—As mobile learning and AI technologies become increasingly integrated into higher education, this study explores how digitally mediated social support shapes university graduates' perceived employability through Psychological Capital (PsyCap). Drawing on Social Cognitive Career Theory (SCCT) and Social Presence Theory (SPT), the study conceptualizes digitally interactive environments—including mentorship apps, AI-powered career tools, and online peer communities—as technology-enabled career support systems that deliver career-relevant social support. Data were collected from 486 final-year undergraduates in Chengdu, Sichuan. A stratified purposive sampling strategy was employed, and responses were collected using an online questionnaire distributed through Wenjuanxing. The dataset was analyzed with Partial Least Squares-Structural Equation Modeling (PLS-SEM). Findings indicated that social support from family, friends, and significant others positively affected perceived employability, with psychological capital functioning as a significant mediator. Among the three sources, support from significant others demonstrated the strongest total effect, thereby highlighting the differentiated roles of social support in digitally interactive settings. This study contributes by integrating SCCT with SPT to explain how social support enhances perceived employability through psychological capital in technology-enhanced higher education. The findings propose a technology-informed framework for promoting graduates' perceived employability and provide practical implications for designing digitally responsive support systems that foster psychological resources and strengthen digital talent development in higher education.**

***Keywords*—digital talent development, educational technology, mobile learning, online career support systems, perceived employability, psychological capital, social cognitive career theory, social presence theory, social support**

I. Introduction

In the evolving landscape of digital transformation, cultivating digitally competent and psychologically resilient talent has become a central priority for national employment strategies and organizational development [1, 2]. University graduates, however, increasingly encounter challenges in navigating employment markets characterized by automation, algorithmic recruitment, and virtual workplaces [2]. These shifts have not only intensified the demand for advanced technical skills but also amplified uncertainties and psychological pressures during the career transition process. At the same time, career development is increasingly reshaped by digitally interactive environments that redefine how graduates access psychological and social resources [3–6]. However, the ways in which digitally interactive environments influence employability remain insufficiently explored, thereby indicating a critical research gap.

Although previous research has emphasized the importance of digital and technical skills, recent studies indicate that deeper underlying issues must be addressed: many graduates remain ill-equipped to navigate employment uncertainty due to insufficient psychological resources, consisting of hope, Optimism (OP), Resilience (RE), and Self-Efficacy (SE), which are collectively defined as Psychological Capital (PsyCap), especially within digitally interactive contexts [7–9]. Building on Social Cognitive Career Theory (SCCT) proposed by Lent *et al*. [10] and Lent *et al*. [11], prior studies have focused on the interplay between self-efficacy and employability [7, 8, 12]; however, limited attention has been directed toward PsyCap as a higher-order construct and its integrative role in employability development. This gap emphasizes the value of further research into how PsyCap, as a composite resource, shapes graduates' career outcomes.

Meanwhile, traditional forms of social support have undergone profound transformations. As face-to-face interactions diminish and digitally enhanced communication becomes dominant, the nature and effectiveness of social support are being reshaped. Digitally interactive environments—such as online mentorship apps, AI-powered career tools, and virtual communities—have broadened the channels through which graduates access emotional and career-related support [6, 13]. These evolving modes of interaction not only increase access to guidance and career opportunities but also reshape the emotional dynamics and overall effectiveness of social support provision [4, 14–17]. While previous research has addressed social support in a general sense [5, 18–20], limited studies have differentiated among its three dimensions—Family (FA), Friends (FR), and Significant Others (SO). Given the accelerated rise of digitally interactive platforms, understanding how these distinct forms of social support operate within digital contexts remains an important research gap. Accordingly, this study defines the contextualized support experience as digitally adapted social support. It retains the original three dimensions of social support as defined in the Multidimensional Scale of Perceived Social Support (MSPSS) by Zimet *et al.* [18]. By situating these dimensions explicitly within digitally interactive environments, the study addresses this gap by analyzing the dynamic and intensifying functions of family, friends, and significant others.

Drawing on SCCT, this study investigates how different forms of social support influence graduates' perceived

employability through PsyCap. Unlike conventional applications of SCCT, this research integrates Social Presence Theory (SPT) to elucidate how digitally interactive platforms strengthen perceptions of social closeness, thereby amplifying the influence of social support on PsyCap and perceived employability. Accordingly, this study aims to examine how social support from family, friends, and significant others influences perceived employability, and to assess the role of PsyCap as an integrated mediating construct in these relationships. To achieve these objectives, the study addresses two research questions: (1) How does social support from family, friends, and significant others affect graduates' perceived employability in digitally interactive contexts? (2) To what degree does PsyCap mediate the association between social support and perceived employability?

The novelty of this study can be summarized in four key contributions. First, this study extends the application of SCCT to digitally mediated support environments by integrating SPT. This integration addresses an existing gap in explaining how digitally transmitted social support fosters PsyCap and employability, thereby advancing theoretical understanding in technology-enhanced educational contexts. Second, this study conceptualizes and empirically validates PsyCap as an integrated construct in explaining employability, thus extending SCCT beyond its conventional focus on self-efficacy. Third, this study conducts a differentiated analysis of the three sources of social support, namely family, friends, and significant others. This study examines their distinct direct and indirect effects on PsyCap and perceived employability within China's digitally enhanced career development environment. Fourth, this study provides contextual and timely insights by situating the analysis within the acceleratedly digitizing employment landscape of China. Accordingly, this study offers applied insights for policymakers, universities, and digital platform designers to enhance graduates' perceived employability.

II. Literature Review

A. Perceived Employability in Digitally Interactive Labor Markets

Conventionally, employability has been defined as a combination of skills, attributes, and capabilities that enhance individuals' likelihood of securing and maintaining employment [21, 22]. Over time, this concept has evolved to emphasize adaptability within dynamic labor markets, particularly under the impact of digitalization [23]. More recent research highlights perceived employability, defined as an individual's belief in their potential to obtain and sustain employment [24, 25]. Rothwell *et al*. [24] further distinguished perceived employability into two dimensions: internal employability, representing personal confidence in one's skills, adaptability, and overall professional value; and external employability, referring to perceptions shaped by organizational reputation and market demand.

In the current digitally interactive environment, graduates' perceived employability increasingly demands a combination of psychological resilience and digital competencies. The rise of artificial intelligence and digitally interactive technologies has significantly shifted labor market requirements from fixed qualifications towards more dynamic skills, such as virtual collaboration, digital content creation, and complex problem-solving [23, 26, 27]. Consequently, graduates must master digitally interactive tools, adapt swiftly to remote work contexts, and leverage digital professional networks to enhance perceived employability [28]. In today's digitally interactive labor market, graduates need more than technical competencies. Moreover, they must also develop PsyCap to manage uncertainty and rely on social support to access emerging opportunities [29]. Hence, it is crucial to understand how PsyCap and social support interactively influence perceived employability in digitally interactive labor markets.

B. Theoretical Framework: Integration of SCCT and SPT

SCCT posits that environmental factors impact career outcomes directly through social reinforcement and indirectly by enhancing psychological resources such as self-efficacy and outcome expectations [10]. Building on this premise, the present study proposes that social support exerts both direct and indirect effects on graduates' perceived employability. According to SPT, the immediacy and emotional richness of digital media further enhance the impact of social support by fostering emotional engagement and rapid interaction [30, 31]. Thus, this study integrates SCCT with SPT, which suggests that digitally interactive platforms amplify the perceived emotional closeness and immediacy of interactions, thereby heightening the effectiveness of social support [32–34].

Although the integration of SCCT and SPT remains underexplored, recent SCCT-based studies in digitally interactive environments [35], together with foundational models [17, 36], collectively offer theoretical grounding. Therefore, this study proposes a unified framework illustrating how social support in digitally interactive environments —such as online mentoring apps, virtual communities, and professional digital platforms—can directly and indirectly enhance perceived employability through PsyCap.

Moreover, existing literature often conceptualizes social support as a singular construct and thereby overlooks the differentiated roles provided by family, friends, and significant others, particularly in digitally interactive career settings [3, 20, 37]. Drawing on the MSPSS by Zimet *et al.* [18], this study explicitly investigates how the three distinct sources of social support function in digitally-mediated contexts. Specifically, family members serve as emotional anchors, friends act as informational intermediaries, and significant others, such as mentors, faculty, and industry professionals, function as career facilitators [38, 39].

Thus, this research extends the application of SCCT, validates MSPSS in digitally interactive contexts, and deepens the understanding of differentiated social support mechanisms within digitally interactive environments. The present study offers a more nuanced and context-sensitive framework for exploring perceived employability in digitally interactive environments.

While SCCT emphasizes self-efficacy as a core psychological mediator, this study adopts PsyCap as a broader construct, encompassing four key dimensions: HO,

OP, RE, and SE [7].This reconceptualization aligns with recent developments in positive psychology and presents a more extensive perspective for interpreting how digitally mediated social support fosters adaptive career development outcomes. As illustrated in the proposed framework (Fig. 1), this study examines both the direct effects of each source of social support on perceived employability and the indirect effects mediated by PsyCap as an integrated construct. This framework integrates SCCT and SPT to explain how social support in digitally interactive contexts from family, friends, and significant others influences perceived employability. PsyCap is positioned as an integrated mediator that consolidates emotional, informational, and instrumental resources transmitted through digital platforms. Social support is conceptualized as comprising three distinct sources: family (e.g., parents or close kin), friends (e.g., peers and classmates), and significant others (e.g., mentors, faculty, alumni, industry professionals, and policymakers).

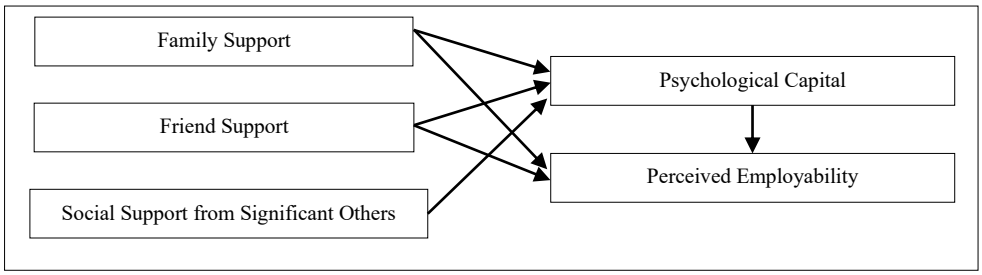

Fig. 1. Research framework.

C. Social Support and Perceived Employability

In line with Zimet *et al*. [18], social support in this study is conceptualized across three established dimensions: family, friends, and significant others. To reflect the digitally interactive career context, each dimension is further specified: Family refers to parental or close kin involvement in students' career concerns; Friends include peers and classmates who interact via both offline and online platforms; and Significant Others encompass mentors, faculty members, alumni, industry professionals, and even policymakers who provide guidance and career resources through formal (e.g., mentoring apps) or informal (e.g., social media) digital channels.

These sources are likely to provide distinct forms of support—emotional, informational, and professional—that directly strengthen graduates' labor market confidence and perceived employability [40, 41]. Prior studies indicate that the relative influence of support from family, friends, and significant others is not uniform, differing considerably across cultural and situational contexts [18, 42, 43]. In certain contexts, peer networks provide critical informational and emotional resources, whereas in others, their effects appear less pronounced compared to family or professional mentors. This inconsistency highlights the need to further examine the differentiated effects of social support sources in digitally interactive environments. Accordingly, the hypotheses to investigate the direct influence of each dimension of social support are presented below:

- H1: Family support is positively associated with perceived employability
- H2: Friend support is positively associated with perceived employability
- H3: Support from significant others is positively associated with perceived employability

D. Social Support and PsyCap

Aligned with SCCT [10], social support functions as a critical environmental factor that fosters PsyCap by enhancing self-efficacy, motivating goal-directed behavior, and mitigating emotional stress. In digitally interactive contexts, technologies that promote social presence further reinforce these effects by increasing emotional engagement and facilitating access to career-related information [30, 44]. These tools not only accelerate communication but also improve the perceived presence and empathy of social interactions, thereby strengthening PsyCap. Recent studies have shown that asynchronous video messages, AI-generated feedback, and immersive virtual platforms can significantly strengthen emotional connection and social bonding, which in turn enhance PsyCap [34, 45, 46].

Moreover, recent studies have emphasized the importance of interactional integration and emotional engagement in sustaining psychological presence in virtual spaces [30, 47, 48]. Family support, for example, provides psychological reassurance during periods of career uncertainty. Friends play a key role in sharing job-related information via social media and promoting emotional resilience through online peer communities [42, 43]. Professionals such as mentors and industry experts contribute by offering career advice and psychological guidance through AI-enabled platforms like LinkedIn and remote mentoring systems [38]. These digitally interactive social support mechanisms reduce psychological distress and further strengthen PsyCap, thereby improving perceived employability [5, 49]. Prior studies show that the influence of family, friends, and significant others on PsyCap is not consistent across contexts [18, 26]. Peer support can be valuable in some situations, but its effects may be less reliable than those of family or professional mentors [42, 43]. This variability underscores the need to examine how different support sources contribute to PsyCap in digitally interactive environments. Accordingly, this study develops the following hypotheses to test the differentiated effects of social support sources on PsyCap:

- H4: Family support is positively associated with PsyCap.
- H5: Friend support is positively associated with PsyCap.
- H6: Support from significant others is positively associated with PsyCap.

E. PsyCap and Perceived Employability

PsyCap is a crucial internal resource that enables graduates

to cope with the uncertainties and dynamic changes of the digital labor market. It comprises four core psychological attributes: Hope (HO), Optimism (OP), Resilience (RE), and Self-Efficacy (SE) [7, 50]. These attributes equip individuals to cope with change, overcome challenges, and leverage new opportunities. Empirical studies confirm its role in fostering adaptability and task engagement in technology-driven environments [12]. For example, graduates with high self-efficacy tend to show greater confidence in mastering digital tools. Those with strong resilience recover more effectively from job setbacks, while those with strong hope and optimism remain motivated when seeking high-quality opportunities in AI-driven labor markets [51].

Perceived employability is defined as individuals' perceptions of their capability to secure and sustain employment, and includes both internal (self-assessed competence) and external (awareness of market factors) dimensions [24, 25]. In this context, PsyCap plays a key role in shaping perceived employability, empowering graduates to navigate career uncertainty with confidence and optimism. Hence, the hypothesis below is formulated:

- H7: PsyCap is positively associated with perceived employability

F. Mediating Role of PsyCap

In digitally interactive contexts, external support alone may not suffice to ensure employability outcomes [51]. Instead, PsyCap serves as a crucial mediator, translating digitally mediated social support into enhanced perceived employability [7, 12].

According to SCCT, social support functions as an environmental factor that influences career outcomes primarily through internal cognitive and motivational mechanisms [10], while SPT further clarifies how digitally-enhanced interactions deepen emotional closeness, amplifying support effectiveness [32]. Recent empirical studies increasingly emphasize the mediating role of PsyCap in translating social support into reduced employment anxiety and improved perceived employability [12, 51, 52]. Thus, we propose the following mediation hypotheses:

- H8: PsyCap mediates the association between family support and perceived employability.
- H9: PsyCap mediates the association between friend support and perceived employability.
- H10: PsyCap mediates the association between support from significant others and perceived employability.

III. Methodology

This study adopted a quantitative research design, employing a self-administered questionnaire to examine the relationships among social support, PsyCap, and perceived employability within digitally interactive environments. Data were collected between March and May 2024 from 486 final-year university students in Chengdu, Sichuan Province, China, using the Wenjuanxing online platform. The overall valid response rate was 82%. The Research Ethics Committee of the institution provided ethical clearance for this study.

Participants were selected using a stratified purposive sampling approach, ensuring both relevance to graduates entering the labor market and balanced representation across academic faculties. While this strategy enhanced contextual validity, its non-probabilistic nature may weaken the transferability of the outcomes to other contexts. With the support of university career centers and faculty administrators, invitations were distributed to final-year students from diverse disciplines, thereby further enhancing both contextual validity and representativeness within the graduate population.

The measurement of social support employed the Multidimensional Scale of Perceived Social Support (MSPSS) developed by Zimet *et al*. [18]. The scale includes three dimensions: family, friends, and significant others, and all 12 original items were retained. Participants provided reflections on their experiences of social support in digitally mediated contexts, such as WeChat, BiliBili, and digital mentorship platforms. Social support in this study is operationally defined as perceived assistance—emotional, informational, and instrumental—received through digitally interactive channels.

PsyCap was measured with the Psychological Capital Questionnaire (PCQ) developed by Luthans *et al*. [7], which contains 12 statements reflecting four facets: self-efficacy, hope, resilience, and optimism. Each item was assessed using a 7-point Likert scale. In this study, PsyCap is conceptualized as an integrated psychological resource comprising these four dimensions.

Perceived employability was evaluated through the scale developed by Rothwell *et al*. [24], which captures both internal and external aspects of perceived employability. All instruments were linguistically and culturally adapted for Chinese participants through a back-translation procedure and content validation conducted by three academic experts.

Reliability and validity were established through expert review and pilot testing. Three experts in human resource management and career development reviewed the instrument for clarity and cultural relevance. A pilot test with 60 students confirmed satisfactory reliability. Reliability and convergent validity were confirmed, as Cronbach's alpha for each construct exceeded 0.80, and both CR and AVE values complied with recommended criteria. Data analysis employed PLS-SEM, which is especially suitable for predictive, exploratory research and multifaceted models involving second-order formative constructs such as PsyCap. Compared with CB-SEM, PLS-SEM tolerates moderate deviations from normality, accommodates smaller samples, and avoids convergence issues associated with formative measurement models [53–55].

IV. Data Analysis and Results

The measurement model was assessed using a combination of reliability, convergent validity, discriminant validity (HTMT), and formative construct analysis, following the latest guidelines from Ref. [56].

A. First-Order Reflective Construct Assessment

All first-order reflective constructs exhibited strong internal consistency, reliability, and convergent validity. As summarized in Table 1, the CR scores were all greater than 0.90 and AVE values above the 0.50 threshold, indicating adequate construct validity [53, 57]. For example, Self-Efficacy (SE) achieved a CR of 0.930 and an AVE of

0.817, perceived External Employability (EEM) showed a CR of 0.959 and an AVE of 0.699, and support from significant others yielded a CR of 0.956 with an AVE of 0.845. These results confirm that the measurement items reliably represent their corresponding latent constructs.

Discriminant validity was evaluated through the Heterotrait-Monotrait (HTMT) criterion, which is commonly applied in assessing reflective constructs within PLS-SEM [54, 58]. Table 2 reveals that the majority of HTMT values remained under the 0.90 cut-off, supporting adequate discriminant validity. However, a few HTMT values among the dimensions of PsyCap marginally exceeded the 0.90 benchmark—specifically, SE–HO = 0.965 and OP–RE = 0.955. Although these values exceed the typical cutoff, Sarstedt *et al.* [54] argued that discriminant validity remains acceptable if the upper limit of the 90% confidence interval obtained through bootstrapping does not surpass 1. This suggests that while the PsyCap dimensions are conceptually close, they are still empirically distinguishable in this model.

Table 1. Reliability and convergent validity of first-order reflective constructs

Construct		Items	Loadings	CR	AVE
Perceived Employability	EEM	EEM1–EEM10	0.821–0.847	0.959	0.699
	IEM	IEM1–IEM6	0.800–0.843	0.927	0.678
PsyCap	HO	PCHO1–PCHO4	0.884–0.918	0.948	0.821
	OP	PCOP1–PCOP2	0.946–0.949	0.946	0.898
	RE	PCRE1–PCRE3	0.882–0.935	0.928	0.812
	SE	PCSE1–PCSE3	0.892–0.924	0.930	0.817
Social Support	FA	SSFA1–SSFA4	0.815–0.911	0.922	0.748
	FR	SSFR1–SSFR4	0.850–0.917	0.938	0.790
	SO	SSSO1–SSSO4	0.886–0.947	0.956	0.845

Notes: PsyCap (PC)= Psychological Capital; HO = Hope; OP = Optimism; RE = Resilience; SE = Self-Efficacy; FA = Family Support; FR = Friend Support; SO = Significant Others; EM = Employability; EEM = External Employability; IEM = Internal Employability; CR = Composite Reliability; AVE = Average Variance Extracted.

Table 2. HTMT values

Constructs	EEM	IEM	HO	OP	RE	SE	FA	FR
EEM								
IEM	0.702							
HO	0.673	0.762						
OP	0.700	0.772	0.870					
RE	0.694	0.808	0.957	0.955				
SE	0.701	0.782	0.965	0.886	0.926			
FA	0.686	0.547	0.405	0.470	0.448	0.440		
FR	0.707	0.595	0.448	0.478	0.493	0.472	0.730	
SO	0.742	0.598	0.451	0.486	0.482	0.472	0.589	0.761

B. Second-Order Formative Construct Assessment

Following the evaluation of first-order reflective constructs, this section assesses the second-order formative constructs, with a particular focus on PsyCap, social support, and perceived employability. The assessment criteria include outer weights, outer loadings, and multicollinearity using the Variance Inflation Factor (*VIF*), as recommended by Hair *et al.* [53]. As shown in Table 3, Hope (HO, VIF = 6.095) and Resilience (RE, *VIF* = 5.646) exhibited slightly elevated VIF values. Although these values slightly exceed the conservative threshold of 5.0, Hair *et al.* [53] suggested the evaluation of formative indicators should be based on a combination of their outer weights and outer loadings. Specifically, the outer weight of HO was 0.079 ($p = 0.220$), which was not statistically significant. However, its outer loading was 0.913 ($p < 0.001$), suggesting that despite its limited independent contribution, HO maintains a strong correlation with the construct and can be regarded as a typical case of "important but non-significant." In contrast, RE showed both a statistically significant outer weight of 0.279 ($p = 0.003$) and a high outer loading of 0.941 ($p < 0.001$), indicating that this dimension made a substantial contribution and was highly representative of the construct.

Table 3. Outer weights, loadings, and VIF values for second-order formative constructs

Variable	Second order constructs	Outer weights	*P*-value	T-value	Outer loadings	P-value	T-value	VIF
PsyCap	HO	0.079	$p = 0.220$	0.773	0.913	$p < 0.001$	42.061	6.095
	OP	0.364	$p < 0.001$	4.418	0.936	$p < 0.001$	55.933	3.872
	RE	0.279	$p = 0.003$	2.705	0.941	$p < 0.001$	57.647	5.646
	SE	0.348	$p < 0.001$	3.906	0.933	$p < 0.001$	55.493	4.886
Social Support	FA	1.000	/	/	1.000	/	/	1.000
	FR	1.000	/	/	1.000	/	/	1.000
	SO	1.000	/	/	1.000	/	/	1.000
Employability	EEM	0.630	$p < 0.001$	21.199	0.935	$p < 0.001$	90.494	1.738
	IEM	0.467	$p < 0.001$	14.843	0.878	$p < 0.001$	56.342	1.738

According to Cenfetelli and Bassellier [59], and Kock [55], formative indicators with VIF values below 10 can be considered acceptable when supported by strong theoretical justification. In the present study, the slightly elevated VIF values are more likely to reflect conceptual cohesion and theoretical interdependence among the dimensions of PsyCap, rather than indicating problematic multicollinearity.

Furthermore, all first-order reflective constructs demonstrated VIF values lower than the accepted cut-off, confirming the stability of the measurement model at the indicator level. In addition, the construct of PsyCap is conceptually defined as a higher-order composite of four

interrelated dimensions: Hope (HO), Optimism (OP), Resilience (RE), and Self-Efficacy (SE). As originally proposed by Luthans *et al.* [7], these components jointly represent an integrated positive psychological resource. Given their theoretical complementarity, excluding any single dimension would compromise the conceptual completeness and measurement validity of the construct.

Considering the above, the marginally high VIF values are better understood as reflecting the conceptual closeness and theoretical interconnectedness of the dimensions, rather than signaling serious multicollinearity issues. Accordingly, all four formative indicators were retained, supported by both theoretical rationale and empirical evidence confirming their acceptability within the measurement model. From a practical perspective, the slightly elevated VIF values for Hope (6.095) and Resilience (5.646) mainly reflect their close relationship with other dimensions of PsyCap. In real life, individuals who are hopeful about the future often also demonstrate resilience in the face of setbacks. This natural overlap demonstrates their mutual reinforcement rather than a methodological issue.

C. Structural Model Assessment

In this study, social support was analyzed at the dimensional level (family, friends, and significant others) to examine its influence on perceived employability. PsyCap, a composite of four interrelated dimensions—Hope (HO), Optimism (OP), Resilience (RE), and Self-Efficacy (SE)—functioned as a mediator, while perceived employability was likewise modeled as a higher-order construct with internal and external components. Fig. 2 presents the structural model with standardized path coefficients, t-values, and mediation paths, providing a visual representation of the hypothesized relationships.

Standardized coefficients, p-values, confidence intervals, and effect sizes (f^2) were used to test the hypothesized paths. Table 4 shows that all seven were significant ($p < 0.05$), with confidence intervals excluding zero, providing evidence for hypothesized relationships. For example, PsyCap strongly predicted perceived employability ($\beta = 0.525$, $t = 20.971$, $p < 0.001$), while SSSO also showed a significant contribution ($\beta = 0.277$, $p < 0.001$).

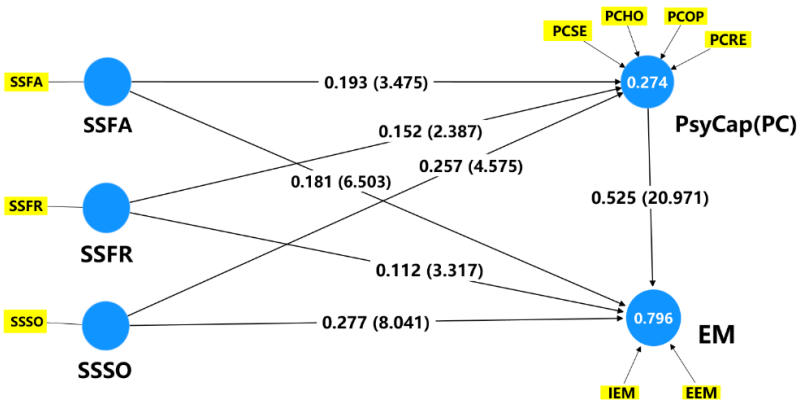

Fig. 2. Structural model.

Table 4. Structural model results for direct effects

Relationship	STD-BETA	STD-DEV	T-Values	P-Values	PCILL–PCIUL	f^2	Effect Size	Decision
SSFA→PsyCap	0.193	0.056	3.475	$p < 0.001$	[0.099–0.281]	0.028	Small	Supported
SSFR→PsyCap	0.152	0.064	2.387	$p = 0.009$	[0.048–0.258]	0.013	Negligible	Supported
SSSO→PsyCap	0.257	0.056	4.575	$p < 0.001$	[0.164–0.348]	0.045	Small	Supported
SSFA→EM	0.181	0.028	6.503	$p < 0.001$	[0.134–0.226]	0.086	Small	Supported
SSFR→EM	0.112	0.034	3.317	$p < 0.001$	[0.057–0.168]	0.024	Small	Supported
SSSO→EM	0.277	0.034	8.041	$p < 0.001$	[0.220–0.332]	0.178	Medium	Supported
PsyCap → EM	0.525	0.025	20.971	$p < 0.001$	[0.484–0.566]	0.981	Large	Supported

Notes: SSFA = Social Support from Family; SSFR = Social Support from Friends; SSSO = Social Support from Significant Others; PsyCap = Psychological Capital; EM = Employability

In line with Hair *et al.* [53], effect sizes were used to evaluate the influence of each independent variable, with 0.02, 0.15, and 0.35 denoting small, medium, and large effects.The PsyCap→perceived employability path exhibited a large effect ($f^2 = 0.981$), indicating a dominant role in explaining variance in perceived employability. The SSSO→ perceived employability path produced a medium effect ($f^2 = 0.178$), while other paths, such as SSFA→ perceived employability ($f^2 = 0.086$) and SSFR→ perceived employability ($f^2 = 0.024$), showed small effects.

One exception is the path from Support from friends (SSFR) to PsyCap. Although statistically significant ($p = 0.009$), it yielded an f^2 of 0.013, lower than the standard criterion of 0.02. According to Hair *et al.* [53], this suggests that the path, while statistically significant, does not make a substantial contribution to the variance explained in the dependent construct. This underscores the importance of evaluating both path significance and effect size: whereas β and p-values confirm the presence of relationships, f^2 provides insight into their practical relevance. In practice, small effect sizes (f^2=0.02–0.15) reflect only marginal contributions to perceived employability, even when statistically significant. For instance, support from friends (SSFR) plays a supplementary rather than a central role in graduates' career readiness. Medium effect sizes (f^2=0.15–0.35), such as support from significant others (SSSO), indicate more noticeable and contextually important contributions. Large effect sizes ($f^2 \geq 0.35$), as observed for PsyCap, underscore its decisive and practically dominant role in shaping employability outcomes.

PsyCap was tested as a mediator using specific indirect effect bootstrapping, as recommended by Hair *et al.* [53].

Results in Table 5 show that all three indirect paths were significant ($p < 0.01$) with confidence intervals not crossing zero, validating the mediation hypotheses. Specifically, the indirect effect of PsyCap was strongest for the SSSO→EM path ($\beta = 0.135$, $t = 4.577$), followed by SSFA→PsyCap→EM ($\beta = 0.101$) and SSFR→ PsyCap→EM ($\beta = 0.080$).

Given that the direct effects of SSFA, SSFR, and SSSO on perceived employability remained statistically significant even after accounting for the mediator, the results in Tables 4 and 5 indicate partial mediation in all three relationships, consistent with the criteria proposed by Hair *et al.* [53] and Preacher and Hayes [60]. The results affirm that PsyCap acts as a cognitive-motivational mechanism [7], facilitating the transformation of social support into improved perceived employability outcomes. This aligns with the SCCT framework, which underlines the significance of personal psychological resources in mediating the influence of contextual factors on career development.

Table 5. Structural model results for mediation

Relationship	STD-BETA	STD-DEV	T-Values	P-Values	PCILL–PCIUL	Decision	Mediation Type
SSFA→PsyCap→EM	0.101	0.029	3.477	$p < 0.001$	[0.052–0.148]	Supported	Partial Mediation
SSFR→PsyCap→EM	0.080	0.034	2.362	$p = 0.009$	[0.025–0.136]	Supported	Partial Mediation
SSSO→PsyCap→EM	0.135	0.029	4.577	$p < 0.001$	[0.086–0.183]	Supported	Partial Mediation

V. Discussion

This research primarily focused on differentiating the roles of family, friends, and significant others' support in shaping graduates' employability within digitally interactive environments, while also assessing the mediating influence of PsyCap. The empirical results supported the proposed hypotheses. All three types of social support were positively associated with perceived employability, both directly and indirectly. Moreover, PsyCap functioned as a partial mediator in these relationships. These findings resonate with prior studies and reinforce the theoretical foundation of SCCT, which posits that perceived employability, as a career-related outcome, can be developed through contextual supports that enhance self-efficacy and positive outcome expectations [10, 11].

A. PsyCap as a Higher-Order Integrative Mediator

The results confirmed the mediating influence of PsyCap between social support and perceived employability. This finding aligns with Liu *et al*. [61], who identified PsyCap as a central mediator, and with Mockałło *et al*. [52], who emphasized its adaptability in digital labor ecosystems. SCCT highlights self-efficacy and outcome expectations as key mechanisms. This study extends that perspective by demonstrating that PsyCap, comprising HO, OP, RE, and SE, operates as an integrative resource. In the Chinese digitally interactive labor market, where uncertainty and competition are widespread, PsyCap enables graduates to transform diverse social supports into adaptive resources that buffer stress and reinforce perceived employability. Emerging studies further underscore the role of AI literacy and attitudes in shaping employment-related psychological outcomes [62]. Taken together, these findings reinforce the importance of PsyCap as a higher-order construct that not only mediates but also amplifies the effectiveness of contextual supports.

B. Differentiated Roles of Social Support in Digitally Interactive Contexts

1) Support from significant others: The expanding role of digital career guidance

The findings revealed that significant others exerted the strongest association with perceived employability, both directly and indirectly. This result resonates with Mockałło *et al*. [52] and Borup *et al*. [34], who noted that digital mentoring and online career platforms enhance perceived employability by fostering social presence and professional networks. More recent studies in AI-supported perceived employability confirm that intelligent agents and adaptive platforms can deliver personalized guidance, provide tailored job recommendations, and expand access to opportunities [63–65]. From a theoretical standpoint, this effect can be explained by integrating SCCT with Social Presence Theory (SPT). While SCCT emphasizes the significance of situational support in shaping occupational development, SPT highlights how digitally mediated interactions create immediacy and trust. Taken together, these perspectives explain why mentors, alumni, and career advisors, especially when supported by AI-driven systems, emerge as the most influential sources of support in digital environments.

2) Family support: Parental involvement in digitally interactive environments

Family support also significantly influenced perceived employability, though its impact was more moderate than that of significant others. This is consistent with Au [3], who highlighted how digital guanxi enables families to mobilize resources through platforms such as WeChat. In contrast to many Western contexts, where family influence is often confined to emotional reassurance, Chinese families typically combine emotional involvement with instrumental assistance, including financial support for job searches and the mobilization of professional contacts. Moreover, digital guanxi allows parents to extend their influence into online networks [3, 66]. From a theoretical perspective, this expands SCCT by illustrating how the family context contributes not only through encouragement but also through active resource provision.

3) Friend support: Information and emotional exchange under competitive pressure

The study further demonstrated that friend support positively contributed to perceived employability, although its effect was the weakest among the three sources. This relatively limited influence aligns with Wu *et al*. [42], Huo [43], and Huang *et al*. [26], who reported that digital peer groups often provide both informational benefits and competitive pressure. Studies on online and blended communities of engagement also underscore the positive contributions of peers to readiness and support structures [5]. In the Chinese digital context, however, online comparison dynamics strongly shape peer influence. Frequent exposure to peers' achievements tends to generate anxiety and

competition rather than collaborative support. Consequently, while peer networks do provide information, their positive impact is diluted under conditions of intensified digital competition. This finding underscores the need to distinguish between supportive and competitive peer interactions when examining social support in digital interactive contexts.

In summary, this study highlights the differentiated roles of family, friends, and significant others in shaping graduates' perceived employability in digitally interactive contexts. Significant others emerged as the most influential source, family provided culturally distinctive support by combining emotional involvement with instrumental assistance, while friends contributed modestly under conditions of online comparison. PsyCap integrated these diverse forms of support, acting as a higher-order mediator that strengthened their collective impact on perceived employability. These findings enrich SCCT by clarifying how different support sources operate in digitally interactive environments and underscore the importance of psychological resources in transforming external support into sustainable career advantages.

VI. Contributions

A. Theoretical Implications

This study advances theory in several important ways. First, it extends SCCT into the broader domain of digital talent development by integrating Social Presence Theory (SPT). While SCCT has traditionally been applied to face-to-face contexts, our findings demonstrate that digitally mediated interactions, including digitally interactive platforms and AI-enhanced mentoring, reshape the role of social support, with significant others emerging as the dominant source of influence. This integration provides a framework that better captures the affordances of technology-mediated environments.

Second, the study reconceptualizes PsyCap as a higher-order integrative mediator. By showing how hope, optimism, resilience, and self-efficacy collectively transform diverse social supports into adaptive career resources, the study refines the theoretical structure of SCCT and underscores its applicability in digitalized labor markets characterized by uncertainty and competition.

Third, the study emphasizes the unique cultural characteristics of family support in Chinese context, where emotional reassurance is combined with instrumental resource mobilization through digital guanxi. This extends existing understandings of social support beyond Western settings and illustrates the value of embedding cultural frameworks into career development research.

Finally, by differentiating the roles of family, friends, and significant others, the study reveals that peer support, while beneficial, is comparatively less effective under conditions of digital comparison and competition. This challenges the conventional conceptualization of social support as a unitary construct and underscores the necessity of analyzing its dimensions independently.

Collectively, these refinements enrich SCCT by integrating SPT, reconceptualizing PsyCap as a higher-order integrative mediator, and situating social support within digitally mediated environments shaped by the Chinese collectivist cultural context. This reconfiguration of PsyCap represents a theoretical breakthrough, as it demonstrates how multiple psychological resources can be consolidated into a single mechanism that amplifies the effectiveness of contextual supports. In doing so, the study provides both conceptual advancement and empirical guidance for future research on platform-based career development.

B. Practical Implications

The study also offers practical insights. For universities, the findings highlight the importance of strengthening digital mentoring by deploying AI-powered platforms that connect students with alumni and industry mentors and by introducing individualized perceived employability dashboards that provide real-time feedback on skills, resume preparation, and interview performance.

For digital platform designers, the results underscore the need to create environments that provide support while reducing competitive anxiety. Useful design features include anonymized benchmarking tools, collaborative project spaces, and transparent, fair algorithms that broaden rather than narrow opportunities. Adaptive functions that align career recommendations with students' PsyCap profiles can further enhance engagement and resilience.

For families and policymakers, the findings underscore the value of integrating emotional and instrumental assistance with digital literacy training and investing in equitable access to AI-driven career services. Together, these measures provide a timely framework for enhancing graduates' perceived employability in digitally interactive environments.

VII. Limitations and Conclusion

This study has limitations that indicate potential research pathways for future research.

First, the sample was restricted to final-year undergraduates in Chinese universities. While this enhances contextual relevance, it constrains generalizability. Future studies should involve students across academic years, institutions, and international contexts. Second, the cross-sectional design restricts inferring causality. Longitudinal or experimental approaches would allow scholars to capture dynamic changes over time and test the causal pathways between social support, PsyCap, and perceived employability. Third, dependence on self-assessed responses may introduce social desirability bias and other methodological limitations. To strengthen measurement validity, future research could incorporate objective indicators such as actual employment outcomes, digital engagement data, or third-party evaluations. Finally, while this study established the mediating effect of PsyCap, it did not examine potential moderating factors. Future research could examine moderators such as digital literacy, AI readiness, and socioeconomic background to clarify the conditions under which digitally mediated social support most effectively enhances perceived employability.

In conclusion, this study addressed its research questions by demonstrating that family, friends, and significant others contribute to perceived employability in digitally mediated environments, with PsyCap functioning as an integrative higher-order mediator. These findings extend Social

Cognitive Career Theory into culturally distinctive digital contexts and provide practical implications for universities, digital platform designers, families, and policymakers, all of whom are collectively engaged in advancing the perceived employability of graduates in the digital era.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

AUTHOR CONTRIBUTIONS

J.Z. conceived the study, collected and analyzed the data, and drafted the manuscript. T.F.Y. provided methodological guidance and critical revisions. E.I. contributed to theoretical framing and final editing. All authors approved the final version.

FUNDING

This research was funded by the 2025 Sichuan Provincial Higher Education Society "Smart Curriculum Teaching Reform Research Project", and is also supported by the 2025 Sichuan Provincial Center for Educational Informatization and Big Data "Educational Digitalization Research Project".

ACKNOWLEDGEMENT

Financial and institutional support for this study was provided by the author's affiliated institution. Gratitude is also extended to all participants for their time and valuable input.

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