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Department of English Studies, Faculty of Pedagogy and Fine Arts, Adam Mickiewicz University, Kalisz
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Anxiety and enjoyment in L2 video-mediated interactions with native speakers: An idiodynamic approach

Xinyue Guo
Qingdao University, Qingdao, China
University of Oxford, UK
http://orcid.org/0000-0003-0759-182X
guoxinyue2001@163.com

Man Wang ✉
Qingdao University, Qingdao, China
http://orcid.org/0000-0002-5681-990X
manwang@qdu.edu.cn

Abstract

Anxiety and enjoyment, a contrastive pair of emotions that significantly affect second language (L2) learning, have been widely investigated under the framework of complex dynamic systems theory. With the growing popularity of video-mediated interactions (VMIs), the investigation of anxiety and enjoyment in online settings is important but underexplored. This study examines the relationship between anxiety and enjoyment in L2 VMIs, using an idiodynamic approach. Four L2 learners completed video-mediated conversations with native speakers (NSs) in English via an online platform and rated their anxiety and enjoyment separately while reviewing their video recordings. Subsequent interviews were carried out to explore the categories of factors influencing these emotions. The findings revealed that the relationship between anxiety and enjoyment was more than a seesaw pattern, with these two emotions converging and diverging at specific events. Moreover, we found that anxiety and enjoyment were influenced by three categories of factors: individual, interpersonal, and environmental. The triangulation of emotion ratings, stimulated recall interview data, and

performance data helped build a richer understanding of emotions in L2 speaking within the VMI context and yielded practical pedagogical implications for enhancing L2 learners' emotional experiences during L2 oral interactions.

Keywords: second language learning; oral communication; emotions; video-mediated interaction; complex dynamic systems theory

1. Introduction

Since the humanistic framework in psychology exerted a formative influence on second language acquisition (SLA) research in the 1970s, there has been an increasing number of studies on emotions' pivotal role in second language (L2) learning and teaching, catalyzing an "affective turn" in this field (e.g., Ducker, 2021; Li & Dewaele, 2021; Prior, 2019). A spectrum of emotions, from negative (e.g., anxiety, boredom, embarrassment) to positive (e.g., enjoyment, pride, hope), has been shown to shape language learning processes, communicative behavior, and learners' well-being (Li, 2020; Li & Wei, 2023, 2025; Shao et al., 2020). Among these emotions, anxiety and enjoyment have emerged as the most extensively studied constructs, given their frequent occurrence in L2 learning contexts and strong associations with L2 performance (Dewaele & MacIntyre, 2016; Li, 2024).

The focus of L2 emotion research is undergoing a methodological refinement, shifting from broad investigations of general emotions to skill-specific analyses and increasingly, micro-level task-based inquiries (Li, 2024). This evolution stems from the recognition that distinct L2 skills are inherently different in cognitive mechanisms, mental effort, linguistic knowledge, and communicative purposes, which generates variations in emotional experiences (Cheng, 2017; Li et al., 2023; Li, 2024). L2 speaking, in particular, stands out as the most emotion-provoking skill, due to its real-time integration of cognitive, linguistic, cultural, and social resources (Cheng & Sun, 2025; Kormos, 2006; Suzuki & Kormos, 2025). Additionally, task-based language teaching (TBLT) research further highlights that L2 speaking tasks (e.g., monologues, dialogues) enhance emotional engagement by emphasizing meaningful interaction in authentic contexts (Ellis, 2003; Li & Dewaele, 2024). Despite this progress, our understanding of emotions in L2 speaking tasks is still limited. It is hypothesized that emotional responses to an ongoing task emerge from interactions between individual differences and task environment features (Long, 1996; Pekrun & Stephens, 2010). Therefore, understanding the complex emotional mechanisms at the micro level warrants a more granular, situation-dependent approach.

To this end, complex dynamic systems theory (CDST) provides an analytic lens for effectively capturing the dynamic and fluctuating characteristics of emotions (e.g., MacIntyre & Ducker, 2022; Ranjbar et al., 2025; Yu et al., 2022). CDST is a meta-theory

that conceptualizes language as a complex adaptive system, emphasizing the dynamic, non-linear, and context-sensitive nature of language development (Ellis & Larsen-Freeman, 2009; Gao et al., 2024; Hiver et al., 2022). Extending this perspective, the individual L2 user's language system operates as a complex dynamic system, where internal subsystems (e.g., linguistic, cognitive, affective) interact with external factors (e.g., task features, task environments, the input a learner receives, and interlocutor characteristics) (Steinkrauss & Lowie, 2025). Such complexity warrants reliance on the idiodynamic method (i.e., second-by-second self-ratings synchronized with task performance and a stimulated recall procedure) that transcends group-level averages to capture individual variation in emotional trajectories.

The present study applies the CDST framework to examine anxiety and enjoyment in L2 speaking tasks situated within video-mediated interaction (VMI) contexts. The proliferation of live-streaming technologies has enhanced accessibility to L2 interactions by connecting L2 learners to various interlocutors across geographic boundaries (Saville-Troike & Barto, 2016). L2 interaction with NSs or first language (L1) users is believed to exert distinctive effects on L2 speakers' language use and to yield particular psychological experiences (Mulken & Hendriks, 2015; Strambi & Tudini, 2020; Zheng et al., 2025). Investigating learners' emotions when communicating with native speakers (NS) interlocutors within the VMI context is thus meaningful for understanding the dynamic interactions among emotions, individuals, and the digital environments, with pedagogical implications for designing emotionally supportive L2 speaking instruction.

2. Literature review

2.1. L2 anxiety and enjoyment

Anxiety and enjoyment were initially conceptualized as bipolar constructs on a single emotional spectrum. Within the L2 learning context, anxiety, a typical negative emotion, is defined as "the worry and negative emotional reaction aroused when learning or using a second language" (MacIntyre, 1999, p. 27). In contrast, enjoyment is framed as a positive affective state characterized by feelings of joy, happiness, and pleasure (Brantmeier, 2005), which emerges when learners perceive that their ability meets their challenges (Dewaele & MacIntyre, 2014).

Recent research highlights the multidimensionality and situational specificity of emotions, prompting a reconceptualization of both anxiety and enjoyment. Control-value theory (Pekrun, 2006) proposes that emotions can be characterized along three structural dimensions: valence (pleasant vs. unpleasant), activation (activating vs. deactivating), and object focus (activity-oriented vs. outcome-oriented).

Following this taxonomy, anxiety is classified as an unpleasant, activating, and outcome-oriented emotion that is closely related to the task result, while enjoyment is a pleasant, activating, and activity-oriented emotion that arises during engagement in an ongoing task (Li, 2024). Accordingly, the traditionally perceived opposition between anxiety and enjoyment stems mainly from the difference in valence, while the other two dimensions reveal a more nuanced and dynamic relationship. The multidimensional, dynamic, and context-dependent nature of emotions thus implies that the interplay between anxiety and enjoyment is far more complex than previously assumed, necessitating further empirical investigation.

A growing body of empirical studies consistently indicate that anxiety and enjoyment are independent emotions rather than "two sides of the same coin" (Dewaele & MacIntyre, 2014, p. 265). For instance, Boudreau et al. (2018) analyzed how the relationship between enjoyment and anxiety evolved dynamically during monologue speaking tasks undertaken by French L2 learners. They found that correlations between anxiety and enjoyment varied from strongly negative to weakly negative, with fluctuation patterns exhibiting substantial individual differences. Similarly, Nakamura et al. (2021) reported increases in both anxiety and enjoyment when L2 learners were granted a greater autonomy over task content, suggesting that the two emotions can co-occur to energize learners' engagement. This finding echoes Dewaele and MacIntyre's (2016) comparison of anxiety and enjoyment to L2 learners' right and left feet, indicating that a dynamic equilibrium between the two fosters adaptive learning processes.

Given the complex, dynamic, and context-specific nature of L2 emotions, this study focuses on anxiety and enjoyment in an L2 speaking task. Specifically, L2 interaction, as a key aspect of L2 speaking and the overall L2 learning and development (Loewen & Sato, 2018; Zheng et al., 2025), constitutes the focus of the present study. With L2 interaction taking on new forms such as VMI, examining anxiety and enjoyment in this complex, novel online context is crucial for advancing our understanding of emotions in L2 learning and informing evidence-based pedagogical practices for L2 instruction.

2.2. L2-NS interaction through VMI

Current research on L2 speaking tasks mainly falls into two paradigms: monolingual tasks (e.g., gap filling, storytelling, speech) and interactive dialogue tasks (e.g., dyadic interaction or group discussion). Among these two, dialogue tasks are recognized as particularly effective in enhancing communicative skills, as they simulate authentic language use and require learners to make meaning in real time (Ellis, 2017; Li & Baldauf, 2011; Li et al., 2025). However, the majority of research

on L2 interaction is confined to the classroom setting, with a predominant focus on L2-L2 interactions (i.e., between non-native speakers) (e.g., Balaman, 2025; Zabihi & Ghahramanzadeh, 2022). Notably, there remains a significant scarcity of empirical investigations into L2 learners' interactions with native speakers or L1 speakers, which limits our understanding of how authentic target-language interaction shapes L2 cognitive and affective processes.

L2-NS interaction offers benefits for L2 learning that are less salient in L2-L2 interactions (Mulken & Hendriks, 2015; Strambi & Tudini, 2020). Engaging with NSs enables learners to access target-language input characterized by greater linguistic sophistication, pragmatic appropriateness, and sociolinguistic authenticity. Furthermore, NSs' communicative adjustments (e.g., simplification of syntax, slower speech rate, or lexical paraphrasing) during interaction offer "comprehensible input" (Krashen, 1985; Long, 1996), which reduces cognitive effort for learners and facilitates the internalization of linguistic forms. Such interaction further facilitates the "scaffolding effect" (i.e., instructional support whereby less proficient learners can lean on more advanced individuals to maximize their linguistic and communicative capabilities; Cho & Cho, 2016; Guo et al., 2023).

VMI makes L2-NS interaction more accessible, yet this novel context has received limited attention in L2 anxiety and enjoyment research (e.g., Licoppe, 2017; Malabarba et al., 2022; Seuren et al., 2021). Conceptually, VMI refers to real-time, bidirectional spoken or symbolic communication between geographically separated participants mediated by video conferencing technologies and platforms (e.g., Zoom, Teams) or specialized English dialogue platforms such as *Cambly*. Unlike face-to-face interactions, VMI platforms typically display a live self-image during interpersonal interactions, heightening self-focused attention and self-awareness during the interaction, which have emerged as significant factors in the development and persistence of social anxiety (Azriel et al., 2020; Clark & Wells, 1995; cf. Hodson et al., 2008). In addition, VMI constitutes a fractured environment that generates communicative obstacles absent in face-to-face conversations (Rusk & Pörn, 2019). For instance, previous research has found the "technology-generated transmission delay" (Seuren et al., 2021, p. 63), which may frustrate smooth conversations with prolonged overlap, silence, sequential disarray, and missed attempts at turn-taking (Rusk & Pörn, 2019). Some researchers have also proposed that the absence of physical co-presence in VMI could diminish the user's perception of social presence and the significance of the other interlocutor (Croes et al., 2016), resulting in a decline in rapport and the motivation for self-disclosure (Manstead et al., 2011).

While previous studies have shown that VMI may affect emotional experiences (e.g., anxiety), they have predominantly focused on L1 interactions and rarely examined how VMI shapes the interplay between L2 interactions and

emotions. The present study addresses this gap by leveraging VMI to investigate L2 learners' anxiety and enjoyment in L2-NS interactions. Through the examination of this complex communication setting, we aim to advance our understanding of L2 learners' emotions and identify the key factors that influence their anxiety and enjoyment in authentic L2-NS interaction.

2.3. The idiodynamic method

With the growing recognition of emotions' multidimensionality, complexity, and dynamicity, the methodologies for emotion research have also evolved. Traditional emotion research in SLA has predominantly relied on post-task self-reported questionnaires (Dewaele, 2005; Horwitz et al., 1986). However, this methodology fails to capture the dynamic emotional experiences during ongoing tasks. Specifically, post-task reports provide only static, retrospective snapshots of learners' overall affective states, thereby obscuring the moment-to-moment temporal fluctuations and context-specific triggers of emotional shifts that characterize real-time L2 interaction (Elahi Shirvan et al., 2024; Wang et al., 2024).

The idiodynamic method has been developed to describe "the complex intra-individual emotional reactions and changes in self-perception, not group averages, that occur during brief episodes of L2 communication" (MacIntyre & Ducker, 2022, p. 1). Conceptually anchored in CDST, the idiodynamic method is a research procedure that integrates two complementary data collection phases. First, participants complete continuous, quantitative self-ratings of their affective states while watching a video playback of their own L2 communication event. Second, these ratings are visualized as a graph, which serves as a stimulus to guide a subsequent qualitative recall interview. In the interview, participants elaborate on the potential factors that trigger specific peaks, troughs, or stable phases in their emotional ratings (MacIntyre & Ducker, 2022).

The strength of the idiodynamic method lies in its ability to capture both the variability and dynamic stability of emotions over time, making it optimal for investigating L2 affective phenomena at the micro-level (MacIntyre & Ducker, 2022). Empirical applications of the idiodynamic approach have demonstrated its efficacy in exploring the discrete emotions, including anxiety (e.g., He et al., 2021), enjoyment (e.g., Elahi Shirvan & Talebzadeh, 2018), and the interplay between these two constructs (e.g., Boudreau et al., 2018). Given that the focus of the present study is on unpacking the dynamics of anxiety and enjoyment during L2 VMIs, the idiodynamic method constitutes an indispensable analytical tool. By triangulating continuous ratings with qualitative stimulated recall data, this approach enables the study to capture the intra-individual emotional dynamics at a granular

level, while also identifying the specific contextual and interactional factors driving emotional shifts. This dual focus aligns with the study's core objective to elucidate the underlying mechanisms of emotional fluctuations during L2 VMIs and provide empirical evidence for the understanding of how individual learners navigate the complex interplay of continuously interacting factors.

In summary, the literature underscores two critical imperatives for L2 emotion research: first, the need to examine anxiety and enjoyment within the ecologically valid context of L2 speaking tasks involving NS interlocutors in the emerging VMI setting; second, the value of adopting the idiodynamic approach to investigate the micro-level factors shaping emotional fluctuations. To address these research needs, the following research questions were formulated:

RQ1: What is the dynamic relationship between anxiety and enjoyment during online L2-NS VMIs?
RQ2: What factors affect anxiety and enjoyment at moments of emotional fluctuations during the online L2-NS VMIs?

3. Methodology

3.1. Participants

Participants included four English learners who were undergraduates at a university in Eastern China (see Table 1). They were born and raised in northeastern China, with Mandarin as their first language and no record of residing in any English-speaking country. They varied in their language proficiency and L2 exposure. Language proficiency was measured by scores on the College English Test Band 6 (CET-6), a standardized English proficiency examination for university students in China, while L2 exposure was measured by the number of spoken English lessons taken and the frequency of language use (i.e., the frequency of using English with family or friends, and in the classroom). The spoken English lessons taken by the participants, both prior to and during the term of this study, included English Phonetics, Spoken English, English Public Speaking, and English Debate, each with 32 credit hours. The native English-speaking interlocutors were sourced from *Cambly©* (see 3.2 for more details), all of whom were prescreened as qualified language tutors. Informed consent was obtained from the four participants and the four NS interlocutors online.

Table 1 Demographic information of participants

Pseudonym	Gender	Age	Major	Year of study	Language proficiency (CET-6 scores)	Number of spoken English lessons taken	Use of English with family or friends	Use of English in the classroom
David	M	22	Computer science	Third	500	0	Never	Never
Ann	F	23	English	Fourth	592	3	Sometimes	Often
Victor	M	22	English	Second	653	4	Sometimes	Often
Tobey	F	22	English	Fourth	542	0	Never	Sometimes

3.2. Instruments and procedures

Participants were individually invited to a laboratory setting after class, and were instructed to engage in oral VMIs via *Cambly©*, a video teleconferencing software that remotely connected language learners with qualified language tutors who were English NSs. The researcher restricted eligible interlocutors to those with British or American English accents, which aligned with the standard curriculum of the participants' university. Participants then self-selected their preferred interlocutor from this predefined pool, forming unique L2-NS conversation dyads. Each dyad performed spontaneous dialogues on one or more topics outlined on the platform, including reasons for learning English, hobbies, favorite movies, weekend plans, dream vacation destinations, and more. Participants received no advance briefing on the topics to be discussed, ensuring the authenticity of their communicative engagement. The participants could begin and end their conversations within the 15-minute time limit. The conversations were recorded using the recording function of the online platform. Throughout the VMI tasks, the researcher adopted a "non-participant observation" approach (Konakahara, 2020, p. 305), maintaining an unobtrusive presence to avoid influencing participants' behaviors or emotions.

Immediately after the conversation, participants proceeded to the idiodynamic rating phase, administered using the Anion Variable Tester V2 software (MacIntyre & Ducker, 2022). Prior to each rating session, participants were provided with operational definitions of the target emotion (i.e., anxiety or enjoyment), consistent with the conceptualizations established in the literature review. For each participant, the rating was conducted twice, once for anxiety and once for enjoyment, with the order being counterbalanced across participants to mitigate order effects.

All participants received standardized instructions on how to use the software prior to the task to ensure consistent understanding of the rating procedure. The rating timeline was synchronized with the video playback of the VMI session: Ratings began at the onset of the participant's first utterance and terminated at the conclusion of the conversation.

During the rating session, participants viewed the video playback of their VMI and pressed the software's up and down buttons to adjust their real-time

ratings of the target emotion. The participants were informed that holding either button maintained the current rating score while releasing a button triggered an automatic and gradual regression of the score to zero. The software collected the button-click data at a second-by-second resolution, and automatically transformed them into continuous rating scores on a bipolar scale ranging from -10 (representing extremely low levels of the target emotion) to +10 (representing extremely high levels of the target emotion). If multiple scores were recorded within a single second, only the final rating was kept for subsequent analysis.

Following the completion of both anxiety and enjoyment rating tasks, participants engaged in stimulated recall interviews, during which the researcher and each participant jointly reviewed the graphs of their ratings generated by the software (see Figures 2-5). Key segments of the VMI video were replayed when necessary to facilitate the participants' reflection on specific moments of emotional fluctuation. To ensure procedural consistency across all interviews, the researchers designed a standardized interview protocol, which included open-ended questions to elicit in-depth insights into the triggers of emotional shifts, such as the following: "Can you describe your overall feelings of anxiety/enjoyment in the interaction process?" "What led to your low/high ratings of anxiety/enjoyment at this moment of the task?" "Why did you experience a sudden increase in anxiety/enjoyment over this time interval?" and "Why did your ratings for anxiety/enjoyment in the beginning change so frequently?" The interview protocol was finalized and refined collaboratively by the researchers before the first researcher conducted all the interviews in a consistent manner. All interviews were recorded and transcribed. The entire procedure for each participant is outlined in Figure 1.

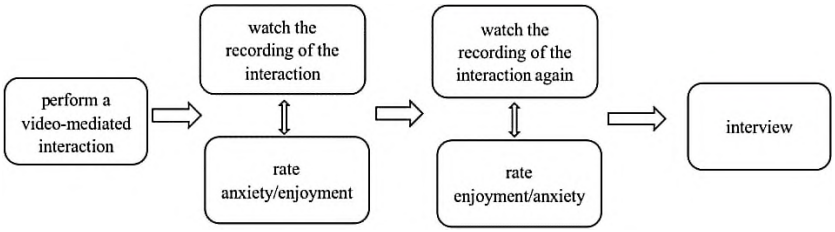

Figure 1 The procedure of the idiodynamic method

3.3. Data analysis

A two-phase analytical framework was employed to address the research questions of the study. First, a dual-level correlation analysis was conducted to examine the relationship between anxiety and enjoyment: an overall correlation analysis to quantify the global association between the two emotions for each participant,

and an examination of the dynamic relationship between the two emotions across the VMI task using the moving correlation technique. Second, a thematic analysis was implemented on the transcribed stimulated recall interview data through preliminary deductive coding based on Aubrey's (2022) framework of factors influencing emotions in speaking tasks and additional inductive coding, which allowed for the identification of emergent themes related to emotional influencers. This combined analytical approach enabled the triangulation of quantitative idiodynamic rating data with qualitative interview insights, facilitating a comprehensive exploration of the mechanisms underlying emotional fluctuations during L2-NS VMIs.

4. Results

4.1. Relationship between anxiety and enjoyment

To address RQ1, two complementary analyses were conducted: overall correlation analysis (capturing static, global associations) and moving correlation analysis (tracking dynamic, time-varying relationships).

4.1.1. Overall static correlation

For each participant, the number of rating scores for each target emotion was 736, 823, 855, and 847, respectively. Since the participants' ratings were recorded on a second-by-second basis, the data size (i.e., the number of seconds of their video clips) was the same for the two emotions' ratings per participant. All participants' ratings showed an overall significant negative correlation between these two emotions. The results are summarized in Table 2.

Table 2 Correlations between per-second ratings of enjoyment and anxiety for each participant

Participant	Anxiety mean (*SD*)	Enjoyment mean (*SD*)	Correlation between anxiety and enjoyment (*r*)	*p* value
David	-1.41 (5.46)	2.47 (4.99)	-.83*	< .01
Ann	-.15 (7.08)	4.50 (5.84)	-.68*	< .01
Victor	.45 (5.15)	.10 (3.38)	-.47*	< .01
Tobey	.12 (3.46)	1.79 (2.85)	-.51*	< .01

Note. * $p < .05$

Despite the significant negative correlation between anxiety and enjoyment, the strength of these correlations varied substantially across individuals, which is

consistent with prior idiodynamic research (Boudreau et al., 2018; Mischel, 1968). Specifically, the correlation between anxiety and enjoyment was strong for David and Ann ($r > .65$), moderate for Tobey ($.50 < r < .65$), and weak for Victor ($.30 < r < .50$).

4.1.2. Dynamic changes in anxiety and enjoyment at the individual level

The overall negative correlation masked substantial intra-individual fluctuations in the anxiety-enjoyment relationship during specific interaction segments. For example, although Ann showed an overall negative correlation between anxiety and enjoyment ($r = -.68$), there was a significant, strong positive correlation between anxiety and enjoyment from 05 min 15 s to 05 min 29 s ($r = .89$, $p < .01$), and a near-zero correlation from 10 min 38s to 11 min 47s ($r = -.08$, $p = .53$; see Figure 3). These observations during specific temporal and interaction segments show that the anxiety-enjoyment relationship is not fixed but dynamically responsive to contextual and interactional cues, supporting the study's CDST-informed premise that emotions are context-sensitive and non-linear.

4.2. Individual-level dynamic patterns of anxiety and enjoyment

To further identify the patterns of dynamic changes in anxiety and enjoyment, further examinations were conducted for each individual's VMI experience.

4.2.1. David: Seesaw relationship

Among all participants, David's ratings were the lowest for anxiety and the second highest for enjoyment. David's VMI rating data revealed a regular pattern with a very strong, negative correlation between anxiety and enjoyment ($r = -.83$), showing a clear seesaw relationship (see Figure 2).

In the early phase (from 0 min 00 s to 4 min 58 s), David experienced a predominantly higher level of anxiety and a lower level of enjoyment. During this segment, when the native interlocutor initiated the first topic, "Why do you want to practice English?," David resorted to an "excuse": "ah (pause) ah please forgive me ah as you can see my English is poor ah um If I don't understand what you says um please forgive me (pause) ah." In this speech segment, David's anxious state was evident through the simultaneous occurrence of frequent pauses, the use of hesitation devices, and obvious incorrect grammar. When asked about this in our interview, David admitted that this speech was prepared in advance to set expectations

for his English proficiency. Despite delivering the prepared speech, he rated high anxiety and low enjoyment because he "still felt nervous and worried." His anxiety decreased slightly when the native interlocutor expressed understanding and offered solutions for clarity, which were to type when necessary. Between 3 min 53 s and 4 min 23 s, David's anxiety peaked twice with low enjoyment. Explaining the ratings for this period, David attributed the high level of anxiety to "cognitive problems" (Aubrey, 2022, p. 7): "I never think about the question. I had no idea about the answer, not to mention answering it in English." Following this, his anxiety further intensified when he struggled to pronounce the word "beneficial" correctly.

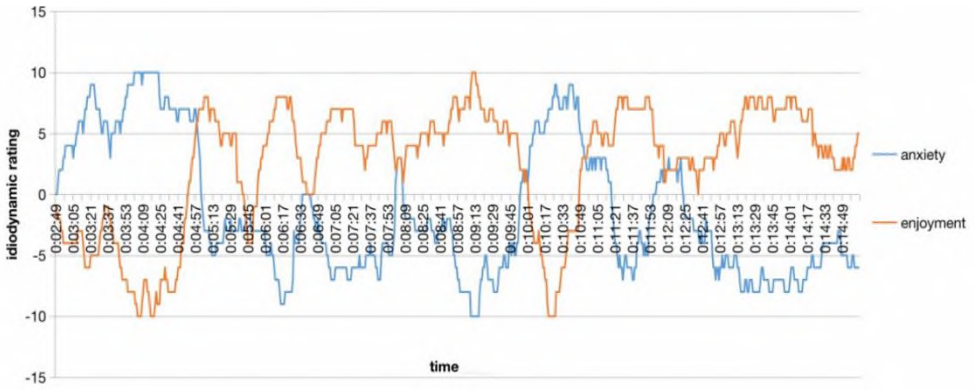

Figure 2 David's idiodynamic ratings

The following phase showed a turning point (from 4 min 24 s to 9 min 56 s), when enjoyment gradually rose and counteracted anxiety. To begin with, the NS interlocutor corrected David's pronunciation of "beneficial," which led to a decline in anxiety and a sharp increase in enjoyment. The native interlocutor's correction or instruction actions occurred many times throughout the conversation, which David considered very helpful: "After she told me the correct expression, I felt kind of happy and had an aha moment." In addition, David attributed this positive trend to his familiarity with the topic. When discussing his major, he felt at ease and communicated smoothly.

In the next phase (from 9 min 56 s to 10 min 52 s), however, David experienced another period of low enjoyment and high anxiety for about one minute when encountering the topic of his favorite movie. He encountered the highest anxiety and the lowest level of enjoyment in the following segment (from 10 min 4 s to 10 min 35 s):

> flipped um it's it's about yeah (pause) maybe its name is called is (pause) flipped and in Chinese its name um peng ran xin dong um it's about a boy and girl's (pause) or um maybe my pronunciation is not um correct.

David attributed his emotional fluctuation in this segment to frustration resulting from his perception of the interlocutor's "indifference" behaviors:

> I couldn't think of the movie's name, and I felt like she wasn't paying attention to my speaking because she was looking somewhere else. I felt helpless and embarrassed, but I still felt that I had to say something to avoid silence, so I said the name of the movie in Chinese subconsciously, even though I knew she didn't understand Chinese, which made the situation worse.

As the conversation continued, however, it turned out that the NS interlocutor was searching online for the film that David intended to describe. After the misunderstandings dissolved, it seemed that the rapport between them improved, and the atmosphere became relaxing. David's performance became more natural, especially after sharing a joke that lightened the mood. Although there were still fluctuations in anxiety and enjoyment, enjoyment gradually surpassed anxiety for the rest of the conversation.

4.2.2. Ann: Extreme fluctuations

Ann also exhibited an overall negative correlation between enjoyment and anxiety (r = -.68), but a closer examination of her data revealed a more complex pattern. Ann's idiodynamic ratings were the highest for enjoyment and had the greatest variance among the four participants. The rapid and extreme fluctuations in her ratings can be observed in Figure 3, with both anxiety and enjoyment sharply rising and falling during the conversation. She attributed this to her personality and sensitivity, noting that she often selected extreme values when rating her emotions because her feelings changed frequently.

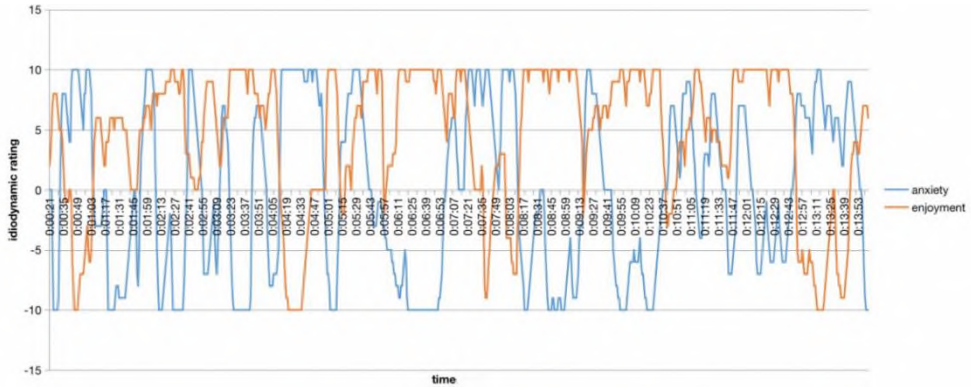

Figure 3 Ann's idiodynamic ratings

Ann mentioned two enjoyment triggers: topic interest and empathy with the interlocutor. For example, to explain the peaks in her enjoyment rating scores, she linked her positive emotions to her preference for the specific topic being discussed (from 3 min 22 s to 4 min 7 s): "When I was interested in the topic we were talking about, I would enjoy the conversation. For example, talking about music made me enjoyable because I like listening to music." Another contributor to the emotion of enjoyment was her empathy for the other interlocutor's feelings. Ann commented: "I would be enjoyable when I felt the happy feelings that she expressed. For example, when she said that she likes to live by the seaside and she is now living by the seaside in Spain, I was happy for her and enjoyed it too."

Anxiety, on the other hand, often arose from concerns about feedback, especially when she perceived a lack of engagement from her interlocutor: "Sometimes I would notice her (the native interlocutor's) facial expressions. If there was no clear sign that she was listening to me, I would be a little anxious." Moreover, the self-evaluation of her own performance led to changes in her anxiety level. This happened when she felt her performance did not align with her identity as an English major student, fearing that her mistakes might appear "cheap and ridiculous."

Co-occurrences of anxiety and enjoyment, where both emotions rose simultaneously, were observed during two segments (from 1 min 55 s to 2 min 6 s and from 11 min 43 s to 11 min 59 s). For example, when discussing her motivation for learning English (a familiar topic), enjoyment increased due to interest, but anxiety also rose because of disfluency. She explained:

> As a student of English major, to be honest, I did hope that the NS interlocutor would point out my mistakes so that I could make progress. Her correction was very valuable to me, so I would feel happy and enjoyable. But I felt a little nervous at the same time, because I felt that I should have performed better.

4.2.3. Victor: Persistent high anxiety

Compared to the other participants, Victor exhibited the highest anxiety ratings and the lowest enjoyment ratings. While there was still a significant negative correlation between Victor's anxiety and enjoyment (r = -.47), it was weaker than that of David and Ann. The fluctuation patterns are presented in Figure 4.

Victor's concerns about self-image tended to give rise to his anxiety. He recalled: "Because of the online platform providing video that I could see myself, I kind of cared about my self-image at the start, and I don't like (to see my self-image)." Victor also described his word choices as influencing his feelings of anxiety. He referred to the following speech segment (from 4 min 12 s to 4 min 28 s) which coincided with high anxiety and low enjoyment: "(what are your hobbies) hobbies my

my fav- favorite my favorite thing my um my hobby is to um watch some English series in my free in my leisure time especially (oh lovely) yeah . . .” His anxiety rose when he used the word “favorite,” a phrase that he considered to be of poor quality:

> In this segment, there was a series of struggles when I chose the word to use. I didn’t want to repeat the words ‘favorite hobby’ in my answers. But at that moment, all I could think of was the very positive word ‘favorite’, to which I was a little disappointed and very nervous.

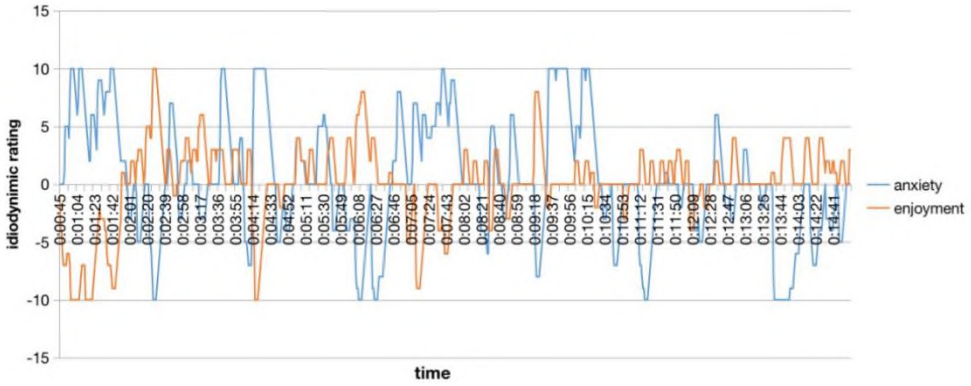

Figure 4 Victor’s idiodynamic ratings

Also relevant to language formulation, when discussing a movie he likes (from 6 min 48 s to 7 min 59 s), Victor felt anxious because he could not fully convey the content of the movie due to his limited language repertoire.

Feedback from the NS interlocutor played a role in his emotional fluctuations, which was also mentioned by the previous two participants. Regularly, he felt relieved when he received positive feedback. In this situation, he could even naturally obtain the speakership by asking “May I ask where are you from?” (from 4 min 28 s to 4 min 31 s) or “Have you ever heard of it (the movie)?” (from 6 min 44 s to 6 min 45 s) to enhance the communication. However, when the NS interlocutor tried to correct his speaking or showed disagreement, his anxiety increased. This segment (from 10 min 43 s to 10 min 53 s) was an example: “. . . maybe firstly from New York the most prestigious city right (The other interlocutor: “Oh, well, I’m not sure I’d call it prestigious. I might call it the most well-known.”) Oh yes well-known.”

A noticeable change in his emotions occurred during the task when he experienced an interruption caused by the internet connection (from 12 min 53 s to 13 min 14 s), which, however, was described by him as “not particularly affecting anxiety, but enjoyment slightly decreasing.” Also, there was overlap and silence in the conversation caused by the network delay. Victor claimed that “this situation seemed not to influence my emotion that much. It was more likely

that we were just cooperating to make the conversation happen. When overlapping, she or I paused; and when there was silence, she or I started a new question to let the conversation go." Towards the end of the conversation (approximately 13 min 34 s), Victor's anxiety started to be undermined by enjoyment. He said: "In this period, due to the time limit, I knew the conversation was coming to an end. I felt that I didn't need to be tensely prepared for communication, thus I did not feel that anxious." This moment marked a temporary emotional transition as the interaction drew to a close.

4.2.4. Tobey: Gradual adaptation

Compared to the other three participants, Tobey reported average ratings for anxiety and enjoyment, with relatively less variance in each. Tobey showed an overall negative correlation between anxiety and enjoyment (r = -.51). Figure 5 visually displays fluctuations in these two constructs. Generally, Tobey described her feelings in the interaction as "getting better as the conversation proceeded." She particularly noted that "I felt gradually comfortable after adjusting to the online environment and the speaking style of the native interlocutor."

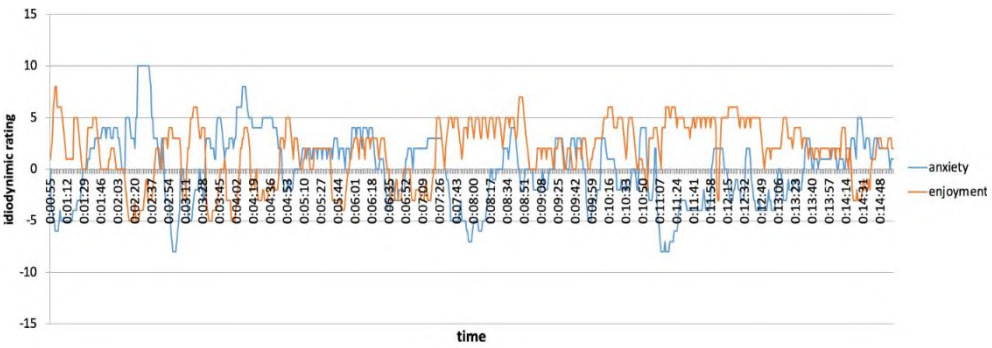

Figure 5 Tobey's idiodynamic ratings

Tobey consistently ascribed her fluctuations in anxiety and enjoyment to the reactions of the interlocutor. Unlike David and Victor, Tobey initiated the conversation with high enjoyment and very low anxiety, noting that "the first impression of the NS interlocutor was positive. She came across as very friendly to me." The first peak of anxiety (from 2 min 23 s to 2 min 36 s) occurred in relation to the interlocutor's accent. She explained: "When she initially pronounced the word 'study' with an accent, I couldn't understand her. What concerned me more was the possibility of her maintaining the accent, which would lead to further misunderstandings in our conversation."

The second peak of anxiety (from 4 min 3 s to 4 min 13 s) appeared when the conversation moved on to Tobey's major. In an effort to explain this, Tobey said: "I lacked confidence in my knowledge of my major. When she asked me anything related to my major, I was very anxious because it seemed like taking part in an interview for the entrance of postgraduate study which I just experienced and I must have replied mechanically."

Tobey's anxiety markedly decreased and her enjoyment grew as the conversation shifted to a more appealing topic (travel destinations). Until this moment, the intense fluctuations in both anxiety and enjoyment that started from the beginning of the conversation subsided, replaced by a mild and pleasing trend in which enjoyment generally overpowered anxiety. She explained: "Now in this period, I was totally warmed up and felt at ease, enjoying our interaction. The accent problems I had worried about earlier did not hinder our communication. I could feel the native interlocutor's enthusiasm, which was always very encouraging."

In addition, throughout the conversation, Tobey's perception of the NS interlocutor influenced her affective experience of enjoyment. Reflecting on the perceived identity of the interlocutor, Tobey noted: "The NS interlocutor did not exert much pressure on me. Instead, I felt that she was like a friend sharing her stories. I liked it when I listened to her sharing of her experiences." This positive perception of the role of the NS interlocutor appeared to facilitate Tobey's gradual adaptation to the task.

4.3. Factors contributing to fluctuations in anxiety and enjoyment

To synthesize findings from individual analyses, a two-step thematic analysis was conducted. Preliminary deductive coding based on Aubrey's (2022) framework was followed by inductive coding to identify emergent factors (see Table 3). These factors were then categorized into three overarching dimensions: individual, interpersonal, and environmental. As shown in Figure 6, emotional shifts emerged from the dynamic interplay of cognitive-linguistic processes, interactional dynamics, and contextual conditions within the virtual environment.

Table 3 Factors contributing to fluctuations in emotions during the conversation

Factors affecting emotional fluctuations	Change in anxiety	Change in enjoyment
Language formulation	David+ Ann+ Victor+	Tobey- Victor- Ann-
Idea conceptualization	David± Victor+	
Language processing	David± Tobey±	David± Tobey±

	David-	Ann+
Interest in conversation topic	Tobey±	Tobey±
		David+
Articulation	David+	David-
	David+	
Self-evaluation of language performance	Victor+	
	Ann+	
Self-image in VMI	Victor+	
Time limits		Victor+
	David±	Victor±
Feedback from the NS interlocutor	Tobey±	
	Victor-	
	David-	David+
Error correction from the NS interlocutor	Victor+	Ann+
	Ann+	
Separate space in the online communication	David+	David-
Network connection failures (disconnection or delay)		Ann-
		Victor-
Empathy of the shared feelings		Ann+
		Tobey+
	Ann+	Ann±
Self-identity	Victor+	Victor-
	Tobey+	Tobey-
Perceived identity of the NS interlocutor	Tobey-	Tobey+
Conversation position change	Victor-	Victor+
		Tobey+

Note. "+" indicates an increase in the emotion, whereas "–" indicates a decrease

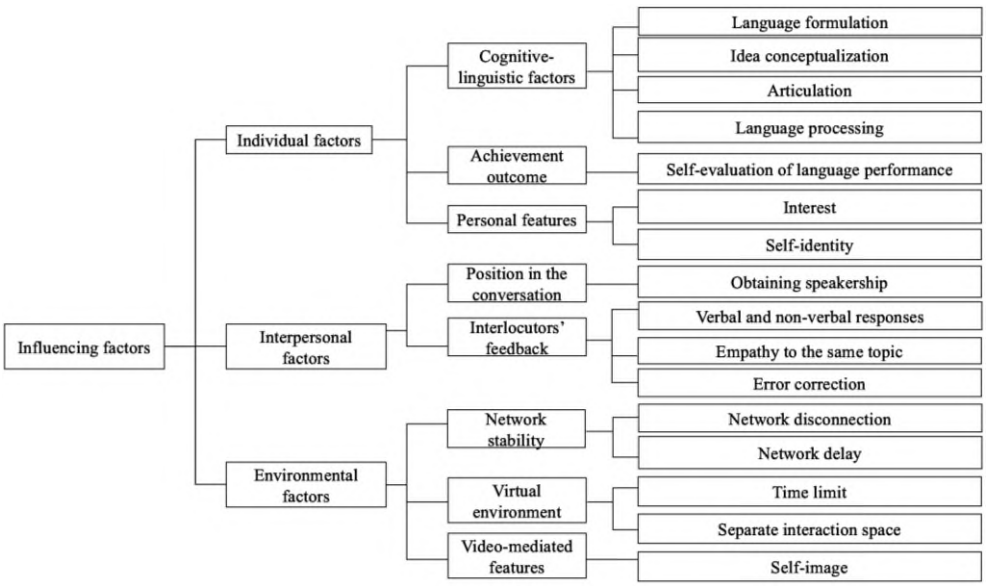

Figure 6 Factors in the fluctuations of anxiety and enjoyment during the task

5. Discussion

The study explored the relationship between anxiety and enjoyment in L2 English learners in the emerging VMI context as well as the factors driving emotional fluctuations, addressing the two research questions outlined earlier. Grounded in CDST and the idiodynamic framework, the findings advance theoretical understanding of affective processes in emergent digital interaction contexts, while offering empirically informed pedagogical implications.

5.1. The dynamic relationship between anxiety and enjoyment (RQ1)

RQ1 investigated intra-individual relationships between anxiety and enjoyment. The analysis showed that all four learners exhibited significant negative correlations between anxiety and enjoyment, but with varying strengths.

Using the idiodynamic method, we observed significant interpersonal variations in how enjoyment and anxiety fluctuate during L2 VMI. This variability aligns with prior idiodynamic research (Boudreau et al., 2018; Dewaele & MacIntyre, 2014) and challenges the traditional bipolar conceptualization of anxiety and enjoyment as mutually exclusive opposites on a single emotional continuum. Instead, the data support the nuanced view that these emotions operate as independent, coexisting constructs with distinct developmental pathways, converging or diverging in response to context-specific interactional events.

A novel contribution of this study is the identification of positive emotion thresholds, a phenomenon where, beyond a certain point, enjoyment overrides anxiety such that it is not felt or perceived anymore in the course of interactions. This was observed in three out of four participants (i.e., David, Victor, and Tobey), regardless of their language proficiency and exposure to oral L2 communications. This stands in contrast to Boudreau et al.'s (2018) finding that anxiety thresholds can undermine enjoyment in monologue tasks, and represents the first empirical demonstration of a positive emotion threshold in interactive L2 contexts. Specifically, stimulated recall data clarified that this threshold was typically triggered by cumulative positive experiences derived from factors such as interlocutor support (e.g., pronunciation corrections, empathetic responses), liking for the interlocutor, and adaptation to the task environment. Together, these findings extend CDST's conceptualization of emotional systems as self-organizing, suggesting that repeated positive interactional cues can shift the "attractor state" (De Bot et al., 2007; Larsen-Freeman & Cameron, 2008; van Geert, 2008) of the affective system toward enjoyment.

5.2. Factors influencing emotional fluctuations (RQ2)

RQ2 explored factors influencing changes in anxiety and enjoyment during L2-NS VMIs. Thematic analysis of stimulated recall interviews, integrated with idiodynamic rating data, identified three interconnected factor dimensions: individual, interpersonal, and environmental. These factors were interconnected, and their interplay shaped learners' emotional trajectories. Consistent with CDST (Larsen-Freeman & Cameron, 2008), these factors operated as "interacting subsystems" (Steinkrauss & Lowie, 2025) rather than isolated variables, resulting in rapid and context-sensitive fluctuation of emotions across all participants.

The first category is based on the individual level. First, "cognitive-linguistic factors" (Aubrey, 2022, p. 13) emerged as a primary driver of emotional change. Aubrey (2022) explained that cognitive-linguistic factors include "momentary breakdowns in the formulation of language or conceptualization of ideas" (p. 13), which were also observed in this study. In terms of "idea conceptualization," this can be reflected by the increase in anxiety when the participant "did not know how to express even in L1," which shows that a deficiency of knowledge or an absence of idea exists whatever language is used. Additionally, all participants, regardless of proficiency level, mentioned that difficulties in word recall when expressing ideas led to increased anxiety and lowered enjoyment, which is consistent with prior idiodynamic research (Aubrey, 2022; MacIntyre & Gregersen, 2022). Moreover, when there are difficulties in processing the information produced by native interlocutors, such as failure to recognize the words heard at that moment due to accents, an increase in anxiety and a related decrease in enjoyment can be predicted, which is indicative of problems in language processing. This finding corresponds to the findings reported by MacIntyre and Gregersen (2022) showing that anxiety could result from the challenge of comprehending the accents of "cross-cultural strangers" (p. 82) in a conversation. These findings show the inner interrelation between cognitive, emotional, and linguistic subsystems.

Second, "achievement outcome factors" (Aubrey, 2022, p. 13) that trigger retrospective emotions (see Pekrun, 2006) were detected when participants constantly monitored their language output in real time during the interactions with the NSs. As outlined by Pekrun (2006), retrospective outcome emotions arise when learners experience and recognize success or failure. It is common for retrospective emotions to be a blend of various emotions (i.e., anxiety and enjoyment in this study), because learners often perceive multiple factors working together in producing an achievement outcome (Pekrun, 2006). For example, a momentary spike in anxiety and a reduction in enjoyment were experienced by Victor when he used a seemingly basic phrase, "favorite thing," to describe his hobby, which he negatively evaluated. Retrospective emotions are rarely studied in the context of communicative

performances. This perspective helps researchers understand how performance evaluation affects emotions during oral interactions.

Third, personal features modulated emotional responses. Participants reported increased enjoyment when discussing topics aligned with their interests or expertise. This coincides with the finding that the alignment of the conversational topic and personal experiences enhances topic familiarity (Aubrey, 2022), willingness to communicate and engagement (Pawlak & Mystkowska-Wiertelak, 2015), thus engendering enjoyment. In addition, identity plays a role in their emotional changes. In this study, English majors (e.g., Ann and Victor) cared more about their performances and the interlocutors' feedback than the non-English major (i.e., David), because they believed that English majors should perform better when interacting with NSs. This high expectation linked to their identity as English majors led them to monitor their own performance more closely and caused emotional fluctuations.

The interpersonal level highlights the importance of conversational position (i.e., speaker or listener) and interlocutor feedback in emotional fluctuations during the VMIs. Tobey described that she felt comfortable as a listener without the requirement to comment. As for Victor, the only one who actively obtained speakership in turn-taking, he showed more enjoyment than anxiety. Interlocutor feedback is another factor that plays an important role, aligning with previous findings that learners' anxiety constantly changes due to verbal and non-verbal feedback (Elahi Shirvan & Talebzadeh, 2018). Positive feedback, such as encouragement, agreement, and support from the NS interlocutors, reduced anxiety and boosted enjoyment across participants. Due to the instructional nature of the interactions based on the educational platform, error correction also influenced learners' anxiety and enjoyment, which echoes previous studies (e.g., Pawlak, 2014; Zulfikar, 2022). In the current study, most participants showed an increase in enjoyment when being corrected by their interlocutors, with more proficient speakers (Ann and Victor) having slight surges in anxiety.

Environmental factors in the online language learning context include three aspects. One is the network stability. Network disconnection or delay may lead to overlap or silence during the conversation, hindering the natural flow of conversation and turn-taking. For example, when experiencing a 25-second silence caused by network disconnection, Victor rated lower enjoyment. In addition, due to the nature of the virtual environment, without a shared space, interlocutors may not receive feedback from each other in time. The time limit in online conversations may function as a positive trigger, as speakers do not need to worry about how to end the conversation. Besides, L2 interlocutors reported higher anxiety when seeing their self-image, which is consistent with previous results (Azriel et al., 2020; Clark & Wells, 1995).

5.3. Limitations

This study has several limitations that point to avenues for future research. First, the standardization of idiodynamic ratings was not optimal. Despite detailed instructions, ratings of anxiety and enjoyment relied on participants' subjective comprehension of the two emotions and software proficiency, which may introduce variability. This can be improved by incorporating pre-task calibration sessions and practice trials to enhance rating consistency and ensure a shared understanding of the target emotions. Second, the small sample size, mostly owing to the time-intensive idiodynamic procedure, limits generalizability. Although this is a common constraint in idiodynamic research (e.g., Hiver et al., 2022; MacIntyre & Ducker, 2022), this approach is designed to conduct fine-grained temporal analysis rather than to achieve broad statistical generalization. Nevertheless, its rigor can be strengthened through triangulation by supplementing self-ratings with physiological indicators (e.g., heart rate, blood pressure, or facial expression analysis) to enhance objectivity. Third, given the specificity of the current task, especially because the VMIs in this study were restricted to the first encounters between participants and native interlocutors, the implications were limited for emotional dynamics in other kinds of interpersonal relationships. For future research, investigating emotions in other interaction types (e.g., peer interaction) may provide a more holistic understanding of L2 learning emotions.

5.4. Pedagogical implications

This research carries significant pedagogical implications for L2 oral communication. First, more authentic interactive conversation practice is needed in teaching and learning to improve communicative competence. Participants in the interviews consistently reported limited opportunities for L2 interactions in their formal learning, highlighting a need to integrate more interactive tasks (e.g., group discussion, drama games, and role-play) into curricula (e.g., Fatimah, 2019). Second, optimizing teacher feedback and support during interaction practices with learners can nurture positive emotions. For example, implicit prompts (e.g., recasting) can help learners recognize and correct errors and improve learning outcomes without undermining learners' confidence (Guo et al., 2023). In addition, post-interaction reviews can contextualize errors and reinforce progress while minimizing negative emotions. Furthermore, timely non-verbal feedback (e.g., nodding, smiling) encourages learners to continue, as it enhances learners' learning outcomes by reducing the "psychical-affective distance" (Hu & Wang, 2023, p. 8). Third, teachers should acknowledge the important role of individual differences in L2 speaking

tasks. For example, customizing conversation topics to coincide with learners' majors or hobbies enhances engagement, while supporting English majors with explicit reassurance about performance expectations can reduce identity-related anxiety.

6. Conclusion

This study contributes to L2 emotion research by unpacking the dynamic relationship between anxiety and enjoyment in L2-NS VMIs, and identifying the multilevel factors driving emotional fluctuations. The findings demonstrate that anxiety and enjoyment are independent, context-sensitive constructs with non-linear trajectories, and introduce the novel concept of positive emotion thresholds, where cumulative positive interactional cues shift the affective system toward enjoyment. Moreover, we concluded that anxiety and enjoyment are influenced by three categories of factors: individual, interpersonal, and environmental. The results highlight the need for micro-level, mixed-methods research to capture the complexity of L2 learning emotions. Pedagogically, the study underscores the importance of interactive tasks, optimized feedback, and tailored teaching in fostering positive emotional experiences. As digital communication becomes increasingly central to L2 learning, understanding the affective dynamics of VMIs will help design effective, emotionally supportive L2 speaking instruction.

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