ReCALL (2025), 37: 3, 403–420
doi:10.1017/S0958344025000059

RESEARCH ARTICLE

Comparing classroom and digital settings: the role of basic psychological needs on EFL students' IDLE engagement

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Abstract

English as a foreign language (EFL) students are increasingly learning English in extramural digital settings (informal digital learning of English; IDLE). Previous research has investigated the antecedents of IDLE engagement, focusing on basic psychological needs (BPNs) in classroom settings. However, little attention has been given to the role of BPNs in digital settings, where digital-native EFL students often fulfil their psychological needs. This study explores the relationship between two core BPNs – *competence* and *relatedness* – in both classroom and digital settings and IDLE engagement among 226 Kazakhstani university EFL students. Hierarchical multiple regression analyses indicate that, *in the classroom*, students who perceive themselves as more competent are more likely to engage in receptive and productive IDLE. Also, a higher sense of in-class relatedness strengthens the positive relationship between in-class competence and productive IDLE. *In the digital settings*, students who perceive themselves as more competent are more likely to engage in receptive IDLE, while competence alone does not directly lead to productive IDLE. A higher sense of relatedness positively moderates the links, amplifying the connection between competence and engagement in both receptive and productive IDLE. These findings suggest that educators can enhance EFL students' IDLE engagement by designing and recommending activities that foster competence and a sense of community in both classroom and digital settings.

Keywords: informal digital learning of English; self-determination theory; basic psychological needs; digital and classroom settings

1. Introduction

As technology continues to develop and becomes more accessible, students learning English as a foreign language (EFL) are increasingly using digital tools and resources for autonomous English learning or practice outside of school (informal digital learning of English; IDLE; see a review paper by Soyoof, Reynolds, Vazquez-Calvo & McLay, 2023). Generally, IDLE activities can be classified into *receptive IDLE* (e.g. watching English-language content on Netflix) and *productive IDLE* (e.g. chatting with others in English; Lee, 2022). Previous research has shown that IDLE is associated with various outcomes in L2 English learning: *affective outcomes* (e.g. boredom, confidence, and investment; Lai, Zhu & Gong, 2015; Liu & Darvin, 2024; Taherian, Shirvan,

Cite this article: Zadorozhnyy, A. & Lee, J.S. (2025). Comparing classroom and digital settings: the role of basic psychological needs on EFL students' IDLE engagement. *ReCALL* 37(3): 403–420. https://doi.org/10.1017/S0958344025000059

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Yazdanmehr, Kruk & Pawlak, 2024), *cognitive outcomes* (e.g. academic grades and digital competence; Lai *et al.*, 2015; Rezai, Soyoof & Reynolds, 2024a; Sundqvist & Wikström, 2015), *linguistic outcomes* (e.g. vocabulary, grammar, and speaking; Cole & Vanderplank, 2016; Kusyk, 2017; Lai *et al.*, 2015; Sundqvist, 2009, 2019), *performance outcomes* (e.g. job engagement; Rezai, Soyoof & Reynolds, 2024b), and *cultural understanding outcomes* (intercultural communication skills; Bae, 2024; Liu, Ma, Bao & Liu, 2023).

Given the growing evidence of the benefits of IDLE, researchers have begun exploring the factors that drive EFL students to engage in IDLE activities (Liu & Wang, 2024). Understanding these factors is crucial for designing effective interventions to increase student participation in IDLE (Lee, 2022). These antecedent factors can be categorized into three main groups: (a) *environmental factors* (e.g. subjective norms; Liu & Wang, 2024), (b) *demographic factors* (e.g. gender and family income; Zhang & Liu, 2023), and (c) *individual factors* (e.g. ideal L2 selves, perceived usefulness, and international posture; Liu, Darvin & Ma, 2024; Zhang & Liu, 2024).

Recent studies that focus on individual factors have attempted to establish a connection between the basic psychological needs (BPNs) theory and IDLE (Fathali & Okada, 2018; Jeon, 2022; Zadorozhnyy & Lee, 2024). The BPNs theory, which is a fundamental subtheory of the broader self-determination theory, suggests that meeting three core needs – autonomy, competence, and relatedness – is key for students to thrive and achieve overall well-being (Ryan & Deci, 2000). However, most of the existing research on BPNs and IDLE has primarily examined traditional classroom settings, overlooking the importance of addressing these needs in digital environments where contemporary EFL students, who are typically tech-savvy, often have their psychological needs met (Sockett & Toffoli, 2020; Toffoli, 2020; Toffoli, Sockett & Kusyk, 2023).

To address this gap, the present study aims to explore how the fulfilment of *competence* and *relatedness* needs across classroom and digital settings relates to EFL students' IDLE engagement. This study focuses on Kazakhstani university EFL students, who, despite being underrepresented, have been actively involved in IDLE activities (Zadorozhnyy & Lee, 2023; Zadorozhnyy & Yu, 2023). The findings of this study will expand our understanding of how the fulfilment of psychological needs in both traditional classrooms and digital settings influences students' engagement in IDLE. Additionally, these findings will provide pedagogical insights for educators on how to enhance EFL students' IDLE engagement by leveraging the components of BPNs, thus informing future intervention research.

2. Literature review

2.1 IDLE

With advancing technology and its increasing affordability, EFL students are increasingly turning to IDLE as a popular alternative to the traditional classroom (Dressman, Lee & Perrot, 2023; Reinders, Lai & Sundqvist, 2022; Soyoof *et al.*, 2023). Instead of relying solely on the traditional methods, IDLE learners are using digital tools and resources to autonomously learn English (Soyoof, 2023). Broadly speaking, IDLE activities can be categorized into two types: receptive and productive IDLE. *Receptive IDLE* involves consuming English content, such as watching English shows or listening to English language songs. By contrast, *productive IDLE* involves producing English content, such as writing posts in English on social media or engaging in video chats with English speakers.

By embracing the IDLE approach, students gain access to a wide range of free and authentic resources for learning English. This empowers them to learn at their own pace and according to their own needs and interests. Research suggests that EFL students who regularly engage in IDLE experience various benefits compared to formal English learners. These benefits include increased learner agency and autonomy (Jeon, 2022; Soyoof *et al.*, 2023), exposure to authentic English

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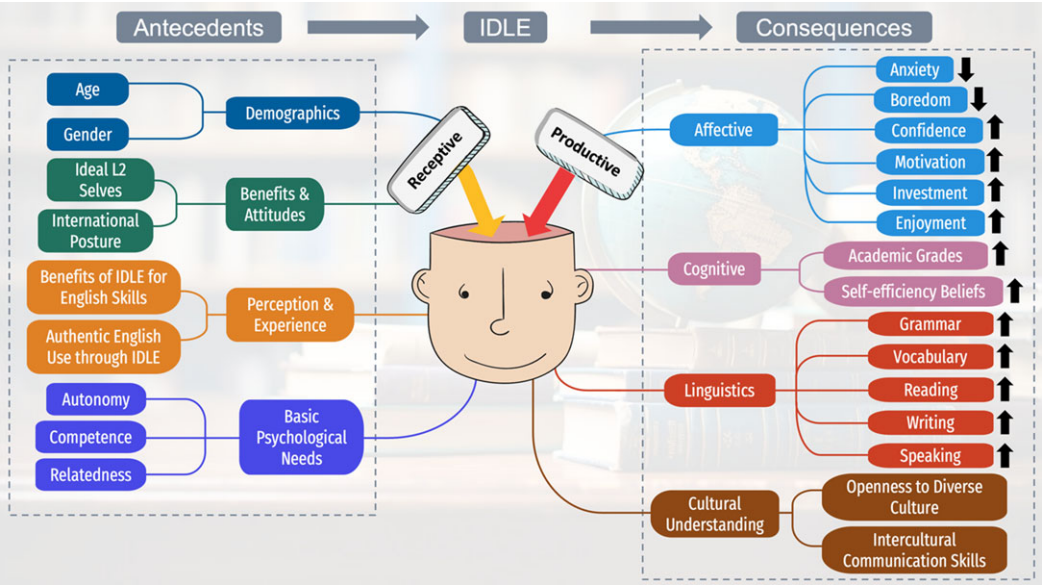


Figure 1. Antecedents and consequences of IDLE.

language use (Zhang & Liu, 2024), intrinsic motivation (Toffoli, 2020), active engagement in virtual communities with like-minded English users (Sauro & Zourou, 2019; Vazquez-Calvo, 2021), use of diverse learning sources (Vazquez-Calvo, Zhang, Pascual & Cassany, 2019), reduced anxiety (Tsang & Lee, 2023; Uztosun & Kök, 2024), and access to comprehensive language input (Lee, 2022). Additionally, IDLE learners tend to demonstrate higher levels of investment and grit in their English learning endeavours (Lee & Taylor, 2024; Liu, Zhang & Zhang, 2024). Taken together, these positive outcomes associated with IDLE have spurred researchers to conduct empirical investigations into the consequences and antecedents of IDLE, which will be further discussed in the following sections.

2.2 Consequences of IDLE

As shown in Figure 1, research on IDLE has revealed various consequences and outcomes in L2 English learning. These outcomes can be broadly categorized into affective, cognitive, linguistic, and cultural understanding domains.

Specifically, IDLE has been associated with *affective outcomes*, including reduced anxiety and boredom, and increased confidence, motivation, investment, and enjoyment in language learning (Lai *et al.*, 2015; Liu & Darvin, 2024; Taherian *et al.*, 2024). Engaging in IDLE activities allows learners to have more control over their learning process, explore their interests, and experience a sense of autonomy, which contributes to positive affective experiences.

IDLE has been also found to have *cognitive benefits* in L2 English learning. Research indicates that learners who engage in IDLE activities tend to achieve higher academic grades, develop digital competence, and possess self-efficiency beliefs in their language learning abilities (Lai *et al.*, 2015; Rezai, Soyoof & Reynolds, 2024c; Sundqvist & Wikström, 2015). The independent and self-directed nature of IDLE encourages learners to develop effective learning strategies, critical thinking skills, and digital literacy, which can enhance their overall cognitive abilities.

IDLE has also been linked to positive *linguistic outcomes* in various language skills. Studies have shown that engaging in IDLE activities is associated with improvements in grammar, vocabulary, reading, writing, and speaking skills (Cole & Vanderplank, 2016; Kusyk, 2017; Lai *et al.*, 2015;

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Sundqvist, 2009, 2019; Sundqvist & Uztosun, 2024). Through exposure to authentic language input and opportunities for practice, learners can enhance their language proficiency and communicative competence.

Lastly, IDLE can also contribute to *cultural understanding and intercultural communication skills development*. Research suggests that engaging in IDLE activities can lead to increased openness to diverse cultures and improved intercultural communication abilities (Bae, 2024; Liu *et al*., 2024). By accessing a wide range of English language content and interacting with speakers from different cultural backgrounds, learners can develop a broader understanding of different cultures and enhance their intercultural competence.

2.3 Antecedents of IDLE

Given the mounting evidence of the benefits of IDLE, researchers have begun investigating the factors that drive EFL students to participate in IDLE activities (Liu & Wang, 2024). These factors can be grouped into three main categories: environmental, demographic, and individual factors.

Specifically, *environmental factors* include subjective norms, which encompass the perceived expectations and approval of friends, family, and peers regarding IDLE participation (Liu & Wang, 2024). When students feel that their social circle values and encourages IDLE activities, they are more inclined to engage in them.

Demographic factors, such as gender and family income, can influence students' engagement in IDLE. For example, research in the context of China has found that female students are more likely to engage in IDLE activities compared to their male counterparts (Zhang & Liu, 2023). However, the study in Kazakhstan, which included gender and year of study as control variables in a structural equation modelling approach, found that satisfied BPNs did not have a significant impact on students' involvement in IDLE (Zadorozhnyy & Lee, 2024). Additionally, family income plays a role, as students from higher-income families may have better access to technology and resources that facilitate IDLE participation.

Individual factors encompass the characteristics and beliefs of students, which influence their engagement in IDLE. Factors such as their ideal L2 selves (their desired future English-speaking identities), perceived usefulness (their belief in the benefits of IDLE activities for language learning), and international posture (their interest and willingness to engage with international cultures and languages) have been found to be associated with IDLE engagement (Liu *et al*., 2024; Zhang & Liu, 2024).

Understanding these antecedent factors can guide the development of interventions and strategies to encourage and increase students' participation in IDLE. By addressing these factors, educators and policymakers can create an environment that fosters and supports EFL students in their IDLE endeavours, promoting resilience and adaptability in both online and offline contexts.

2.4 BPNs and IDLE

Based on Ryan and Deci's (2000; see also Deci & Ryan, 2004) self-determination theory, the subtheory of BPNs emphasizes three essential needs – autonomy, competence, and relatedness – as vital for students' flourishing and well-being (Ryan & Deci, 2000). *Autonomy* refers to the learner's sense of choice and control over their actions, *competence* relates to their mastery and capability within their environment, and *relatedness* involves their sense of belonging and association with others (Deci & Ryan, 2004). When these needs are satisfied, students often develop intrinsic motivation, engaging in activities for sheer enjoyment (McAuley, Duncan & Tammen, 1989). By contrast, unmet needs can lead to motivation driven by external pressures or even disengagement. Therefore, educational practices that support students' BPNs are essential for cultivating intrinsic motivation, engagement, growth, and well-being (Deci & Ryan, 2004; Dincer,

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Yeşilyurt, Noels & Vargas Lascano, 2019; Sørebø, Halvari, Gulli & Kristiansen, 2009; Standage, Duda & Ntoumanis, 2005).

Grounded in research on classroom settings (Alamer, 2022; Dincer *et al.*, 2019; Joe, Hiver & Al-Hoorie, 2017), BPNs theory offers a solid framework for understanding engagement in IDLE (Fathali & Okada, 2018; Jeon, 2022; Sockett & Toffoli, 2020; Toffoli, 2020; Toffoli *et al.*, 2023). IDLE supports *autonomy* by allowing learners to choose materials and strategies that match their interests. It fosters *relatedness* through connections with like-minded individuals in online communities and enhances *competence* by providing authentic English materials, thereby improving receptive skills while engaging in productive activities (e.g. writing and conversing).

Additionally, satisfying BPNs impacts intrinsic motivation, which can positively impact various learning behaviours, such as engagement in autonomous language learning activities like IDLE. However, the satisfaction of psychological needs can vary significantly across different learning spaces due to the nature of interactions and the agents involved (Noels, Adrian-Taylor, Saumure & Katz, 2019; Pham, 2023). In formal classrooms, students mainly interact with teachers and peers, receiving structured guidance and immediate feedback. By contrast, digital spaces offer interaction with a broader network, including online friends, global peers, and digital communities via social media, online forums, and digital collaborative platforms. The nature of online communication – characterized by asynchronous interactions, lack of physical presence, and diverse cultural backgrounds – differs markedly from face-to-face classroom interactions and may impact the satisfaction of BPNs differently.

Sockett and Toffoli (2020) explored how BPNs could conceptually drive engagement in IDLE. Empirical evidence from Fathali and Okada (2018) showed that fulfilling BPNs increased Japanese EFL students' interest in using technology for English learning outside the classroom. Similarly, Jeon (2022) found that meeting BPNs led to longer engagement with English learning apps among Korean EFL students. However, most research has focused on perceived psychological needs within traditional classrooms, overlooking how students' needs are met in digital spaces (Sockett & Toffoli, 2020; Toffoli, 2020). Our study addresses this gap by separately examining the fulfilment of BPNs across classroom and digital settings among Kazakhstani university EFL students.

2.5 Research models and hypotheses

Existing studies have shown that fulfilling competence needs positively impacts engagement in IDLE activities (Fathali & Okada, 2018; Jeon, 2022; Zadorozhnyy & Lee, 2024). Specifically, students who feel more competent in their English language skills are more likely to participate in IDLE activities. For instance, Fathali and Okada (2018) found that Japanese EFL university students with a stronger sense of competence were more interested in using technology for learning English outside the classroom. Similarly, Jeon (2022) observed that Korean EFL primary students with a stronger sense of competence spent more time engaging with interactive English learning apps beyond the classroom.

However, since L2 learning occurs in different settings, the contexts in which competence is experienced may have potentially distinct influences on IDLE engagement. Previous studies have not distinguished between these contexts, but doing so is crucial. The mechanisms linking competence to IDLE engagement may differ due to variations in social interactions, feedback, and resources. In classrooms, immediate feedback and face-to-face interactions can directly enhance students' sense of competence. In contrast, digital settings require greater self-regulation and independent resource seeking, potentially altering how this need is satisfied. Therefore, given the importance of context-

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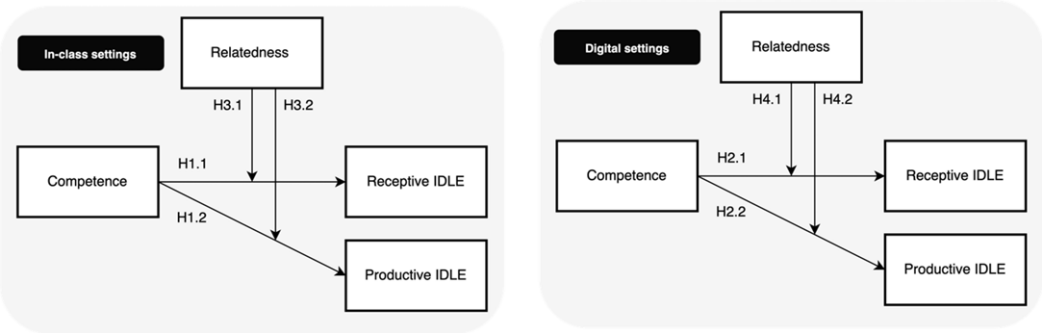


Figure 2. Proposed models.

specific analysis, we propose the following hypotheses regarding competence's direct impact on IDLE engagement:

- H1: *In the classroom*, students with a higher sense of competence than others will show higher engagement in receptive IDLE (H1.1) and productive IDLE (H1.2).
- H2: *In digital settings*, students with a higher sense of competence than others will show higher engagement in receptive IDLE (H2.1) and productive IDLE (H2.2).

Beyond competence, relatedness may also play a crucial role as a conditional factor in the relationship between competence and IDLE engagement. Previous research has emphasized the importance of relatedness in enhancing motivation and engagement in informal language learning (Alamer & Al Khateeb, 2023; Sockett & Toffoli, 2020). However, Zadorozhnyy and Lee (2024) found that in-class relatedness alone did not predict engagement in either receptive or productive IDLE, suggesting that strong classroom bonds may not extend to informal learning practices.

Given the lack of agreement in the findings, it is important to understand the interaction between relatedness and competence and their influence on engagement in IDLE. Students' experience of relatedness may differ between in-class and digital settings due to variations in social connectivity and community building. In the classroom, students interact directly with peers and instructors, fostering a sense of belonging and mutual support. In digital environments, relatedness might be established through online communities, social media interactions, or collaborative learning platforms. To explore different configurations of connection between perceived relatedness and competence, we propose examining the interaction between relatedness and competence to explore their predictive power for IDLE engagement. Therefore, we propose the following hypotheses:

- H3: In the classroom, relatedness will moderate the relationship between competence and engagement in receptive IDLE (H3.1) and productive IDLE (H3.2).
- H4: In digital settings, relatedness will moderate the relationship between competence and engagement in receptive IDLE (H4.1) and productive IDLE (H4.2).

Given that IDLE inherently involves "autonomous" learning – referring to self-directed and voluntary activities (Chik & Ho, 2017; Lee, 2022) – this study focuses on perceived "competence" and "relatedness". By operationalizing these two dimensions without modifying the foundational principles of self-determination theory, we aim to test our research hypotheses (see Figure 2) to enhance understanding of the specific dynamics at play in each setting and their translation to engagement in IDLE.

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3. Methods

3.1 Participants and context

The research involved students enrolled in language teacher education programs at higher education institutions in Southern Kazakhstan. A total of 226 students from three different public institutions voluntarily participated in the survey, with the following distribution: University 1 ($n = 77$), University 2 ($n = 85$), and University 3 ($n = 64$). The sample demographics were predominantly female, with 212 female students (93.81%), which aligns with the typical gender distribution in social sciences teaching majors in Kazakhstan (Zhunussova, 2021). Participants came from various academic years, with the largest group being the first-year students. The number of participants decreased with each subsequent year, with fewest from the graduate year. Specifically, the distribution was as follows: Year 1 ($n = 81$, 35.84%), Year 2 ($n = 73$, 32.30%), Year 3 ($n = 63$, 27.88%), and Year 4 ($n = 9$, 3.98%).

3.2 Measures

The survey was structured into three parts: (a) demographic information, including age, gender, and academic year; (b) competence and relatedness in in-class and digital settings; and (c) engagement in IDLE activities.

To measure *competence and relatedness in in-class settings*, we adapted subscales from previous research (McAuley *et al.*, 1989; Standage *et al.*, 2005), which were previously employed to gather self-report on satisfaction of BPNs. For the purposes of our study, we define these two dimensions – in-class competence and in-class relatedness – each represented by five items. *In-class competence* included statements like "I am satisfied with my performance during English language classes" ($\alpha = .82$), while *in-class relatedness* encompassed statements such as "I feel supported by other students in my English language class" ($\alpha = .87$). Participants rated these items on a scale from 1 (*strongly disagree*) to 7 (*strongly agree*).

Competence and relatedness in digital settings were measured using adapted subscales originally developed by Sørebø *et al.* (2009). The items were modified to fit the context of IDLE, specifically addressing the digital environments where IDLE activities occur and evaluating perceived satisfaction regarding competence and relatedness in these spaces. Both dimensions were assessed using a 7-point Likert scale. For *competence in digital settings* ($\alpha = .84$), the original item "When I am using e-learning, I often do not feel very capable" was revised to "When I am involved in IDLE, I often do not feel very capable". For relatedness ($\alpha = .80$), the item "People at work are pretty friendly towards me" was adapted to "People in IDLE environments are pretty friendly towards me".

To assess *IDLE engagement*, we used a questionnaire developed by Lee and Drajati (2019), which has been previously validated and commonly employed in studies across different contexts (Liu *et al.*, 2024; Liu & Ma, 2023). The instrument included two subscales: (a) *Receptive IDLE*, which had eight items (e.g. "I listen to English language podcasts and audiobooks"; $\alpha = .80$); and (b) *Productive IDLE*, which had six items (e.g. "I Skype, Zoom or have video- and audio-calls with others in English"; $\alpha = .86$). Both subscales used a Likert scale ranging from 1 (*never*) to 6 (*very often* [several times a day]).

3.3 Data collection

This study employed a cross-sectional survey design. Following approval from the Education University of Hong Kong's Human Research Ethics Committee, we adapted scales from prior studies and revised them as necessary to ensure content validity. Participants were recruited through convenience sampling. Recruitment was facilitated by university language instructors who distributed information about the study through their established email lists and WhatsApp

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groups, which are typically used for course-related communication and announcements. The participants, all native speakers of Russian, Kazakh, or both, had the option to complete the questionnaire in their native language(s) or in English. Prior to survey dissemination, university language instructors were invited to review the survey instrument for comprehensiveness. Participants were then invited to participate in the study. Before filling out the survey, participants were instructed to watch an instructional video, produced by the first author, which outlined the concept of IDLE, research objectives, procedures, potential risks, and benefits of participation, emphasizing the confidentiality and anonymity measures in place. At last, participants were required to complete consent forms before accessing and completing the survey.

3.4 Data analysis

We employed hierarchical multiple regression to investigate how competence in both in-class and digital settings predicts IDLE engagement and whether relatedness across these two settings moderates these relationships. Before diving into the analysis, we assessed the factor structure of each subscale and calculated subscale factor scores using confirmatory factor analysis with the lavaan package in R (Rosseel, 2012). We chose factor scores over composite scores to correct for item-level measurement errors before computing bivariate correlations.

As a preliminary step, we created two initial models that included demographic variables (age, year of study) as controls, referred to as Model 1a and Model 2a. We then conducted four separate regression models to test our hypotheses. Two models examined the individual effects of competence and relatedness in both in-class and digital settings, along with their interaction term, on receptive IDLE (Models 1b and 1c). Another two models replicated these relationships with productive IDLE as the dependent variable (Models 2b and 2c). Age and year of study were included as covariates in all models.

In the final step, we used the Johnson-Neyman (JN) technique and simple slopes analysis within R to visualize the models. The JN technique identifies the specific value across the moderator's score range where the effect of the independent variable on the dependent variable shifts from significant to non-significant (Hayes, 2017). The simple slopes plot was used to examine the moderating effects by calculating slopes at one standard deviation below (-1 *SD*) and above ($+1$ *SD*) the mean, respectively.

4. Results

4.1 Descriptive statistics and correlation analysis

Table 1 presents a comprehensive overview of the descriptive statistics, normality indicators, and bivariate correlations for all study variables. The data indicate that Kazakhstani students showed a stronger preference towards receptive IDLE compared to productive IDLE. They reported higher levels of "relatedness" in classroom settings than in digital environments, but higher "competence" in digital settings compared to classrooms. Additionally, all variables followed normal distributions, and the correlations among them were positive and statistically significant.

4.2 Model testing: Receptive IDLE

4.2.1 Competence and relatedness in the classroom (H1.1 and H3.1)

Classroom competence was positively associated with receptive IDLE ($\beta = 0.315$, $p < 0.001$). Similarly, classroom relatedness was also positively linked to receptive IDLE ($\beta = 0.152$, $p < 0.01$). However, the interaction between competence and relatedness did not significantly influence receptive IDLE. Despite this, the overall model was statistically significant, accounting for 17% of the variance in receptive IDLE, $F(5, 220) = 9.022$, $p < 0.001$, $R^2 = 0.17$.

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Table 1. Descriptive statistics, normality indicators, and bivariate correlations

	1	2	3	4	5	6
1. Receptive IDLE	1					
2. Productive IDLE	.530***	1				
3. Relatedness in digital settings	.363***	.308***	1			
4. Competence in digital settings	.361***	.160*	.599***	1		
5. Competence in the classroom	.381***	.335***	.322***	.373***	1	
6. Relatedness in the classroom	.293***	.231***	.405***	.354***	.427***	1
M	4.02	2.93	5.03	5.14	4.96	5.25
SD	1.08	1.26	1.16	1.11	1.27	1.08
Skewness	−0.15	0.44	−0.61	−0.99	−0.5	−0.8
Kurtosis	−0.66	−0.48	0.97	2.06	−0.11	0.87

Note. IDLE = informal digital learning of English.
***$p < .001$; *$p < .01$.

4.2.2 Competence and relatedness in digital settings (H2.1 and H4.1)

In digital settings, competence was positively correlated with receptive IDLE ($\beta = 0.271$, $p < 0.001$) and so was relatedness ($\beta = 0.281$, $p < 0.001$). As shown in Table 2, the interaction term (competence × relatedness) also showed a significant effect ($\beta = 0.128$, $p < 0.01$), though small. This model was statistically significant, explaining 20.5% of the variance in receptive IDLE, $F(5, 220) = 11.338$, $p < 0.001$, $R^2 = 0.205$.

To delve deeper into the significant moderating effect in Model 1c, the JN technique and simple slopes analyses were applied. The JN plots indicated that, in the range of the observed values of relatedness in digital settings (−3.17 to 1.50), the slope of competence in digital settings is significant at values above −0.81. Further, simple slopes analysis demonstrated that the positive link between competence and receptive IDLE was significant at high ($\beta = 0.46$, $t = 4.17$, $p < 0.001$) and moderate ($\beta = 0.31$, $t = 3.48$, $p < 0.001$) levels of relatedness. However, at low levels of relatedness, the relationship was not significant ($\beta = 0.16$, $t = 1.80$, $p = 0.07$). This suggests that the impact of competence in digital settings on receptive IDLE strengthens with higher levels of relatedness and diminishes with lower levels (see Figures 3a and 3b).

4.3 Model testing: Productive IDLE

4.3.1 Competence and relatedness in the classroom (H1.2 and H3.2)

Classroom competence was positively related to productive IDLE ($\beta = 0.337$, $p < 0.001$), but classroom relatedness did not show a significant effect. As shown in Table 3, the interaction term (competence × relatedness) significantly predicted productive IDLE ($\beta = 0.163$, $p = 0.001$). This moderation model was significant, explaining 17.2% of the variance in productive IDLE, $F(5, 220) = 9.110$, $p < 0.001$, $R^2 = 0.172$. Exploring the moderating role of classroom relatedness on the competence-productive IDLE link, we found that competence was significant beyond the interval of above −0.91 for relatedness levels. Simple slopes analysis revealed a significant positive relationship between competence and productive IDLE at all relatedness levels: low ($\beta = 0.23$, $p = 0.02$), moderate ($\beta = 0.44$, $p < 0.001$), and high ($\beta = 0.66$, $p < 0.001$), showing a shift from small to moderate effect sizes (see Figures 4a and 4b).

https://doi.org/10.1017/S0958344025000059 Published online by Cambridge University Press

https://doi.org/10.1017/S0958344025000059 Published online by Cambridge University Press

Table 2. Moderation effects of relatedness on the relationship between competence and receptive IDLE

	Model 1a	Model 1b	Model 1c
	β (*t*, *SE*, *p*, *CI*)	*β* (*t*, *SE*, *p*, *CI*)	*β* (*t*, *SE*, *p*, *CI*)
Intercept	0.287	0.161	0.042
	(1.074, 0.268, −0.240 : 0.815)	(0.644, 0.250, −0.331 : 0.653)	(0.171, 0.248, −0.446 : 0.531)
Gender	−0.306	−0.172	−0.127
	(−1.109, 0.276, −0.851 : 0.238)	(−0.670, 0.256, −0.676 : 0.333)	(−0.503, 0.252, −0.623 : 0.370)
Year of study	0.049	0.049	0.025
	(0.731, 0.067, −0.083 : 0.180)	(0.785, 0.062, −0.073 : 0.170)	(0.407, 0.061, −0.096 : 0.146)
In-class competence		**0.315*** **	
		(4.530, 0.070, 0.178 : 0.452)	
In-class relatedness		**0.152***	
		(2.199, 0.069, 0.016 : 0.288)	
In-class competence x In-class relatedness		0.000	
		(0.007, 0.048, −0.095 : 0.096)	
Online competence			**0.271*** **
			(3.482, 0.078, 0.118 : 0.425)
Online relatedness			**0.281*** **
			(3.632, 0.077, 0.129 : 0.434)
Online competence x Online relatedness			**0.128****
			(3.127, 0.041, 0.047 : 0.209)
N	226	226	226
R^2	0.008	0.170	0.205

Note. All continuous variables are mean-centred and scaled by 1 standard deviation. IDLE = informal digital learning of English.
***$p < 0.001$. **$p < 0.01$. *$p < 0.05$.

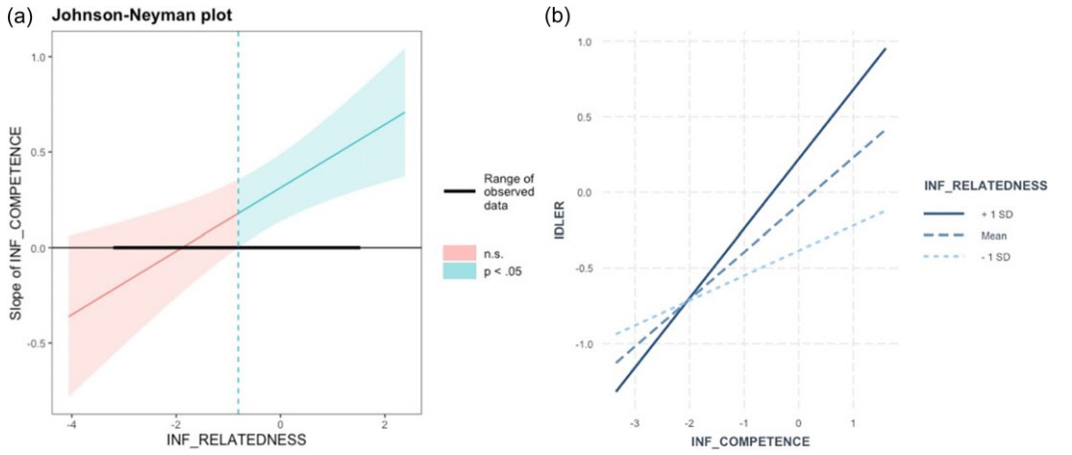


Figure 3. Interaction effect of competence × relatedness in digital settings on receptive informal digital learning of English (IDLE).

4.3.2 Competence and relatedness in digital settings (H2.2 and H4.2)

Competence in digital settings did not significantly affect productive IDLE, whereas digital relatedness had a strong positive association ($\beta = 0.413$, $p < 0.001$) (see Model 2c). However, the interaction term (competence × relatedness) was significant ($\beta = 0.208$, $p < 0.001$). The model was significant as well, explaining 20% of the variance in productive IDLE, $F(5, 220) = 11.019$, $p < 0.001$, $R^2 = 0.200$. The JN interval shows that competence's impact on productive IDLE becomes significant when relatedness in digital spaces falls outside the range of −0.84 to 0.56 (see Figure 5a). Simple slopes analysis shed further light on this dynamic. At low levels of relatedness (−1 *SD*), the effect of competence on productive IDLE was negative and significant (estimated $\beta = -0.23$, $t = -2.09$, $p = 0.04$). At average levels of relatedness, competence had no significant effect (estimated $\beta = 0.06$, $t = 0.53$, $p = 0.59$). Conversely, at high levels of relatedness (+1 *SD*), the relationship between competence and productive IDLE was positive and significant (estimated $\beta = 0.34$, $t = 2.60$, $p = 0.01$). These findings underscore the moderating role of relatedness in digital settings, revealing an antagonistic moderating effect on the relationship between competence in digital spaces and productive IDLE (see Figures 5a and 5b).

Overall, Figure 6 provides a visual overview of the outcomes from our model testing.

5. Discussion

Unlike past research that focused mainly on BPNs in classroom settings and IDLE, this study examined BPNs across classroom and digital environments among Kazakhstani university EFL students. This group, actively engaged in IDLE, has often been overlooked in previous studies.

In the classroom, competence was positively associated with both receptive and productive IDLE, **supporting H1.1 and H1.2**. This suggests that EFL students who feel assured and capable in their English classes are more likely to engage in receptive IDLE (e.g. watching English movies) and productive IDLE activities (e.g. writing English blog posts). This finding aligns with past research, which shows that a strong sense of competence encourages autonomous learning (Fathali & Okada, 2018; Ryan & Deci, 2017; Sockett & Toffoli, 2020). Therefore, boosting EFL students' confidence in the classroom can significantly increase their participation in independent, digitally mediated English learning activities outside school.

In digital environments, competence was positively linked to receptive IDLE, **supporting H2.1**. This means that EFL students who feel confident and capable in digital settings are more likely to

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Table 3. Moderation effects of relatedness on the relationship between competence and productive IDLE

	Model 2a	Model 2b	Model 2c
	β (t, SE, p, CI)	β (t, SE, p, CI)	β (t, SE, p, CI)
Intercept	0.412	0.193	0.063
	(1.541, 0.267, −0.115 : 0.938)	(0.773, 0.250, −0.299 : 0.685)	(0.254, 0.249, −0.427 : 0.553)
Gender	−0.439	−0.279	−0.199
	(−1.591, 0.276, −0.982 : 0.105)	(−1.093, 0.256, −0.783 : 0.225)	(−0.790, 0.252, −0.697 : 0.298)
Year of study	0.028	0.021	0.018
	(0.427, 0.067, −0.103 : 0.160)	(0.343, 0.062, −0.101 : 0.143)	(0.288, 0.062, −0.104 : 0.139)
In-class competence		**0.337*** **	
		(4.841, 0.070, 0.200 : 0.474)	
In-class relatedness		0.130	
		(1.882, 0.069, −0.006 : 0.266)	
In-class competence x In-class relatedness		**0.163*** **	
		(3.360, 0.048, 0.067 : 0.258)	
Online competence			0.042
			(0.533, 0.078, −0.112 : 0.196)
Online relatedness			**0.413*** **
			(5.320, 0.078, 0.260 : 0.566)
Online competence x Online relatedness			**0.208*** **
			(5.064, 0.041, 0.127 : 0.289)
N	226	226	226
R^2	0.012	0.172	0.200

Note. ***$p < .001$.

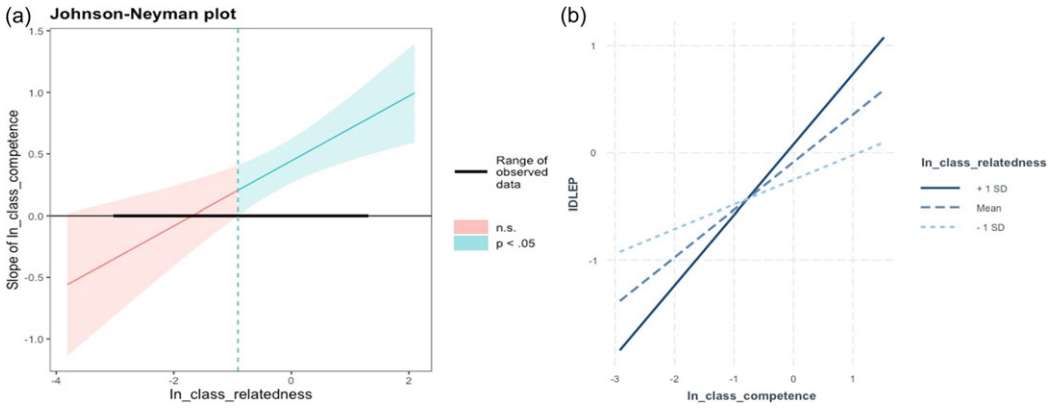


Figure 4. Interaction effect of competence × relatedness in the classroom on productive informal digital learning of English (IDLE).

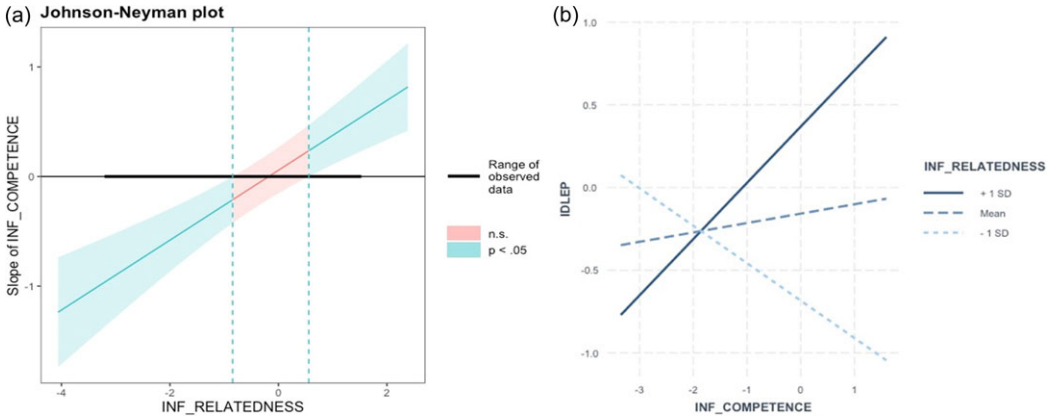


Figure 5. Interaction effect of competence and relatedness in digital settings on productive informal digital learning of English (IDLE).

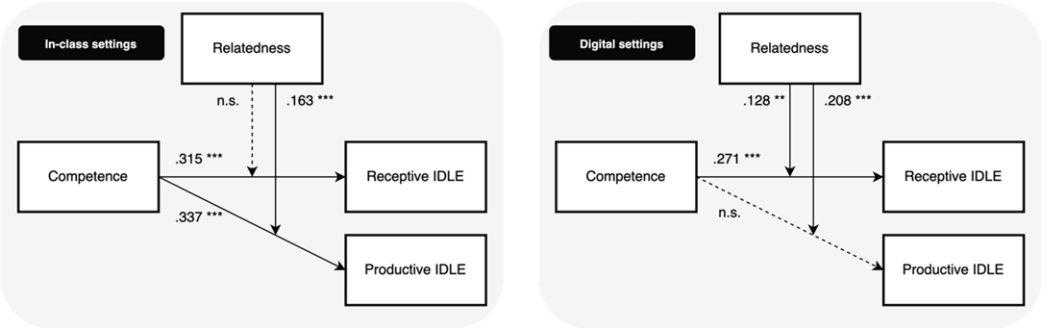


Figure 6. Visual overview of model testing results.
Note. Gender and year of study were included as control variables in all models. n.s. = non-significant relationship.
***$p < .001$.

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seek out English learning opportunities online, such as listening to English songs, watching English movies, and reading English content on social media. This study extends previous research by revealing a nuanced connection between BPNs in digital settings and receptive IDLE (Fathali & Okada, 2018; Jeon, 2022; Sockett & Toffoli, 2020). However, competence in digital spaces was not significantly linked to productive IDLE, thus **rejecting H2.2**. One potential reason for this could be the different nature of receptive and productive activities in digital environments. While receptive IDLE activities (e.g. watching videos or reading articles) are passive and require less effort, productive IDLE activities (e.g. writing blog posts or creating videos) demand higher levels of creativity, effort, and time commitment (Chik & Ho, 2017; Lee, 2022; Toffoli *et al*., 2023). Even if students feel confident in their English skills in digital settings, they might still avoid these more demanding tasks due to a lack of motivation, time, or resources (Lee, 2022; Toffoli, 2020). This could explain why competence in digital settings does not necessarily lead to engaging in productive IDLE activities, which contrasts with earlier studies suggesting that competence generally transfers across different activities (Deci & Ryan, 2004; Jeon, 2022). Future research should validate these claims.

In the classroom, relatedness did not moderate the relationship between competence and receptive IDLE, **rejecting H3.1**. This means that EFL students' sense of connection and belonging in the classroom did not influence how their English competence affected their receptive IDLE activities. This finding makes sense, as receptive IDLE activities (e.g. listening to English songs or watching YouTube videos) are often done independently and without involving classroom interactions (Lee, 2022; Sauro & Zourou, 2019). However, relatedness did moderate the relationship between classroom competence and productive IDLE, **supporting H3.2**. This indicates that when EFL students feel capable in their English classes (*competence*) and have a supportive and connected classroom environment (*relatedness*), they are more likely to engage in creating English content online (*productive IDLE*). In other words, feeling connected to their classmates and teacher may encourage EFL students to be proactive and use their English skills more actively in extramural digital settings. This finding supports previous research on the importance of relatedness in boosting motivation and engagement in informal language learning (Alamer & Al Khateeb, 2023; Sauro & Zourou, 2019; Sockett & Toffoli, 2020; Toffoli, 2020). To our knowledge, this is the first study to show that classroom relatedness can significantly amplify the relationship between competence and productive IDLE.

In digital settings, relatedness moderated the relationship between competence and both receptive and productive IDLE, **supporting H4.1 and H4.2**. This means that when EFL students feel confident about their English abilities in digital environments (*competence*) and have a supportive online community (*relatedness*), they are more likely to engage in both consuming and creating English content online (receptive and productive IDLE). Additionally, our findings highlight the antagonistic impact of low relatedness on productive IDLE, where the absence of relatedness can reverse the positive effects of competence, emphasizing the importance of the sense of belonging in digital learning environments. This means that feeling connected to others online helps EFL students use their English skills more actively and in diverse ways. Taken together, our findings support broader research on the importance of social connections in online learning (Sauro & Zourou, 2019; Toffoli *et al*., 2023; Vazquez-Calvo, 2021; Vazquez-Calvo *et al*., 2019). Therefore, creating digital communities where students feel connected is crucial to enhancing their engagement in IDLE activities.

6. Pedagogical implications

Our findings offer pedagogical insights for teachers on designing activities for both classroom and digital environments.

In the classroom, as competence is positively linked to both receptive and productive IDLE, teachers can assign EFL students regular semi-structured tasks, such as oral presentations on topics they are passionate about (Dressman *et al*., 2023). Providing encouraging and constructive

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feedback can help build their public speaking skills and boost their sense of accomplishment. This approach can inspire greater engagement in receptive IDLE (e.g. watching YouTube videos related to their presentation topic) and productive IDLE activities (e.g. chatting with others about their topic).

Given that relatedness moderates the relationship between competence and productive IDLE, teachers can break language tasks into manageable steps, offer clear guidance and feedback, and gradually increase the challenge (Sundqvist & Sylvén, 2016). This helps EFL students build confidence in their English abilities (*competence*). Collaborative learning activities that encourage idea sharing, peer support, and a classroom culture of mutual respect can also foster a sense of community (*relatedness*). As a result, EFL students are more likely to use their English skills actively in extramural digital settings (*productive IDLE*).

In digital environments, as competence is positively associated with receptive IDLE, teachers can design a 14-day IDLE challenge where EFL students set their learning goals based on their needs and interests (e.g. improving speaking fluency), choose digital tools (e.g. a dubbing app), and select strategies (e.g. recording and uploading daily speaking practice; Lee, 2022; Sundqvist & Sylvén, 2016). Teachers can help break down the challenge into smaller steps, provide examples and models, and offer on-demand support. As students complete their IDLE challenge, their confidence increases, likely leading to more engagement in receptive IDLE (e.g. finding additional resources from social media).

Since relatedness moderates the relationship between competence and both receptive and productive IDLE, teachers can design collaborative digital storytelling tasks. EFL students can work in small groups on digital platforms (e.g. Padlet and WhatsApp) to brainstorm, write, and design a theme and narrative using various multimodal sources (e.g. texts, images, audio, videos, and emojis; Dressman *et al*., 2023; Lee, 2022). Throughout the task, students can use English, draw on personal experiences, and provide feedback to each other, boosting their confidence in their English abilities (*competence*) and building a supportive digital community (*relatedness*). Taken together, these insights can guide language educators in creating a more cohesive synergy between in-class and out-of-class language learning experiences, thereby enhancing student engagement in IDLE. Additionally, they can support the integration of IDLE within the instructional framework by utilizing the IDLE continuum model (Lee, 2022; Zhang & Liu, 2024) to facilitate a seamless L2 learning journey.

7. Limitations and future research

This study has three main limitations, including the sample, research instrument, and design. First, most participants were female pre-service EFL teachers from one country, limiting the applicability of our findings to the entire student population. Future studies could include a more diverse sample, incorporating more male participants from different disciplines and countries to enhance generalizability. Second, we relied solely on self-reported data, which is subject to recall bias (Sundqvist, 2024). Future studies could strengthen data sources by including more qualitative methods (e.g. interviews and reflective essays). Lastly, as a cross-sectional study, we cannot establish causal links. Future research could use longitudinal or experimental designs to investigate whether supporting students' BPNs in classroom and digital settings increases IDLE engagement (Sockett & Toffoli, 2020). Furthermore, researchers might consider implementing repeated testing and conducting studies across diverse contexts to enhance the generalizability and robustness of the findings.

8. Conclusion

This study examines the relationship between two core BPNs (*competence* and *relatedness*) in both classroom and digital settings and IDLE engagement among Kazakhstani university EFL students.

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We found that, *in the classroom*, EFL students who perceive themselves as more competent are more likely to engage in receptive and productive IDLE, while a higher sense of relatedness strengthens the positive link between competence and productive IDLE. Similarly, *in digital settings*, competence is positively associated with receptive IDLE, while high levels of relatedness amplify the link between competence and engagement in both receptive and productive IDLE. Our study provides the first empirical evidence of a positive link between BPNs in both settings and IDLE engagement. Pedagogically, teachers can enhance EFL students' IDLE engagement by designing activities that foster competence and a sense of community in both classroom and digital settings.

Data availability statement. Data available on request due to privacy/ethical restrictions.

Authorship contribution statement. Artem Zadorozhnyy: Conceptualization, Methodology, Formal analysis, Writing – original draft, Writing – reviewing & editing; Ju Seong Lee: Conceptualization, Methodology, Formal analysis, Writing – original draft, Writing – reviewing & editing.

Funding disclosure statement. This work is a part of research funded by the Hong Kong Postdoctoral Fellowship Scheme (Grant number PDFS2223-8H04).

Competing interests statement. The authors declare no competing interests.

Ethical statement. This research project was conducted in accordance with the approval of the Human Research Ethics Committee of the Education University of Hong Kong. All participants were volunteers.

GenAI use disclosure statement. During the development of this work, the authors used the AI service provided by Poe's GPT-4 platform (https://poe.com/GPT-4; accessed January–March 2024) to enhance the readability of the text. However, no AI-enabled resources were used for generating ideas or data analysis.

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https://doi.org/10.1017/S0958344025000059 Published online by Cambridge University Press