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Department of English Studies, Faculty of Pedagogy and Fine Arts, Adam Mickiewicz University, Kalisz
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Task flow in L2 writing: Antecedents and effects on task performance

Chengchen Li ✉
Shanghai Jiao Tong University, China
https://orcid.org/0000-0002-7262-3309
chengchenli@sjtu.edu.cn

Jean-Marc Dewaele
VIZJA University, Warsaw, Poland
University College London, UK
Birkbeck, University of London, UK
https://orcid.org/0000-0001-8480-0977
j.dewaele@bbk.ac.uk

Peter D. MacIntyre
Cape Breton University, Sydney, Canada
https://orcid.org/0000-0002-1085-6692
peter_macintyre@cbu.ca

Abstract

Flow has been highly valued by educational researchers and practitioners for its positive effects on learner well-being, learning outcomes, and academic success. While interest in flow within second language (L2) acquisition has grown recently, comprehensive evidence remains limited regarding both its antecedents and its impact on L2 task performance, particularly in writing contexts. Grounded in Egbert's (2003) theoretical model of flow and language acquisition, this study investigated how flow states in L2 writing are shaped by learners' prior writing proficiency and immediate perceptions of task control, and how these factors collectively influence writing task performance. A

total of 206 Chinese eighth-graders learning English as a foreign language completed a pre-task L2 writing proficiency test, an argumentative writing task, and post-task scales measuring task flow and task control. Path analysis revealed that perceived task control predicted task performance both directly and indirectly through its influence on task flow. In contrast, L2 writing proficiency predicted task performance directly, without mediation by task flow. These findings largely support Egbert's (2003) model within a task-based L2 writing context. The study suggests pedagogical implications for task design, emphasizing the importance of fostering a sense of control to facilitate flow states and enhance task performance.

Keywords: task flow; task control; L2 writing; positive psychology; task-based language teaching (TBLT)

1. Introduction

Flow, a key concept in positive psychology, describes a subjective state characterized by intense focus, loss of self-consciousness, perceived control over one's actions and environment, distorted sense of time, positive post-activity emotions (e.g., enjoyment), and a willingness to engage in similar experiences in the future (Csikszentmihalyi, 1991; Nakamura & Csikszentmihalyi, 2014; Peterson, 2006). Flow has been widely recognized by educational researchers for its role in shaping learners' emotions, engagement, well-being, and academic success (e.g., Harris et al., 2023; Rogatko, 2009; Shernoff et al., 2014).

The concept of flow has garnered research interest in second language acquisition (SLA) since the early 2000s (Egbert, 2003). The introduction of positive psychology into SLA during the 2010s further advanced flow research in language learning (Aubrey, 2017a; Czimmermann & Piniel, 2016; Dewaele et al., 2023). Studies have linked flow to second language (L2) learning achievement in both face-to-face settings (e.g., Amini et al., 2016; Dewaele & MacIntyre, 2024) and online environments (e.g., Hong et al., 2017; Li et al., 2019). However, relatively few studies have explored the role of flow in L2 writing performance or how it emerges in response to specific task features and learner perceptions in task-based language teaching (TBLT) contexts (Cho, 2018; Piniel & Albert, 2019; Zuniga, 2023).

Writing, as a complex cognitive and communicative process, requires the integration of multiple factors, including cognitive, emotional, and motivational elements (Kormos, 2012, 2023; Li et al., 2024). Flow, as previously defined, reflects deep cognitive engagement, positive emotional experiences, and heightened motivation, enabling individuals to perform at their best (Almukhaild & King, 2024; Zuniga & Payant, 2021). When experiencing flow, writers may maximize the potential of a

given task, leveraging opportunities to stretch their existing skills. Additionally, recurring flow states may contribute to long-term well-being by fostering positive emotional associations with writing tasks (Li, 2024; Li & Dewaele, 2024).

These findings underscore the importance of incorporating flow as a key psychological construct into both TBLT and L2 writing research. Accordingly, this study investigates how flow arises and influences task performance in L2 writing. Theoretically, Egbert's (2003) flow and language acquisition model posits that flow experiences in a task depend on an individual's general L2 skills and their perceived control over the task, which in turn enhances motivation, engagement, behavior, and performance. Guided by this framework, the study examines how L2 writing proficiency and perceived task control jointly predict flow and how flow relates to task performance.

2. Literature review

2.1. Theoretical model of flow and language acquisition

Flow is conceptualized as an autotelic experience marked by intense concentration, complete task absorption, diminished self-awareness, and intrinsic enjoyment (Csikszentmihalyi, 2014). This optimal psychological state emerges when an individual's skills align with the perceived challenge of an activity (Csikszentmihalyi, 1991, 2014). During flow, individuals operate at peak performance levels, creating ideal conditions for skill development and expansion (Csikszentmihalyi, 2014). Importantly, flow exhibits domain, skill, and task specificity as its manifestation depends on learners' environmental perceptions and responses to contextual factors (Csikszentmihalyi, 2014).

Within the domain of L2 learning, Egbert (2003) proposed the theoretical model of flow and language acquisition, a foundational framework for conceptualizing and evaluating flow experiences in language learning activities. This model delineates the nomological network of flow, linking its antecedents, characteristics, and outcomes. Grounded in this framework, the current study defines flow in L2 writing tasks as a psychological state emerging from a perceived sense of control over the task when an individual's skill level aligns with the challenge posed by the task. This state is characterized by intense and focused concentration, genuine investment of effort, loss of self-consciousness, temporal distortion (e.g., time passing unnoticed), and positive post-activity affect (e.g., enjoyment or heightened intrinsic motivation), culminating in a willingness to engage in similar tasks in the future. This definition synthesizes key constructs from positive psychology

(Csikszentmihalyi, 1991, 2014) and SLA research on flow (Aubrey, 2017b; Dewaele & MacIntyre, 2024; Egbert, 2003; Moeller, 2018; Piniel & Albert, 2019).

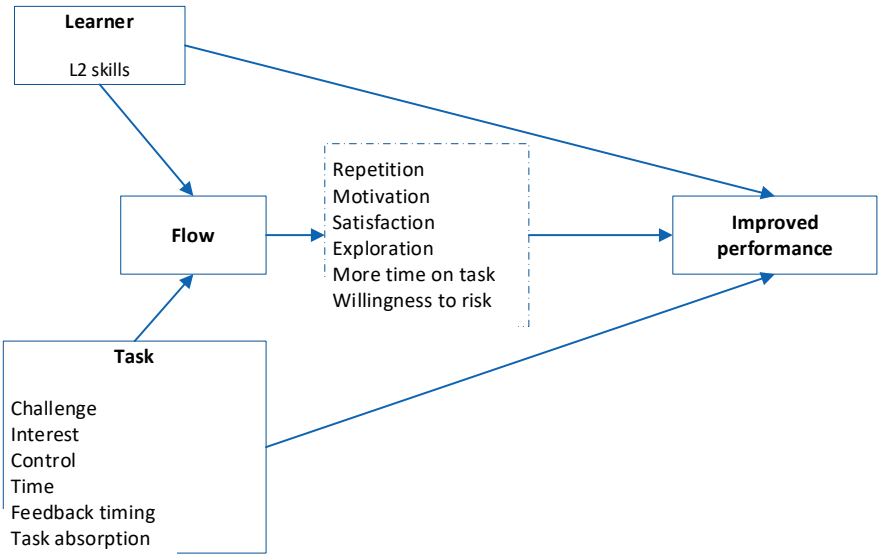

Figure 1 Simplified model of flow and language acquisition

Egbert's (2003) model of flow and language acquisition posits that flow experience occurs as a product of the interplay between a learner and the task, and contributes to improvements in the learner's performance or competence (see Figure 1). Relevant learner characteristics include skills in the target language, such as reading, writing, speaking, listening, pragmatics, and typing. Relevant task features include learners' perceptions of how challenging, interesting, or controllable the task is, as well as the sufficiency of time allotted, the immediacy of feedback, and whether the task allows learners to focus without disruptions. Flow, in turn, contributes to necessary repetition in the task, increased motivation, subjective satisfaction, a desire to explore, focused time on the task, and a greater willingness to take risks. These factors ultimately lead to improved performance or competence. Egbert (2003) also argued that causality in flow and performance is bidirectional. Learners who manage to find a balance between skill and challenge when performing a task can reach a state of flow, which may lead to improved performance and strengthen flow in the future.

A central assumption directly relevant to this study is that an individual's general L2 proficiency and their subjective perceptions of control over a task jointly predict flow experiences during the task. In turn, flow enhances learner motivation, engagement, and subsequent task performance. This study aims to test this assumption in the specific context of L2 writing within the TBLT framework.

2.2. Sources of flow experiences in L2 learning

Accumulating evidence has shown that L2 learners reach a state of flow as a result of the interplay between specific learner characteristics (e.g., L2 proficiency and age: Dewaele & MacIntyre, 2014, 2024), task-related features or perceptions (e.g., perceived control over a task, task complexity, modality, novelty, goal orientation, playability, and time constraints: Cho, 2018; Czimmermann & Piniel, 2016; Egbert, 2003; Li et al., 2019; Piniel & Ritecz, 2022; Zuniga, 2023), and environmental factors (e.g., classroom environment: Rubio, 2011; cultural factors: Aubrey, 2017b; Zuniga, 2023), extending Egbert's (2003) theoretical model of flow and language acquisition to include learning environment at macro levels. Subsequent sections will focus on how flow experiences are shaped by individuals' overall L2 proficiency as well as their perceived control over specific tasks. The moderating effects of task-related features (e.g., modality, topic, and format) and environmental factors (e.g., cultural or educational) will also be reviewed.

2.2.1. L2 proficiency as a source of flow

Prior studies have examined the links between L2 proficiency and the experiences of flow in L2 learning, yielding mixed findings. For example, in a study by Zuniga (2023), learners' flow experiences were analyzed across various tasks using an experience sampling method. The study involved 13 teachers and 327 students from 18 French L2 classes in a Canadian postsecondary school. The findings revealed that L2 proficiency did not have a notable impact on the experience of flow. In contrast, task-related features were found to play a significant role in flow experiences: Learners experienced significantly higher levels of flow during tasks that featured novelty, dyadic participant structures, gamification, meaningful interactions, information exchanges, and communication technologies. In another study in oral task contexts, Aubrey (2017b) found that perceived high L2 proficiency was a significant predictor of flow experiences, based on content analysis of 208 diary entries from 42 Japanese university English as a foreign language (EFL) students. This relationship held consistently across different task types (information exchange and decision-making) and topics (intercultural and intracultural contexts). In a more recent study at a longer timescale, Dewaele and MacIntyre (2024) examined flow experiences in L2 learning in general among 1,044 foreign language learners from various countries. Results indicated that at the beginning of their foreign language (FL) learning journey and when their perceived social status in the group was low, flow experiences were typically self-focused, rare, and short-lived. As learners advanced in their FL skills, these flow experiences became more common,

intense, and enduring, and were increasingly shared with others. This indicates that more proficient L2 learners were more likely to experience more flow with higher levels of intensity and longer duration.

2.2.2. Task control as a source of flow

Prior studies, particularly those in L2 oral task contexts, have examined how individuals' flow experiences in specific tasks were shaped by their perceived control over the tasks in light of other task-related features. For example, Egbert (2003) conducted the first empirical study to examine the existence and sources of flow in seven oral tasks among 13 American secondary school students of Spanish. The tasks were completed individually, in pairs, in small groups, or with the whole group. Using questionnaires, observations, and interviews, Egbert (2003) found that flow occurred when tasks were perceived as controllable, interesting, intensely focused, and manageable, whereas routine tasks inhibited flow. The findings highlight the consistent role of perceived control over tasks in facilitating flow.

Czimmermann and Piniel (2016) investigated flow experiences among 85 Hungarian EFL students completing written-spoken narrative tasks. Their study made an important distinction between task-specific flow and general classroom flow, finding these constructs were moderately correlated yet distinct (r = .34). The analysis revealed moderate associations between task-specific flow and three key features: perceived challenge-skill balance (r = .34), task interest (r = .30), and sense of control (r = .26). Notably, task modality (individual, pair, or group work) showed no significant impact on flow levels. The study also identified several anti-flow predictors: state anxiety (r = -.36), boredom (r = -.59), and apathy (r = -.53). Piniel and Ritecz (2022) partially replicated the study conducted by Czimmermann and Piniel (2016) by focusing on flow experiences during speaking tasks among 75 Hungarian EFL students. They concentrated on individual work, pair work, and group work. Comparing the means of the different task-specific flow constituents with those in Czimmermann and Piniel (2016), they found that the challenge-skills constituent had the highest mean, in contrast with the previous study, where attention had the highest mean.

Almukhaild and King (2024) investigated the positive flow experiences of anxious FL learners engaged in online speaking tasks. Participants included 127 Saudi EFL university students who completed a questionnaire, with 25 also participating in stimulated recall interviews alongside interviews with their English teacher. They found that anxious students could reach a state of flow and that this positive state was maintained under specific conditions: engaging in authentic communication on appealing topics, having control over task content, and balancing

challenge with skill. Zuniga and Payant (2021) found that task repetition boosted flow experiences among 24 multilingual English learners (with varied first languages [L1s]) in decision-making gap tasks, primarily by raising perceived control, but effects were mediated by task modality (oral vs. written).

Cultural contexts have also been found to play a role in shaping flow experiences in L2 learning. Wu and Albert (2024), for example, examined the effect of study contexts on flow experiences in English writing among two groups of Chinese students – one in Hungary and the other in China, with a total of 40 participants. Each student produced 120 narratives and completed a flow questionnaire after each task. Results indicated a significant effect of study context: Students in Hungary experienced higher levels of flow during writing tasks, while those in China experienced more anti-flow, suggesting the role of cultural contexts in task flow. This highlights the need to cross-validate the above-mentioned source-flow links in diverse cultural backgrounds.

2.3. Outcomes of flow experiences in L2 learning

Prior research has investigated flow-achievement relationships in L2 learning contexts. Studies have also extensively explored flow associations with other psychological outcomes in L2 learning. Grounded in Egbert's (2003) flow and language acquisition model (Figure 1), the prevailing theoretical assumption posits that flow first influences learning psychology, including emotions, motivation, and engagement, which in turn mediates its effects on L2 achievement. Accordingly, the following sections review both the flow-achievement relationships and flow-psychology connections in L2 learning to establish a preliminary understanding of the direct and indirect pathways linking flow to psychological states and, ultimately, to task performance.

2.3.1. Flow and achievement outcomes in L2 learning

Extant studies have generally found that flow experiences predicted improved L2 learning achievement. Amini et al. (2016), for example, demonstrated that the flow states experienced by 65 learners at an English language institution in Sarab significantly predicted vocabulary retention. Similarly, Li et al. (2019) found that among 291 Chinese EFL undergraduates, flow experiences in digital game-based vocabulary learning positively predicted perceived vocabulary acquisition outcomes. Extending these findings, Liu et al. (2022) showed that flow experiences among 216 Chinese undergraduate students predicted their end-of-semester writing course scores. Yet, relatively few studies have established the flow-achievement link in task-based writing contexts.

2.3.2. Flow and psychological outcomes in L2 learning

In addition to the established links between flow and L2 learning achievement, prior research has explored flow associations with other psychological factors, such as emotions, motivation, and engagement. These findings suggest that such psychological factors may mediate flow effects on L2 achievement. Notably, these relationships have been extensively examined in general L2 learning contexts and L2 speaking tasks, and they remain largely unexplored in task-based writing contexts.

Firstly, the links between flow and emotions in the L2 learning context have been well-established. Boredom, anxiety, and enjoyment are found to be significant correlates of flow (Nakamura & Csikszentmihalyi, 2009; Pekrun et al., 2007). This pattern is slightly different in FL contexts. For example, in the study by Dewaele and MacIntyre (2014), results from 1,742 FL learners globally revealed a significant positive correlation between flow and foreign language enjoyment (FLE) (r = .62) and a weaker negative correlation between flow and foreign language anxiety (FLA) (r = -.27). In another study, Dewaele and MacIntyre (2024) compared 761 EFL learners with 825 learners of languages other than English (LOTE) from the same database. EFL learners reported lower levels of FLE (Cohen's d = 0.179) and less time in flow (Cohen's d = 0.145), along with higher FLA (Cohen's d = 0.157) compared to LOTE learners. Despite small effect sizes, the study suggests that positive emotions and flow were not inherently linked to the prestige of the target language; LOTE learners may show greater commitment to learning a less common language. A further study by Dewaele and MacIntyre (2024) explored the relationships between flow and three emotions (enjoyment, anxiety, and boredom) in 165 Arab and Kurdish students in both face-to-face and online EFL learning settings. Statistical analyses demonstrated that FLE, particularly the personal FLE dimension, was a strong positive correlate of flow. Conversely, boredom emerged as a significant negative correlate of flow. Interestingly, in contrast to prior studies, FLA did not show a significant relationship with flow. In L2 speaking task contexts, Piniel and Ritecz (2022) also found that boredom was a significant predictor of anti-flow experiences of 75 Hungarian EFL students.

Besides emotions, motivation was found to be an important correlate of flow experiences in L2 learning. Piniel and Albert (2019), for example, found that flow experiences of 214 Hungarian EFL learners were positively related to self-efficacy and motivated behavior. They concluded that with increased perceived skill, learners can experience more flow, which strengthens their motivation. Similar results were found among 216 undergraduate students in an L2 writing context in China (Liu et al., 2022) as well as 78 fourth-graders from an elementary school in New Taipei in a Chinese-as-L2 radical learning context.

Engagement, a key precursor to effective performance (Mercer & Dörnyei, 2020), has been consistently identified as positively correlated with flow experiences in L2 learning contexts. The quasi-experimental study by Aubrey (2017a) pointed to the impact of flow on task engagement in two groups: an intercultural group (*N* = 18) and an intracultural group (*N* = 18). Both groups completed five oral tasks, with the intra-cultural group continuing with Japanese peers and the inter-cultural group performing with international interlocutors (*N* = 18). Analysis of flow questionnaires and task transcripts revealed that flow experiences improved specific aspects of task engagement, such as the frequency and quality of turns taken during the L2 tasks.

In summary, existing research consistently demonstrates that flow in L2 learning is associated with positive emotional outcomes (e.g., enjoyment), motivational outcomes (e.g., self-efficacy), and increased learner engagement, particularly in task-based activities. As Egbert's (2003) model of flow and language acquisition suggests, these psychological benefits may subsequently contribute to improved L2 achievement and task performance.

2.4. Flow in task-based writing

TBLT is a pedagogical approach that fosters L2 acquisition and development through meaning-oriented tasks (Ellis et al., 2020). Central to TBLT are tasks with four defining characteristics: (1) a non-linguistic outcome, (2) a primary focus on meaning, (3) the presence of a gap (e.g., information or opinion gaps), and (4) reliance on learners' own linguistic and non-linguistic resources (Ellis, 2003). For example, planning a school event with group partners is a task, while completing a grammar worksheet is not.

Existing research has suggested that TBLT has the potential to foster flow experiences in L2 learning more effectively than traditional methods by providing more meaningful, goal-oriented communication tasks. Rubio (2011) found that 93% of Spanish EFL learners (27/29) achieved flow during meaning-focused oral tasks (e.g., discussions) but not in form-focused activities like cloze tests. Similarly, Aubrey (2017a) demonstrated that the intercultural contact group (international students) generated significantly higher flow than the intracultural contact group (domestic Japanese students) during a series of information exchange and decision-making oral tasks (e.g., planning a trip, discussing an endangered species), which underscores the importance of authentic interaction. Cho (2018) further examined the effects of task complexity and modality on flow among 141 Korean undergraduate English learners. Participants performed four argumentative decision-making tasks, varying in complexity (2 vs. 5 elements)

and modality (speaking vs. writing). Results showed that task complexity played no role in flow experience, while task modality did because, compared with speaking, participants perceived high interest in and control over writing tasks.

Despite the strong potential of writing tasks to facilitate flow experiences, research examining flow antecedents and outcomes in L2 writing contexts remains scarce. Four key limitations are particularly evident in current scholarship. First, L2 flow research has predominantly investigated general, long-term flow experiences rather than task-specific flow experiences, which ignores the situation-dependent nature of flow. Second, existing task-specific flow studies have largely focused on speaking and overlooked L2 writing. However, writing and speaking differ fundamentally in terms of the presence of the audience, stability of language signal, and the degree of control (Ravid & Tolchinsky, 2002). Therefore, examining flow in L2 writing tasks can provide insights that extend the current understanding primarily derived from speaking. Third, many studies claiming to investigate flow experiences in different tasks employ activities (e.g., cloze tests) that fail to meet TBLT criteria (Ellis, 2003) or represent short-term pedagogical exercises rather than authentic or meaning-focused tasks. This gap underscores the need for research on flow within rigorously designed TBLT tasks, especially those targeting productive skills, such as writing. Finally, few studies have simultaneously examined both the antecedents of flow and its impact on L2 task performance, limiting our understanding of the underlying mechanisms. Collectively, these research gaps provide strong justification for the current investigation.

3. Research question and hypothesized model

Given the gaps identified previously, the current study aims to answer the following research question (RQ):

How do L2 writing proficiency, task control, and task flow collectively predict L2 writing task performance?

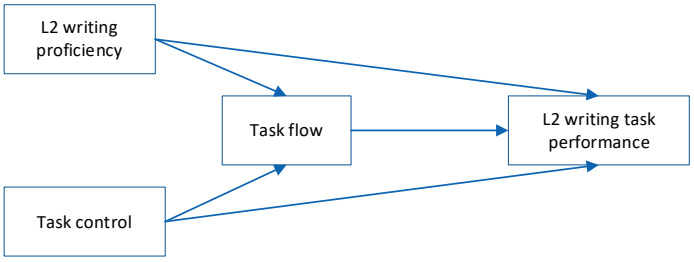

Figure 2 Hypothesized model: flow and L2 writing task performance

Drawing on Egbert's (2003) model of flow and language acquisition, we hypothesize a mediation model within a task-based writing instruction context (see Figure 2). In this model, L2 writing proficiency and task control jointly predict task flow, which in turn influences writing performance.

4. Methods

4.1. The local L2 context and participants

The study employed convenience sampling and was conducted with eighth-grade EFL learners at a rural Chinese middle school. Participants (N = 206) were recruited from five intact classes (40-50 students each) whose English teachers voluntarily participated in the research. These students received six to nine 40-minute English lessons weekly, following a curriculum emphasizing explicit grammar instruction, rote memorization, and controlled mechanical practice, while devoting minimal attention to speaking skills. The single-site sampling choice was particularly valuable given the current study focus on task-specific psychological states of flow in the following two ways: (1) it maintained consistency in instructional approach and learning environment across participants, and (2) it helped control for potential confounding variables that might influence psychological responsiveness, including flow experiences.

The participants comprised 120 males (58.3%) and 86 females (41.7%), aged 12 to 15 years (M = 13.31, SD = 0.72). They began learning English in Grade 3 and started English writing instruction in Grade 7. Prior to the study, they had taken a practice version of the *Cambridge A2 Key for Schools English Test*, scoring an average of 46.92 out of 85 (SD = 14.73), excluding the speaking section, indicating a proficiency level approximately corresponding to A1 on the *Common European Framework of Reference for Languages*. All participants had Chinese as their L1 and English as their L2, with no travel experience to English-speaking countries. In line with local educational policies, they were classified as beginners in English according to the proficiency standards set by the Chinese Ministry of Education.

4.2. Instruments

4.2.1. L2 writing proficiency test

Prior L2 writing proficiency was assessed using scores from the practice version of the *Cambridge A2 Key for Schools English Writing Subsection*. This subsection

included an email writing task and a picture-based storytelling task, both frequently practiced in class and as homework. The minimum length was 25 words for the email and 35 words for the story. Each task was scored on a scale of 0-15 (see the section on scoring for more details).

For research targeting beginner-level L2 writers and school-aged learners, the *Cambridge A2 Key for Schools Test* provides a rigorously standardized, psychometrically validated, and pedagogically aligned assessment of L2 writing proficiency (Cambridge Assessment English, 2020). The methodological robustness of the test, evidenced by its structured communicative tasks, analytic scoring rubrics, and direct CEFR alignment, makes it particularly effective for evaluating foundational writing competence in educational settings. Moreover, its reliability has been empirically established in previous studies conducted at the same research site (e.g., Li et al., 2023, 2024), further supporting its appropriateness for similar research contexts and its potential for comparable investigations.

4.2.2. The writing task

The participants were instructed to write an essay of at least 80 words within 40 minutes, in line with the requirements and teaching practices of the research site. The argumentative writing task, *Choosing the Best Roommate*, involved selecting the best roommate based on three categories: hobby, strength, and weakness (Li et al., 2024). The writing task qualifies as a decision-making task within TBLT framework, satisfying Ellis' (2003) four defining criteria: (1) it yields a non-linguistic outcome (a roommate selection decision mirroring real-world task completion), (2) it maintains primary focus on meaningful communication, (3) it incorporates an opinion gap requiring resolution, and (4) it necessitates learners' independent use of both linguistic and cognitive resources.

Due to their relatively low English proficiency, information on the roommate candidates was provided in both English and Chinese, and the instructions were given in Chinese. The assessment was conducted under controlled conditions: Students wrote on paper without access to external resources (dictionaries, teacher assistance, or peer collaboration). Within the 40-minute limit, participants could self-manage their time allocation for pre-writing, drafting, revising, and editing phases.

4.2.3. Post-task scales for task control and task flow

After completing the writing task, participants filled out task-based scales for perceived task control and task flow. Consistent with L2 task perception literature

(Révész et al., 2017; Robinson, 2001), participants rated their agreement with each statement on a 1-9 point scale, with higher scores indicating stronger agreement (see Appendix). To ensure complete comprehension, all scales were in Chinese. We assessed the construct validity (the extent to which a measure assesses what it claims, or purports, to be measuring; Messick, 1989) and reliability of all post-task scales (see Section 4.5 for statistical analyses and Table 1 in Section 5.1 for results). The scales were the following:

1. *Task control.* Three items were generated to measure participants' perceptions of task control based on: (1) the definition of control appraisals as posited by the control-value theory (Pekrun, 2006) and (2) existing relevant scales in general and L2 literature (Frenzel et al., 2007; C. Li, 2021). An example item is "The writing task was completed smoothly." The *Task Control Scale* showed excellent construct validity (χ^2/df = 0/0; RMSEA = 0; CFI = 1; TLI = 1; SRMR = 0) as well as reliability (α = .72).
2. *Task flow.* Consistent with the majority of SLA studies employing Likert scales, and given the challenge of identifying a clear boundary between "flow" and "non-flow" states (Abuhamdeh, 2020), we operationalized flow as a continuous variable representing varying intensities of flow experiences. The *Task Flow Scale* with nine items was developed to assess flow experience during the writing task based on the following sources: (1) the definitions and core elements of flow in general and L2 contexts (i.e., the balance between challenge and skills, a sense of control, post-task enjoyment, interest, intense focus, engagement with the task, willingness to repeat the task, lack of self-consciousness, and distorted time perceptions) (Aubrey, 2017a, 2017b; Csikszentmihalyi et al., 2014; Dewaele & MacIntyre, 2024; Egbert, 2003; Moeller, 2018) and (2) existing relevant scales measuring flow in L2 (writing)-specific contexts (Aubrey, 2017b; Czimmermann & Piniel, 2016; Egbert, 2003; Wu & Albert, 2024; Zuniga, 2023). An example item is "Time was flying so fast when I was writing the essay." The *Task Flow Scale* showed excellent construct validity (χ^2/df=96.1/24; RMSEA = .07; CFI = .973; TLI = .96; SRMR = .03) as well as reliability (α = .90).

4.3. Ethics

We received official approval from our institution and the research site, as well as consent from participants, their English teachers, and their guardians, before collecting data. They were briefed on the nature of the project, its purpose, benefits (e.g., snacks), data confidentiality, and their right to decline the participation or withdraw at any time without adverse consequences.

4.4. Scoring

Writing samples from both the L2 writing proficiency test and the L2 writing task were analyzed for language, content, and organization, each category being scored out of five points, following the *Writing Assessment Subscales* outlined in the *Cambridge English Teacher Guide for A2 Key for Schools.* Six experienced L2 English teachers participated as raters in the study following a comprehensive three-stage training protocol (60 minutes per session) conducted by the first author. The training began with rubric familiarization, where teachers thoroughly examined the scoring criteria, followed by practice calibration using sample responses from the *Cambridge Writing Assessment Guide*, during which they compared their independent ratings with benchmark examiner scores. The final session focused on consensus-building through the evaluation of three writing samples from the current study. Complete training materials are archived in the supplementary documentation (Li et al., 2024).

During actual scoring, to ensure inter-coder reliability, half of the writing samples from the L2 writing proficiency test and each from the L2 writing task were assessed by two teachers. The inter-coder reliability for the L2 writing proficiency test was acceptable: for the email writing task, $r_{\text{-language}}$ =.82, $r_{\text{-content}}$ = .73, $r_{\text{-organization}}$ = .72; for the story-telling task, $r_{\text{-language}}$ = .73, $r_{\text{-content}}$ = .91, $r_{\text{-organization}}$ = .76 (N = 103). Similarly, the inter-coder reliability for the L2 writing task was $r_{\text{-content}}$ = .83; $r_{\text{-organization}}$ = .79; $r_{\text{-language}}$ = .82 (N = 206). Any discrepancies on a rubric dimension were discussed until consensus was reached. The final score for each writing sample was determined by averaging the scores from the two raters.

4.5. Statistical analysis

We analyzed the data using SPSS 19.0 and Mplus 8.3. Initially, a series of preliminary analyses was conducted, encompassing reliability (measured via Cronbach's alpha), construct validity (assessed through confirmatory factor analysis with maximum likelihood estimator), descriptive statistics (including means and range), and tests for normality (skewness and kurtosis; absolute value < 2; West et al., 1995). To address the primary research question, we conducted Pearson correlation analysis first, followed by the primary path analysis with 1,000 bootstraps resampling to examine the hypothesized mediation model. In this model, L2 writing proficiency and task control serve as independent variables, while task flow acts as the mediating variable, and task performance is the dependent variable. Missing data were managed automatically using full information maximum likelihood estimation. Model fit was evaluated based on the following criteria: χ^2/df

< 3, comparative fit index (CFI ≥ .90), Tucker-Lewis index (TLI ≥ .90), and root mean square error of approximation (RMSEA ≤ .08) (Hair et al., 2010).

5. Results

5.1. Descriptive results

As shown in Table 1, our data generally followed a normal distribution. Overall, the writing task was perceived as controllable, with a mean score of 5.67 out of 9, and participants reported a relatively high level of task flow, with a mean score of 5.88 out of 9.

Table 1 Descriptive statistics

Variables	Range	*M* (*SD*)	Skewness (*SE*)	Kurtosis (*SE*)
Writing proficiency	0-15	11.39 (3.93)	-1.62 (.17)	1.72 (.34)
Task control	1-9	5.67 (1.73)	.11 (.18)	-.05 (.35)
Task flow	1-9	5.88 (1.86)	-.08 (.18)	-.45 (.35)
Task performance	0-15	11.14 (2.26)	-.81 (.17)	.36 (.34)

5.2. Path analysis results

Prior to path analyses, we conducted a Pearson correlation analysis. Table 2 shows that prior L2 writing proficiency, task control, and task flow were all significantly related to task performance (.286 < *r* < .507, *p* < .001). The significant correlations enable subsequent path analysis.

Table 2 Correlation analysis results

		1	2	3	4
1	Task performance	1			
2	Task control	.324***	1		
3	Writing proficiency	.507***	.142*	1	
4	Task flow	.286***	.618***	.066	1

Note. *p < .05, **p < .01, ***p < .001

In the primary path analysis, the hypothesized mediation model was saturated with satisfactory fits (χ^2/df = 0/0, RMSEA = 0, CFI = 1, TLI = 1, SRMR = 0; see Figure 3). As Figure 3 shows, both L2 writing proficiency and task control significantly and positively predicted L2 writing task performance directly with small effect sizes (β =.280, p < .001; β = .208, p = .041). Besides direct effects, task control

also had a small indirect positive effect on L2 writing task performance by first predicting task flow (β = .134, p = .037), while writing proficiency did not have a significant effect on task performance via task flow (β = -.002, p = .672) (see Table 3).

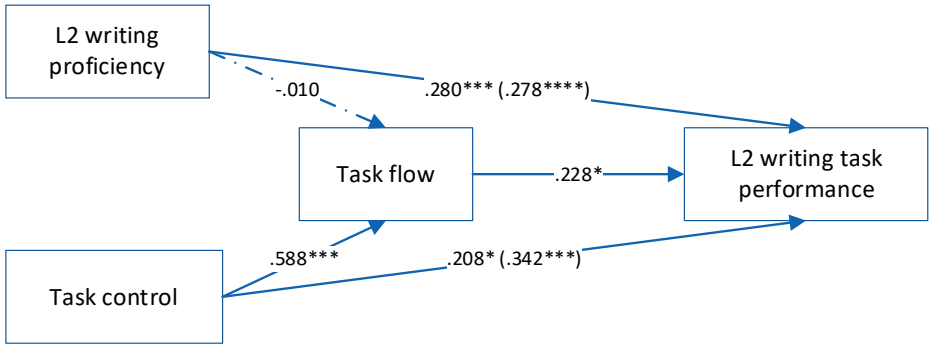

Figure 3 The mediation model (all are standardized coefficients, and dotted lines indicate non-significant results; values in and out of brackets are total effects and direct effects, respectively; *p < .05, **p < .01, ***p < .001)

Table 3 Mediation analysis results

Effects	Paths	Estimate	*SE*	*p*	95% CI
Total	Task control→task performance	.342	.080	.000	[.159, .352]
direct		.208	.101	.041	[.031, .279]
Indirect	Task control→task flow→task performance	.134	.064	.037	[.021, .179]
Total	Writing proficiency→task performance	.278	.034	.000	[.398, .573]
direct		.280	.034	.000	[.402, .576]
Indirect	Writing proficiency→task flow→task performance	-.002	.005	.672	[-.019, .011]

Note. All are standardized results; CI = confidence interval, performance = L2 writing task performance, proficiency = L2 writing proficiency; bolding indicates a significant path

6. Discussion

This study is one of the first to focus on the experience of flow in a task-based writing instruction context, examining its antecedents and impact on task performance simultaneously. Our participants, young Chinese learners of English as an L2, reported relatively high levels of flow in the L2 writing task (Table 1), echoing the high frequency and intensity of flow experiences observed in an L2 writing task among Chinese EFL learners (Wu & Albert, 2024), in L2 speaking tasks (Almukhaild & King, 2024; Aubrey, 2017a, 2017b; Ghanbaran et al., 2023; Piniel & Ritecz, 2022; Rubio, 2011), and across oral, written, and multimodal tasks (Zuniga, 2023).

Drawing on Egbert's (2003) theoretical model of flow and language acquisition, we hypothesized that task flow may mediate the predictive effects of L2 writing proficiency and task control on L2 writing task performance. Initial correlation analyses supported the individual relationships posited in our model, revealing significant positive associations between task flow and learners' (a) prior L2 writing proficiency, (b) perceived task control, and (c) writing performance (Table 2). Subsequent mediation analyses (Table 3; Figure 3) provided partial support for the complete hypothesized model, confirming some but not all of the proposed pathways.

Regarding the antecedents of task flow, our analysis revealed task control as a statistically significant positive predictor, whereas prior L2 writing proficiency failed to demonstrate significant predictive power when both variables were examined concurrently within the task context. This pattern suggests that learners' perceived controllability of the immediate writing task, rather than their general L2 writing competence, served as the primary facilitator of flow states during task performance. These results corroborate existing findings on flow in L2 speaking tasks (Almukhaild & King, 2024; Czimmermann & Piniel, 2016; Piniel & Ritecz, 2022) and extend empirical support for the generalizability of the phenomenon across proficiency levels and task modalities (Egbert, 2003; Zuniga, 2023). Crucially, the prominence of task controllability over prior L2 writing proficiency in enhancing flow experiences supports the foundational flow theory (Csikszentmihalyi, 1991, 2014) and its adaptation to SLA contexts (Egbert, 2003), which posits that flow depends on optimal challenge, or the equilibrium between perceived task challenge and skill (Csikszentmihalyi, 1975) rather than absolute proficiency. Learners who considered the writing task as the optimal challenge have a stronger sense of control, thus contributing to more comfortable, manageable and enjoyable experiences, which are indicators of flow. Instead, those who thought of the task as either too difficult or too easy may lose interest, fail to concentrate and be unwilling to engage in similar tasks. Our findings are also in line with Cho (2018), who found that writing tasks elicited higher difficulty-skill balance, perceived control and interest than speaking tasks, and difficulty-skill balance consistently predicted flow experience. Together, these findings suggest that writing provides conditions more favorable for experiencing balance and flow due to its psycholinguistic nature.

Concerning the effect of flow, both correlational (Table 2) and mediation analyses (Table 3) confirmed that task flow significantly predicted L2 writing performance, supporting our hypothesized model. This finding aligns with theoretical propositions by Csikszentmihalyi (2014) and Egbert (2003) that flow states enable learners to extend their existing capabilities. The performance-enhancing mechanism of task flow can be understood through Egbert's (2003) model of flow and language acquisition, which delineates direct and indirect pathways between flow and achievement. During flow states, characterized by focused concentration, deep engagement, diminished self-consciousness, temporal distortion, and positive affect

(Aubrey, 2017b; Egbert, 2003; Piniel & Albert, 2019), learners demonstrate peak performance (Egbert, 2003). As established in prior empirical research (see Section 2.3.), these flow characteristics yield multiple performance-enhancing benefits: cognitive (intense focus, sustained attention), affective (subjective satisfaction, enjoyment, reduced boredom and anxiety), motivational (heightened intrinsic motivation, increased risk-taking propensity), and behavioral (exploratory behaviors, deep task engagement) (Aubrey, 2017a; Liu et al., 2022; Nakamura & Csikszentmihalyi, 2009; Piniel & Albert, 2019; Piniel & Ritecz, 2022; Li et al., 2019). Collectively, these benefits create optimal conditions for improved task performance (Egbert, 2003). However, while theoretically plausible, the indirect pathways between flow and performance through psychological mediators (e.g., emotion, cognition, motivation, engagement) require more direct empirical validation beyond existing indirect evidence.

The comprehensive mediation analysis partially validated Egbert's (2003) model of flow and language acquisition within task-based L2 writing instruction. Results demonstrated that task control significantly predicted writing performance through both direct and indirect pathways (mediated by task flow), whereas prior L2 writing proficiency only exerted direct effects. This pattern suggests that learners' perceived task controllability, regardless of their baseline writing proficiency, served as the primary gateway to flow states during writing, which in turn enhanced performance. Importantly, while proficiency did not directly influence flow experiences, Table 2 reveals its significant positive association with task control perceptions. This implies that long-term writing proficiency may indirectly foster flow by first shaping learners' sense of task controllability. These findings also reveal two distinct yet complementary pathways influencing L2 writing task performance: (1) long-term, objective language proficiency representing linguistic competence, and (2) immediate, subjective task perceptions (notably control) and their resulting flow states. The results demonstrate that while foundational linguistic abilities provide necessary baseline competence for successful task execution, the psychological sequence of perceived task control-flow states and enhanced task performance represents an equally vital mechanism. This dual-pathway model aligns with the contemporary SLA paradigm that emphasizes psychological dimensions, particularly the interplay between affective dimensions and cognitive-linguistic dimensions of L2 development (Dewaele & Li, 2020; MacIntyre & Mercer, 2014).

7. Implications, limitations, and future directions

This study has pedagogical implications. Our findings emphasize the facilitating role of flow in enhancing L2 writing performance. Educators can significantly improve

learners' L2 writing task performance by creating conditions that facilitate flow, such as providing appropriately challenging and interesting tasks, fostering a sense of control, and promoting focused engagement. Our findings also indicate that flow can emerge when learners with limited proficiency engage in tasks that are neither too difficult nor too easy, but where they feel they have a degree of control. Planning a successful FL class for beginners is akin to the work of a video game developer, who must design games that appeal to both novices and those seeking more challenging levels. Lastly, taking into account previous research (Baralt & Gurzynski-Weiss, 2011; Cho, 2018), writing tasks may create a more supportive and favorable environment for flow compared with other modalities such as speaking, because they are more individual, less public, and self-paced (Li et al., 2023), and produce permanent output that can be externally reviewed and free up memory resources. Therefore, educators can select appropriate modalities with well-designed tasks to cultivate a flow experience. For example, a meaning-focused writing task meeting TBLT criteria, with clear objectives, scaffolded prompts, and opportunities for peer and teacher feedback, can enable learners to experience a sense of control over the task and flow, fostering engagement in the L2 classroom.

The current study is not without limitations. Firstly, any research design is the result of a trade-off between the quantity of information required from participants and the number of participants willing to complete the questionnaire (Dörnyei & Dewaele, 2022). This means that the number of independent variables in the present study was relatively limited. We acknowledge the potential influence of a range of other variables on task flow and task performance. According to the integrated task-mediated cognitive-affective model of L2 writing (Li et al., 2024), L2 writing task performance and flow states in the L2 writing processes can be influenced by the interplay between contextual factors (e.g., task features including task complexity, repetition, planning, and focus on form or meaning) and learner-internal factors, including both long-term, task-independent factors (e.g., cognitive individual differences such as working memory and aptitude, as well as emotional factors like general foreign language enjoyment, anxiety or boredom) and short-term, task-specific factors (e.g., task enjoyment, anxiety, and boredom) (Pawlak et al., 2020). Future research should further investigate how the interplay between these learner and task factors shapes flow states and affects task performance.

Secondly, the study measured flow exclusively as a continuous construct using post-task scales, which differs from the original categorical conceptualization of flow as an optimal state (Csikszentmihalyi, 1975). Due to a lack of consensus on how to operationalize flow, some scholars advocate for a categorical or both categorical and continuous approaches (Abuhamdeh, 2020; Peifer & Engeser, 2021). Therefore, future research should consider integrated, multi-method approaches that enable both categorical identification and moment-to-moment tracking of flow, such as

the idiodynamic method (MacIntyre, 2023) and experience sampling (Zuniga, 2023). In addition, future research can focus on optimizing task design to maximize flow experiences in language learning contexts. It is particularly important to identify which aspects of task control most effectively foster flow and how these can be integrated into L2 writing pedagogy to support learners across various proficiency levels. Additionally, future studies should investigate how flow influences writing performance further, including the mediating processes such as repetition, motivation, satisfaction, exploration, increased time on task, and risk-taking, as proposed by Egbert's (2003) model.

Thirdly, the hypothesized model represents only a partial conceptualization of Egbert's (2003) model of flow and language acquisition and has been empirically tested with a single writing task among Chinese young EFL learners. Given the potential moderating effects of task characteristics and cultural influences as reviewed previously, the current findings may not be generalizable to a broader context. This limitation underscores the need for more research to cross-validate and extend the model across different learner populations and task conditions.

8. Conclusion

This study represents one of the first empirical investigations of flow within task-based L2 writing instruction, examining how flow states manifest among young Chinese EFL learners, a population notably underrepresented in both L2 writing and flow research. Grounded in Egbert's (2003) theoretical model of flow and language acquisition, we investigated the combined effects of an individual difference factor (L2 writing proficiency) and task-specific perception (task control) on both flow experiences and writing task performance. Our findings not only confirm the occurrence of flow during L2 writing tasks but also elucidate its significant associations with immediate task control perceptions, prior writing proficiency, and subsequent task performance. These results provide empirical support for integrating flow as a key psychological construct within TBLT frameworks and L2 writing research, while simultaneously advancing the theoretical convergence between positive psychology and task-based language teaching (Li, 2026). This study further suggests unexplored pathways through which flow may emerge and influence task performance, as theoretically posited by Egbert (2003). Future research along these lines promises to strengthen the interdisciplinary bridge between positive psychology and TBLT (Li, 2024; Li & Dewaele, 2024), fostering development in this emerging area.

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APPENDIX

Scales for task control and task flow

说明：请回忆你刚才完成的英语写作任务，阅读以下描述，并对各条描述进行评分，评分区间 1-9，分值越高代表你越赞成该描述。

Instructions: Please recall the English writing task you have just completed, read the following statements, and then give your ratings for each statement. Higher scores from 1 to 9 mean higher levels of agreement.

在刚才的写作任务中……

During the writing task…

Task Control Scale

《任务可控感量表》	***Task Control Scale***
1. 我觉得写刚才这篇作文很轻松。	The essay task was easy for me.
2. 刚才这篇文章很费脑筋。*	The writing task required a lot of mental effort. *
3. 刚才这篇文章我写得很顺畅。	The writing task was completed smoothly.

* Reverse coding

Task Flow Scale

《任务心流量表》	***Task Flow Scale***
1. 刚才写的那篇作文符合我的写作能力。	The essay task matched my writing ability.
2. 我觉得我对刚才的写作任务有很好的把控。	I felt a good sense of control over the writing task.
3. 我很享受刚才的写作过程。	I enjoyed the writing process.
4. 刚才的写作任务很有意思。	The writing task was interesting.
5. 整个写作过程我全神贯注。	My attention was fully concentrated on the writing task.
6. 我非常努力地完成刚才的写作任务。	I made my best effort in the writing task.
7. 我以后还想写这样的作文。	I would like to have more writing tasks of this kind.
8. 写刚才那篇作文时，时间过得很快。	Time was flying so fast when I was writing the essay.
9. 刚才我忘我地写作文，直到把它写完。	I was so absorbed in the writing that I forgot myself.