



The predictive role of L2 motivation in receptive and productive informal digital learning of English: A chain mediation model

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Abstract

This article draws attention to the ways in which Hong Kong university students are motivated to engage in informal digital learning of English (IDLE) activities. Drawing upon the second language (L2) Motivational Self System (Dörnyei, 2009), it seeks to examine how Hong Kong students' L2 motivational components, including the ideal L2 self, the ought-to L2 self, and L2 learning experiences, predict their receptive IDLE activities (RIA), and productive IDLE activities (PIA). Using an adapted and validated questionnaire, we collected data from 310 undergraduate students in a public Hong Kong university and analyzed the data following a structural equation modeling approach (Collier, 2020). Results supported that Hong Kong university students' ideal L2 selves could positively predict their L2 learning experiences, RIA and PIA, while the ought-to selves could only directly influence L2 learning experiences. Our findings based on the mediation analysis also highlighted that L2 learning experiences and RIA could partially mediate the impact of the ideal L2 self on PIA and fully channel the indirect effect of the ought-to L2 self on PIA. These findings not only add to the existing understanding of IDLE in a localized Hong Kong context but also disclose the dynamic interactions between L2 motivation, and receptive and productive out-of-class learning activities in the digital age.

Keywords: informal digital learning of English (IDLE); L2 motivation; receptive IDLE activities; productive IDLE activities; Hong Kong undergraduates

Introduction

The ubiquitous availability of digital technologies and globalization has opened abundant opportunities for self-directed English language learning and usage beyond traditional classroom settings (Dressman & Sadler, 2020; Reinders & Benson, 2017; Richards, 2015). In Hong Kong, since the early 1990s, when the government began offering language enhancement grants and funding for the construction of self-access language learning centers (UGC, 2023), there has been a surge of interest in how Hong Kong English learners develop their autonomy and engage in technology-mediated language learning outside the classroom (e.g., Cheung, 2023; Chik & Ho, 2017; Lai, 2013; Lee et al., 2022; Littlewood & Liu, 1996). For example, to identify the factors influencing self-directed informal learning with technology among Hong Kong second language (L2) learners, Lai (2013) surveyed 373 undergraduate students at a local university. The results from structural equation modeling indicated that attitudinal factors, such as L2 learning motivation and perceived usefulness, play a vital role in guiding Hong Kong L2 English learners toward autonomous language learning with technology. Similarly, Chik and Ho (2017), through a longitudinal qualitative research design, examined how three adult learners in Hong Kong negotiated freely available online resources to engage in leisure-related L2 English learning beyond the classroom between 2010 and 2015. Their findings highlighted that changes in life stages such as transitioning from university to workplace, can diminish the time and energy available for recreational language learning. This necessitates that L2 learners recognize the affordances of engaging in bite-size L2 learning experiences and “keep learning in smaller chunk” outside formal contexts (Chik & Ho, 2017, p. 169).

While this body of research has illuminated the out-of-class learning ecology for Hong Kong English learners, uncertainties remain regarding the impact of L2 motivational dynamics on their engagement in informal language learning within an increasingly digitalized world. This gap is significant *not only* because motivation serves as the conative foundation of L2 learning (Danesh & Shahnazari, 2020; Dörnyei, 2019; Li et al., 2022; Sadoughi & Hejazi, 2024) *but also* because effectively utilizing the out-of-class learning ecology relies on a nuanced understanding of how L2 learners navigate their motivational resources to participate in both formal and informal learning contexts (Godwin-Jones, 2019).

Thus, this study draws on Dörnyei’s (2009, 2019) L2 motivational self system (L2MSS) to operationalize the motivational forces influencing Hong Kong L2 English learners. It builds on prior research related to informal digital learning of English (IDLE hereafter) (Lee & Dressman, 2018; Lee, 2021; Liu, 2024a; Liu & Ma, 2024) to frame the self-directed informal language learning practices of Hong Kong English learners with technology. Adopting a structural equation modeling approach (Collier, 2020; Kline, 2023), this article aims to examine the relationships between L2MSS and IDLE by testing a hypothesized structural model based on questionnaire data collected from a public university in Hong Kong. The key question that guides this study is:

RQ: How does L2 motivation influence Hong Kong English learners’ participation in IDLE?

Literature Review

IDLE as a Nascent Field in Computer-Assisted Language Learning (CALL)

Situated at the intersection of CALL and language learning beyond the classroom, IDLE has recently gained considerable momentum. It highlights the technology-assisted informal learning phenomenon among digital natives who have convenient access to information technologies and stable internet connections (Lee, 2021; Lee & Dressman, 2018; Zhang &

Liu, 2022). The working definition of IDLE is technology-mediated autonomous English learning activities motivated by language learners or their significant others, occurring outside traditional classroom settings (Lee & Dressman, 2018; Lee & Lee, 2021). According to Lee and Drajiati (2019), IDLE can be categorized into receptive IDLE activities (RIA) and productive IDLE activities (PIA). RIA focuses on the comprehension and consumption of English content in authentic contexts—such as listening to English songs online—positioning learners as consumers of English language content. In contrast, PIA emphasized the creation of English content, like posting content on social media in English, indicating that learners are perceived as active content creators.

Over the recent decade, IDLE has garnered significant attention from researchers and practitioners worldwide, with studies in the cases of South Korea (Lee & Lee, 2021; Lee et al., 2021), Sweden (Lee & Sylvén, 2021), Indonesia (Lee & Drajiati, 2019), Kazakhstan (Zadorozhnyy & Lee, 2023), Iran (Taherian et al., 2023), Saudi Arabia (Mohammed & Ali, 2021), China (Liu & Darwin, 2024; Zhang & Liu, 2022; Zhang & Liu, 2023), and even in under-resourced contexts like Sudan (Othman, 2023). This growing body of literature has disclosed that engaging learners with IDLE can positively influence their performance in standardized English tests (Ghorbani & Golparvar, 2020), vocabulary learning (Lee, 2021), intercultural competence (Liu, Ma, Bao, & Liu., 2023) language confidence (Lai et al., 2015; Liu, 2024b), and affective gains such as foreign language enjoyment (Lee & Lee, 2021).

While these studies have underscored the advantages of involving students in IDLE, it is important to note that IDLE has often been treated as a unidimensional and overarching variable in these empirical attempts. Consequently, there is a critical gap in understanding the specific constituents of IDLE, namely RIA and PIA, and how they interrelate with linguistic or individual difference factors, such as motivation, which is a prominent driver of informal language learning behaviors (see Lee & Lu, 2023; Liu et al., 2024). Addressing this knowledge gap constitutes a pressing need to advance the understanding of IDLE in a world where digital technologies are constantly reshaping and complicating the realities that informal language learners face.

L2MSS and its Three Components

L2MSS has been a widely used framework in L2 motivation research since the 1990s. Proposed by Zoltán Dörnyei (2005, 2009), it draws on Markus and Nurius's (1986) theory of possible selves and Higgins' (1987) self-discrepancy theory. The fundamental dimensions of the L2MSS comprise the ideal L2 self, the ought-to L2 self, and the L2 learning experience. The ideal L2 self represents the self-image that L2 learners aspire to attain (Dörnyei, 2009; 2019). This concept encompasses integrative motives, reflecting a desire to integrate into the target language community, as well as internalized instrumental motives tied to personal language learning goals (Dörnyei, 2009). L2 learners with clear ideal L2 selves are more likely to recognize the discrepancy between their current state and their desired future self, motivating them to engage in language learning practices to bridge that gap (Dörnyei & Al-hoorie, 2017; Liu, 2024a; Papi, 2010). In contrast, the ought-to L2 self arises from external pressures and responsibilities, embodying the extrinsic attributes that L2 learners feel they must possess to meet the expectations of significant others (e.g., parents, teachers) or to shun negative consequences (e.g., passing a high-stake exam) in their learning context (Dörnyei, 2009). In essence, the ought-to L2 self emphasizes how the pressure to meet others' expectations can serve as a powerful motivator for L2 learning efforts and behaviors (Lee & Lu, 2023). Therefore, as Yung and Chiu (2023) summarize, the ought-to L2 self is commonly associated with prevention-focused motives, while the ideal L2 self is closely linked to promotion-focused motives.

The often-overlooked dimension in L2MSS, the L2 Learning Experience, incorporates both situated and executive motives, highlighting the motivational effects of the actual L2 learning process on learners (Dörnyei, 2019). Situated motives reflect contextual influences and specific learning situations that shape learners' motivation. On the other hand, executive motives draw attention to learners' self-directed and self-regulatory processes within the learning experience (Dörnyei, 2009). In a recent effort to revisit the concept of the L2 learning experience, Dörnyei provided an updated definition that considers it as "the perceived quality of learners' engagement with various aspects of the language learning process" (Dörnyei, 2019, p. 19). Unlike the Ideal L2 and Ought-to L2 selves, the L2 learning experience does not focus on internal or external pre-existing self-images. Instead, it emphasizes how tangible outcomes and meaningful engagement in learning, such as progress and achievements, play a crucial role in motivating learners to sustain their language learning efforts.

Research Model and Hypotheses

Several studies have investigated the relationship between L2 motivation and IDLE or similar out-of-class self-directed language learning practices in Asian contexts. For instance, Zheng et al. (2018) employed the L2MSS questionnaire developed by You and Dörnyei (2016) to explore the motivational factors influencing 293 Chinese university students' online self-regulated learning. The results revealed a positive impact of the ideal L2 self on EFL learners' engagement in online self-regulated activities, but no significant predictive relationship was found between the ought-to L2 self and online self-regulated learning beyond the classroom. Likewise, Lee and Lee (2021) conducted a survey investigation involving 661 Korean EFL students across various educational levels. While their study aimed to examine the influence of the L2MSS and IDLE on students' foreign language enjoyment, the correlation analysis demonstrated a close association between the ideal L2 self, ought-to L2 self, and Korean EFL students' involvement in IDLE practices. Building on an explanatory mixed-method approach, Liu, Zhang, and Zhang (2023) explored the impacts of international posture on 401 Chinese university students' ideal L2 self and participation in IDLE activities. Their study revealed the ideal L2 self as a partial mediator between international posture and IDLE, suggesting that the ideal L2 self significantly predicted students' engagement in IDLE. Focusing on the localized Hong Kong context, Yung (2019) interviewed 18 secondary students and found that participants' ought-to L2 selves resulting from their high aspiration for performing well in high-stake examinations could shape their investment in after-school English private tutoring and out-of-class L2 learning behaviors. Yung (2019) also made the case that the construction of learners' vivid ought-to L2 images might foster their positive attitudes and close engagement with English learning within and beyond the classroom. These empirical insights have underscored the role of the ideal L2 and ought-to L2 selves in increasing L2 learners' positive learning experiences and predicting their language learning practices outside of the formal context. As such, we propose the following hypotheses:

- H1: IdealL2 positively predicts L2Experience.
- H2: IdealL2 positively predicts RIA.
- H3: IdealL2 positively predicts PIA.
- H4: OughtL2 positively predicts L2Experience.
- H5: OughtL2 positively predicts RIA.
- H6: OughtL2 positively predicts PIA.

While there is a lack of direct evidence regarding the impact of the L2 Learning experience on learning practices in out-of-class and digital learning environments, positive L2 learning

experiences and feelings have been positioned as a reliable and influential factor in explaining L2 learners’ intended learning efforts and motivated behavior, at least in formal classroom contexts (Dörnyei, 2009, 2019; You & Dörnyei, 2016). As such, we tentatively postulate:

- H7: L2Experience positively predicts RIA.
- H8: L2Experience positively predicts PIA.

Based on the observed pattern that self-directed language learners who engage creatively and flexibly in out-of-class language learning tend to experience the identity shift from English content consumers (e.g., browsing English YouTube videos as attending receptive learning activities) to English content creators (e.g., writing English emails as productive IDLE activities) (Lee & Draijati, 2019; Lee, 2021; Liu, 2023), we formulate the final hypothesis:

- H9: RIA positively predicts PIA.

By integrating the above hypotheses, the following hypothesized structural model in Figure 1 that showcases the hypothesized inter-factor relationships is generated:

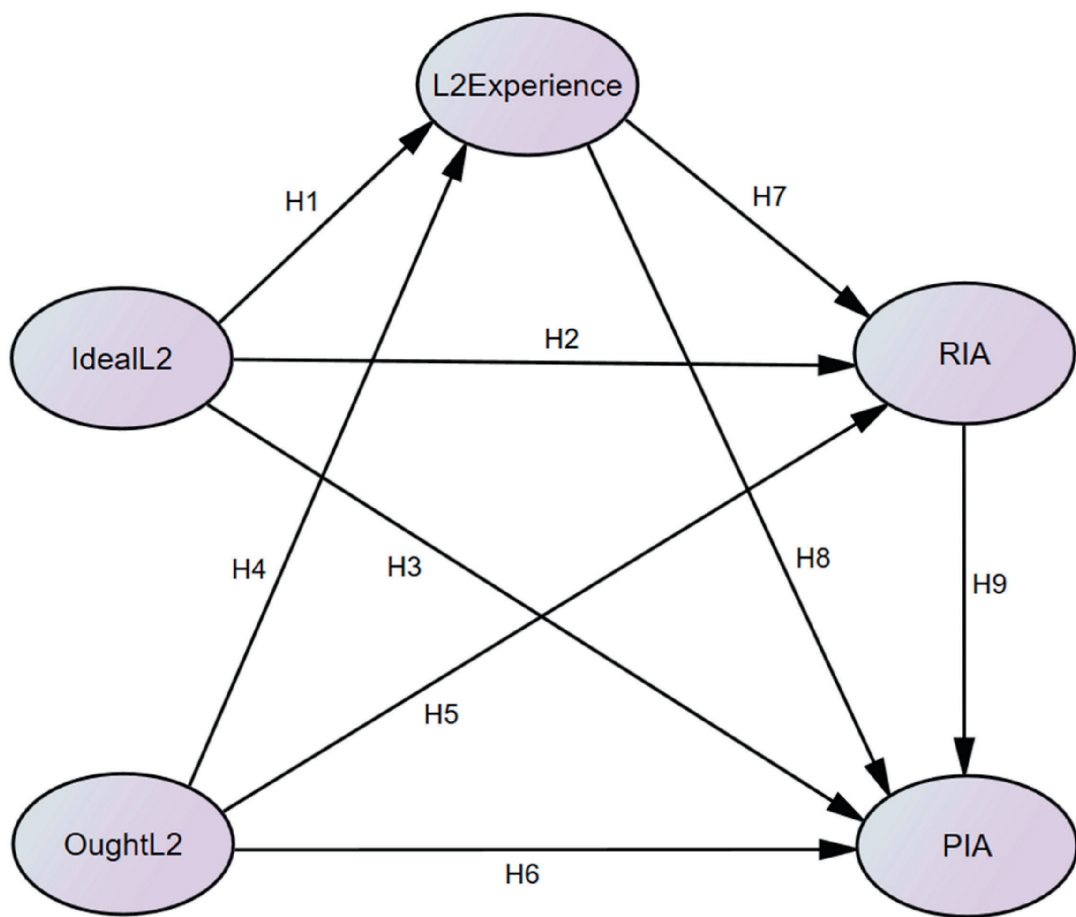


Figure 1 The hypothesized structural model.

Method

Context and Participants

This study utilized survey data obtained from a large research project that investigated Hong Kong undergraduates' self-directed use of technology for out-of-class English learning purposes. The research was primarily conducted at a local government-funded university, where 86.77% of the students come from Cantonese-speaking backgrounds and English is the main language of instruction. For the sake of feasibility and accessibility, participants were recruited through purposive sampling, with a public announcement containing an online questionnaire link sent to all registered full-time undergraduate students via the university's mass mail system. Two inclusion criteria were emphasized: (1) participants identified English as an additional language rather than their first language, and (2) they had engaged in technology-mediated English learning beyond the classroom in the past six months.

From April 2023 to December 2023, A total of 310 undergraduates, consisting of 206 females (66.45%) and 104 males (33.55%), provided informed consent and voluntarily completed the survey. Most participants ($n = 245$, 79.03%) were born between 2001 and 2004. In addition, 47 (15.16%) were born before 2001, while only 18 (2.81%) were born after 2004. The participants were distributed across different academic years, with 58 (18.71%) in their first year, 81 (26.13%) in their second year, 100 (32.26%) in their third year, and 71 (22.90%) in their fourth year or above. They were enrolled in various undergraduate programs, including Education ($n = 27$, 8.71%), Arts or other social science programs ($n = 166$, 53.55%), Business ($n = 20$, 6.45%), Medicine ($n = 35$, 11.29%), Science or engineering ($n = 51$, 16.45%), and double majors or other interdisciplinary programs ($n = 11$, 3.55%).

All participants identified themselves as multilingual speakers. The majority ($n = 281$, 90.64%) reported Cantonese, Putonghua (Mandarin Chinese), and English as their first language (L1), second language (L2), and third language (L3), respectively. Additionally, seventeen (5.42%) students indicated that they only spoke Cantonese and English. Twelve (3.94%) students identified both Putonghua and Cantonese as their L1s, with English as an additional language. It is worth noting that, apart from Cantonese, Putonghua, and English, 53 (17.24%) students reported proficiency in at least one other European language (e.g., French, German, Dutch), while 107 (34.48%) students indicated proficiency in at least one other Asian language (e.g., Japanese, Korean, Tagalog).

The Instrument

A modified and validated questionnaire was used in this study to measure Hong Kong undergraduates' motivation to engage in IDLE activities. The questionnaire began with demographic questions regarding sex, year level, and languages spoken. Subsequently, participants were requested to provide their answers regarding the intensity of their L2 motivation and the frequency of the IDLE activities they attended. In this part, a six-point Likert scale ranging from one (strongly disagree) to six (strongly agree) was selected to reduce deviation and improve the level of discrimination and reliability (Chomeya, 2010).

To operationalize the components of L2MSS, we drew upon previous L2 motivation research conducted in Hong Kong (e.g., Magid & Chan, 2012) and the Chinese mainland context (You & Dörnyei, 2016). Three experienced quantitative researchers in the field reviewed the face validity of the subscales: Ideal L2 Self (5 items, Cronbach's $\alpha/\alpha = .89$), Ought-to L2 Self (5 items, $\alpha = .88$), and L2 Learning Experience (5 items, $\alpha = .87$). These subscales were integrated into a contextualized 15-item L2MSS scale (see the Appendix). The measurement of IDLE was primarily built upon the scale developed by Lee and his colleagues (e.g., Lee &

Drajati, 2019; Lee & Lee, 2021). This scale aimed to identify the typical Receptive IDLE activities (RIA), and Productive IDLE (PIA) activities attended by Korean and Indonesian EFL learners. In revising this scale, we also referred to relevant IDLE studies in the mainland Chinese context (e.g., Liu, Zhang, & Zhang, 2023; Liu et al., 2014; Zhang & Liu, 2022). After two rounds of revisions based on the face validity check, the final RIA subscale comprised 5 items ($\alpha = .74$), and the PIA subscale consisted of 7 items ($\alpha = .86$).

Data Analysis

Following a structural equation modelling (SEM) approach (Collier, 2020; Kline, 2023), we employed SPSS 26 and Amos 26 to analyze data in seven steps.

- 1) A comprehensive screening of the dataset was done, which included examining missing values, errors, multivariate outliers, and data normality. The results indicated that the data were suitable for further analysis.
- 2) The internal reliability of the questionnaire’s subscales was assessed using Cronbach’s alpha (α). All subscales exhibited values higher than the threshold of .7 (Kline, 2023), indicating satisfactory internal consistency.
- 3) Principal component analysis with varimax rotation on five dimensions was performed to evaluate construct validity. Factor loadings, communalities, the Kaiser-Meyer-Olkin value (.93), and Bartlett’s Test of Sphericity ($\chi^2 = 3795.21$; $df = 406$; $p < 0.001$) supported the naming of the proposed five constructs/factors after excluding Q4 and Q27 from the factor RIA and Q5 and Q23 from PIA. The final cumulative post-rotation variance (65.15%) further supported the acceptance of the five-factor solution.
- 4) The questionnaire’s convergent validity and discriminant validity were assessed. Convergent validity was examined through the computation of composite reliability (CR) and average variance extracted (AVE) values. As presented in Table 1, all CR and AVE values exceeded the recommended thresholds of .7 and .5 (Kline, 2023), respectively, indicating the establishment of convergent validity. To evaluate discriminant validity, the Heterotrait-Monotrait Ratios of Correlations were calculated following the suggestion of Henseler et al. (2015). All these ratios did not exceed .90 (see Table 1), indicating that the five factors could be statistically distinguished from each other.
- 5) The maximum likelihood method was employed to examine the measurement model comprising the five factors.
- 6) Path analysis was conducted to verify the inter-factor hypotheses.
- 7) Considering the presence of two mediating variables in the hypothesized model, mediation analysis was performed following Collier’s (2020) recommendation. A chain mediation model was also constructed to explore any possible serial mediation effects.

Table 1 Convergent validity and discriminant validity.

	AVE (>.5)	CR (>.7)	HTMT (<0.9)				
			IdeallL2	OughtL2	L2 Experience	PIA	RIA
IdeallL2	0.63	0.89	–				
OughtL2	0.61	0.89	0.33	–			
L2 Experience	0.59	0.87	0.75	0.48	–		
PIA	0.54	0.85	0.87	0.23	0.76	–	
RIA	0.501	0.74	0.86	0.30	0.85	0.88	–

Results

Descriptive Statistics

The means (*M*), standard deviations (*SD*), kurtosis and skewness of all items were computed and presented in the Appendix. The means of IdealL2 and OughtL2 items were all higher than 4.0 and their SDs fluctuated between 0.97 and 1.38, which indicated that students in this study had vivid Ideal L2 and ought-to L2 selves. It was also found that the means and SDs of the rest three factors ranged from 3.38 to 5.29, and the SDs for these items varied between 0.88 and 1.63, which reflected moderate variability in the responses. These implied that participants held generally positive attitudes toward their L2 learning experience and maintained frequent involvement with receptive and productive IDLE activities. Regarding the specific IDLE activities that participants attended, it was shown that Hong Kong undergraduates demonstrated a higher level of interest and frequency in terms of receptive activities such as listening to English songs online (Q4, *M* = 4.82, *SD* =1.18) and browsing English or English-related content on social media (Q17, *M* = 4.90, *SD* = 1.03), and productive activities such as chatting with friends in English on social media (Q10, *M* = 4.56, *SD* = 1.22), writing English emails after class (Q23, *M* = 5.29, *SD* = 0.88).

The kurtosis and skewness indices for all items encompassed a spectrum from −0.71 to 3.35 and a range from −1.68 to 0.09, respectively. These values fell within the acceptable range for univariate normality, considering the recommended kurtosis cutoff of |8.0| and skewness cutoff of |3.0| as advised by Kline (2015). Therefore, the dataset exhibited a satisfactory level of normality based on these measures, which means that they are suitable for further SEM analysis.

The Measurement Model

The measurement model was examined by evaluating various goodness-of-fit indices, following Collier (2020). These indices included the ratio between the chi-square (χ^2) and the degrees of freedom (*df*), the comparative fit index (CFI), the Parsimony-Adjusted Measures Index (PNFI), the Incremental Fit Index (IFI), the root mean square error of approximation (RMSEA), the Tucker-Lewis index (TLI), and the Standardized Root Mean Square Residual (SRMR). Table 2 disclosed that the measurement model was accepted as all the seven goodness-of-fit indices lay within suggested ranges, which implied that this study could proceed to test the structural model.

The Structural Model and Hypotheses Testing

The model-fit indices in Figure 2 demonstrate a good fit between the structural model and the data set. In addition, Table 3 summarizes the major results of path analyses, and the eight hypotheses based on the structural model. To be specific, Ideal L2 Self was found to be a positive

Table 2 Goodness-of-fit indices of the measurement models.

	χ^2/df	CFI	PNFI	IFI	RMSEA	TLI	SRMR
The measurement model	2.04	.94	.78	.94	.06	.93	.08
Threshold values (Kline, 2023)	< 3	> .90	>.50	> .90	< .10	> .90	≤ .10

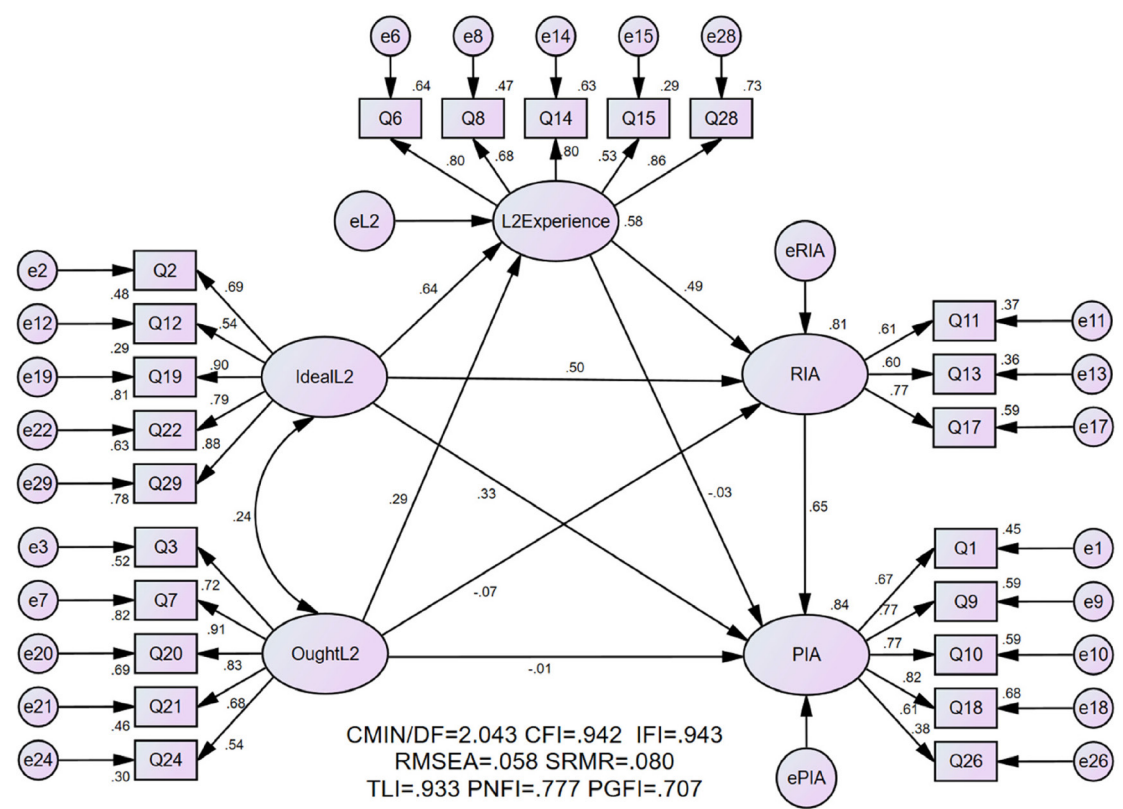


Figure 2 The final structural model (R^2 : L2Experience = 58%, RIA = 81%, PIA = 84%).

Table 3 Hypotheses test results.

Hypotheses	β	p	t-values (>1.96)	Results
H1: IdealL2 $\rightarrow$ L2Experience	.64***	$p < .001$	11.23	Supported
H2: IdealL2 $\rightarrow$ RIA	.50***	$p < .001$	5.95	Supported
H3: IdealL2 $\rightarrow$ PIA	.33**	.008	2.67	Supported
H4: OughtL2 $\rightarrow$ L2Experience	.29***	$p < .001$	5.15	Supported
H5: OughtL2 $\rightarrow$ RIA	-.07	.201	-1.23	Unsupported
H6: OughtL2 $\rightarrow$ PIA	-.01	.821	-0.23	Unsupported
H7: L2Experience $\rightarrow$ RIA	.49***	$p < .001$	5.27	Supported
H8: L2Experience $\rightarrow$ PIA	-.03	.845	-0.19	Unsupported
H9: RIA $\rightarrow$ PIA	.65**	.002	3.05	Supported

Note: $p < 0.001$ ***; $p < 0.01$ **.

predictor of L2 Learning Experience ($\beta = .64, p < .001, t\text{-value} = 11.23$), RIA ($\beta = .50, p < .001, t\text{-value} = 5.95$), and PIA ($\beta = .33, p = .008, t\text{-value} = 2.67$), while Ought-to L2 Self could only positively predict L2 Learning Experience ($\beta = .29, p < .001, t\text{-value} = 5.15$) and failed to leave a direct impact of RIA ($\beta = -.07, p = .201, t\text{-value} = -1.23$) and PIA ($\beta = -.01, p = .821, t\text{-value} = -0.23$). Also noteworthy is that L2 learning Experience could positively influence RIA ($\beta = .49, p < .001, t\text{-value} = 5.27$), but it was unable to predict PIA ($\beta = -.03, p = .845, t\text{-value} = -0.19$). Additionally, RIA served as a predictor of PIA ($\beta = .65, p = .002, t\text{-value} = 3.05$).

Looking at the R^2 values in Figure 2, it was evident that 58% variance of L2 Learning Experience could be accounted for by Ideal L2 Self and Ought-to L2 Self and that this model was able to explain the majority of change in RIA ($R^2 = 81\%$) and PIA ($R^2 = 84\%$). The large R^2 values not only added credits to the explanatory power of this SEM model but also provided evidence for the strong effect size of all statistically significant paths because all R^2 values went beyond the threshold of .5 as suggested by Plonsky and Ghanbar (2018).

The Mediation Analysis

Given that there were two mediating variables and only two direct paths (i.e., OughtL2→RIA, OughtL2→PIA) were not accepted, this study undertook mediation tests to further explore the inter-factor relationships by employing a bootstrap analysis with 2000 samples with a 95% confidence interval. As shown in Table 4, there were five mediational paths that deserved further verification. The results of mediation analysis revealed that L2 Learning Experience could partially mediate the relationship between Ideal L2 Self and RIA and fully mediate the path from Ought-to L2 Self to RIA because their corresponding lower bounds and upper bounds did not cross zero and the p values were significant at the level of $p < 0.001^{***}$. Also, although L2 Learning Experience did not predict PIA directly, it was found that it could leave an indirect impact on PIA through the full mediator RIA (see Table 4).

Furthermore, to gain a more comprehensive understanding of the indirect effects through multiple mediators, a chain mediation test was undertaken to examine if L2 learning experience and RIA could jointly mediate the impacts of Ideal L2 Self and Ought-to L2 Self

Table 4 Mediation test results.

Mediation paths	95% Confidence Interval		<i>p</i>	Indirect effects	Results
	Lower bound	Upper bound			
M1: IdealL2→L2Experience→RIA	.16	.44	$p < .001$	.29***	Partial mediation
M2: OughtL2→L2Experience→RIA	.09	.37	$p < .001$	.19***	Full mediation
M3: L2Experience→RIA→PIA	.08	.87	.007	.31**	Full mediation
M4: IdealL2→L2Experience→RIA→PIA	.05	.58	.007	.20**	Partial mediation
M5:OughtL2→L2Experience→RIA→PIA	.03	.42	.007	.13**	Full mediation

Note: $p < 0.001^{***}$, $p < 0.01^{**}$.

on PIA. As shown in Table 4, the mediation effects of L2 Learning Experience in the paths IdealL2→L2Experience→RIA→PIA and OughtL2→L2Experience→RIA→PIA were significant, suggesting that L2 Learning Experience and RIA both served as partial mediators in the indirect impact of Ideal L2 Self on PIA and full mediators in the indirect effect of Ought-to L2 Self on PIA.

Discussion

Building upon Dörnyei's (2005, 2009, 2019) conceptual framework of the L2MSS and the notion of IDLE (Lee & Dressman, 2018; Lee, 2021; Zhang & Liu, 2022), this SEM study aims to explore the influence of different L2 motivational components-- including the ideal L2 self, the ought-to L2 self, and L2 learning experiences on the engagement of Hong Kong undergraduates in receptive and productive IDLE activities. Through constructing and validating a structural model that comprises these five variables, we identified four major interesting findings that should be discussed in depth.

Firstly, the study revealed a strong predictive effect of the ideal L2 self on participants' English learning experience (H1: Supported), as well as on their participation in receptive IDLE activities (H2: Supported) and productive IDLE activities (H3: Supported). These findings chime with prior research emphasizing the motivating effects of the ideal L2 self on L2 learning behaviors (Fathi & Hejazi, 2023; Lee & Lee, 2021; Liu et al., 2024; You & Dörnyei, 2016; Zheng et al., 2018). As the ideal L2 selves of Hong Kong undergraduates become clearer, their perceived quality of English learning improves, leading to increased involvement in both receptive and productive IDLE activities. Dörnyei (2019) emphasized that motivation is not just about desire; it involves actions. As students become more motivated by their ideal self, they are more likely to engage in IDLE activities that will help them achieve their language goals.

Secondly, the study found that participants' ought-to L2 self significantly predicted their L2 learning experience (H4: Supported), but did not directly influence their commitment to receptive IDLE activities (H5: Unsupported) and productive IDLE activities (H6: Unsupported). These results are reminiscent of Papi's (2010) emphasis on the role of ought-to L2 self in reinforcing positive learning experiences. Learners with vivid ought-to self-images usually have a clear understanding and mastery of their learning progress and goals, and the language learning beliefs and desires that bring them closer to their ought-to L2 selves reinforces their perception of progress and allows them to benefit from a positive feedback loop. In addition, these results align with the observed pattern in some of the IDLE literature that the ought-to L2 self does not always translate into the efforts and practices of participation in IDLE activities among EFL learners (Lee & Lee, 2021; Lee & Lu, 2023). One possible explanation is that the washback effect stemming from high-stakes examinations, which shapes students' ought-to L2 selves, diminishes their willingness to engage in IDLE activities that are not explicitly assessed by language teachers (Lee, 2021). Thus, while this study highlights the role of the ought-to L2 self in shaping their L2 learning experiences, the findings suggest that the Ought-to L2 Self in shaping L2 learning experiences, this concept may not directly encourage students to actively participate in IDLE activities. This phenomenon may be closely related to the specific English learning context in Hong Kong, characterized by high-stakes examinations and a focus on utilitarian language learning goals that prioritize formal classroom learning over informal language learning activities (Lai & Lyu, 2019).

Third, the present study brings attention to the often-overlooked aspect of L2 learning experiences within L2MSS (Dörnyei, 2019). The findings revealed that L2 learning experiences significantly predicted participants' participation in receptive IDLE activities (H7: Supported), while showing no direct impact on their involvement in productive IDLE activities

(H8: Unsupported). This finding partially aligns with Papi's (2010) research in the Iranian EFL context that emphasizes the role of positive L2 learning experiences in motivating learners and fostering their efforts to learn English within the classroom. However, different from Papi's (2010) study, this paper contributes nuanced insights by identifying the distinct impacts of L2 learning experiences on receptive and productive learning practices in the out-of-class digital context. Furthermore, the study confirmed the predictive influence of involvement in receptive IDLE activities on participation in productive IDLE activities (H9: Supported), which is consistent with prior research indicating that learners who actively engage in diverse language environments tend to transition from passive consumers to active creators of English learning content (Lee & Drajati, 2019; Liu, 2023). Based on these results, along with the full mediating role of receptive IDLE activities in the relationship between L2 learning experiences and productive IDLE activities, it can be inferred that close engagement with English learning and tangible learning outcomes indirectly motivate Hong Kong undergraduates to invest in productive IDLE practices (e.g., listening to English songs and playing English games) by first engaging them in receptive IDLE activities.

Finally, this study provides novel insights into the joint mediating role of L2 learning experience and receptive IDLE activities by uncovering their partial mediation between the ideal L2 self and productive IDLE activities, as well as their full mediation roles in the path from the ought-to L2 self to productive IDLE activities (refer to Table 4). These findings present two significant theoretical contributions to the existing IDLE literature (cf., Lai et al., 2015; Lee, 2021; Liu et al., 2023). One lies in the identification of a causal relationship between a vivid ideal self-image and participation in productive IDLE activities, further reinforced by the perceived enhancement in the L2 Learning Experience and engagement in receptive IDLE tasks. In other words, individuals who possess a clear ideal L2 self are more likely to actively participate in productive IDLE activities, driven by their improved learning experiences and engagement in receptive activities. At its core, the ideal L2 self represents the aspirational identity that learners strive to achieve. According to Dörnyei (2005, 2009), this self-image motivates learners to pursue activities that align with their goals. When learners possess a vivid and well-defined ideal L2 self, they are more likely to perceive their language learning experiences as relevant and meaningful. This clarity enhances their intrinsic motivation, leading to increased participation in productive IDLE activities. The positive feedback loop between the ideal self and engagement in productive activities reinforces their language skills and self-efficacy, further solidifying their commitment to informal digital language learning. The other contribution highlights that although the construction of ought-to self-images may not directly guide Hong Kong undergraduates toward productive IDLE practices, it is reasonable to assume that the presence of clear ought-to L2 selves can lead to rewarding L2 learning experiences. These positive experiences, in turn, prompt students to spend time engaging with receptive IDLE activities, which may finally invite students to engage in productive IDLE activities. Such phenomena may be explained by the interaction between the ought-to self and engagement in L2 learning experiences, which can create a positive feedback loop. As students engage more with positive learning experiences, they gain confidence, which may reinforce their ought-to self-image. This enhanced self-image, in turn, can motivate them to pursue more challenging productive IDLE tasks. The explanatory power of the two serial mediation effects can also be observed from the substantial R^2 values of RIA (85%) and PIA (85%) in the structural model, which indicates that the proposed scenarios can explain the vast majority of the change in students' involvement in receptive and productive IDLE activities, at least within the specific context of Hong Kong university.

Implications

The findings in this study hold significant implications for pedagogical considerations in Hong Kong and similar Asian contexts. For example, one crucial future pedagogical endeavor is to construct, reinforce, and substantiate learners' ideal L2 selves through the implementation of motivation-enhancing classroom activities that cater to their desired future selves in Hong Kong society. To achieve this, language teachers can design open-ended tasks, such as envisioning future professions, prompting learners to reflect on their ideal selves in a globally connected and digitalized Hong Kong. Once students' initial ideal self-images are identified, the collaboration between teachers and curriculum developers can lead to the design of learning plans and pedagogical activities that encourage L2 learners to explore and engage in communicative and literacy practices beyond the classroom that may enhance and substantiate their potential L2 selves in a self-directed and autonomous manner. Additionally, it is significant for language teachers and other stakeholders, including parents and policy developers, to collaborate in helping students negotiate ought-to self-images that strengthen students' perception of positive English learning experiences and sustain their commitment to IDLE. Furthermore, considering the specific finding in this study that participants' engagement in receptive digital learning activities outside the classroom may predict their engagement in productive IDLE activities, language instructors should recommend and introduce additional out-of-class leisure-based receptive activities, such as watching English movies, as a complement to formal instruction. These activities should be thoughtfully selected to pique students' interest and motivate them to independently engage in more language-usage or content-creation English learning activities (e.g., YouTube commenting in English). Very importantly, it is crucial to recognize that exploring and substantiating learners' ideal English and ought-to English selves is a long-term process that requires collaboration among students, teachers, policymakers, parents, and future research insights.

Conclusion

This study utilized an SEM approach to investigate the motivational factors influencing undergraduate students' engagement in receptive and productive IDLE activities within a Hong Kong university context. It was found that Hong Kong university students' ideal L2 selves could predict their L2 learning experiences, RIA and PIA, while the ought-to selves were only able to directly influence L2 learning experiences. However, our findings based on the mediation analysis highlighted the important mediating role of L2 learning experiences and RIA, suggesting that the two mediators could partially mediate the impact of the ideal L2 self on PIA and fully channel the indirect effect of the ought-to L2 self on PIA. These findings contribute to the field not only by adding to the existing understanding of informal language learning in a localized Hong Kong context but also by disclosing the dynamic interactions between L2 motivation, receptive and productive informal digital learning activities. Based on these insights, we have proposed pedagogical implications that may inform future pedagogical practices in Hong Kong or similar Asian contexts.

Despite the empirical and practical significance of this article, there exist some limitations that should be highlighted when interpreting and generalizing the findings across contexts. For instance, while this study adopted purposive sampling techniques to recruit participants for the sake of feasibility, a stratified random sampling method is suggested in future studies to better represent the experiences and opinions that Hong Kong youth hold in the out-of-class digital English learning ecology. Furthermore, future studies that integrate longitudinal in-depth qualitative ethnographic data (see Yu & Liu, 2023) are recommended to enhance the

existing understanding of the non-linear and complex ways in which Hong Kong L2 English learners negotiate their L2 motivation forces and access to emergent new digital technologies (e.g., generative artificial intelligence, see Liu, Darwin, & Ma, 2024) to engage informal language learning practices with greater productivity and creativity.

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Appendix

Descriptive Statistics and questionnaire items

Factors	Items	M	SD	K	S	α
Ideal L2	Q2. I can imagine myself living or traveling abroad and having a discussion in English.	4.92	1.00	1.29	−1.02	.89
	Q12. Whenever I think of my future career, I imagine myself using English.	5.06	1.10	3.35	−1.68	
	Q19. I can imagine myself speaking English with international friends or colleagues.	4.79	1.12	1.08	−1.06	
	Q22. I imagine myself as someone who is able to speak English.	4.84	0.97	2.00	−0.97	
	Q29. I can imagine myself speaking English in the future with foreign friends in informal settings.	4.76	1.15	1.53	−1.13	
Ought L2	Q3. Studying English is important to me in order to gain the approval of my peers and teachers.	4.01	1.38	−0.35	−0.59	.88
	Q7. Studying English is important to me in order to gain the approval of the society.	4.40	1.25	0.19	−0.84	
	Q20. Studying English is important to me because other people will respect me more if I have a knowledge of English.	4.37	1.30	0.21	−0.78	
	Q21. I consider learning English important because the people surrounding me think that I should do it.	4.23	1.33	−0.34	−0.56	
	Q24. Studying English is important to me because an educated person is supposed to be able to use English.	4.67	1.19	0.65	−0.90	
L2 Experience	Q6. I would like to catch any available opportunities to use English beyond the classroom.	4.21	1.27	−0.34	−0.40	.87
	Q8. I would like to spend lots of time studying English.	3.78	1.26	−0.46	−0.15	
	Q14. I think time passes faster while studying English.	3.38	1.29	−0.45	0.16	
	Q15. I always look forward to using English beyond the classroom.	4.70	1.01	1.72	−0.94	
	Q28. I really like the actual process of learning English.	3.95	1.25	−0.40	−0.18	

Continued

Continuation

Factors	Items	M	SD	K	S	α
PIA	Q1. I use technology to connect with native speakers of the language (e.g. American, British).	4.03	1.44	−0.71	−0.41	.86
	Q5. I use technology to connect with non-native speakers of English all over the world (e.g., Japanese, Korean).	4.17	1.38	−0.47	−0.61	
	Q9. I share English content online.	3.84	1.41	−0.65	−0.17	
	Q10. I chat with others in English on social media (e.g., Facebook, WhatsApp, Instagram etc).	4.56	1.22	0.69	−0.90	
	Q18. I write English content online.	4.20	1.41	−0.66	−0.44	
	Q23. I send an email to others in English.	5.29	0.88	1.41	−1.27	
	Q26. I play online games in English.	4.18	1.51	−0.84	−0.39	
RIA	Q4. I listen to songs in English online.	4.82	1.18	0.23	−0.93	.74
	Q11. I listen to English-language news programs online or TV.	3.90	1.46	−0.74	−0.33	
	Q13. I watch English-language movies or dramas with subtitles in English.	4.48	1.35	0.31	−0.93	
	Q17. I browse English or English-related content via social media (e.g., Instagram, Facebook, Snapchat, Twitter etc)	4.90	1.03	2.02	−1.16	
	Q27. I watch sports events in English online or TV.	3.52	1.63	−1.20	0.09	

Note: K = kurtosis; S = skewness.

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