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Cong Liu,
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REVIEWED BY

Rakel Österberg,
Stockholm University,
Sweden
Weifeng Han,
Federation University Australia,
Australia

*CORRESPONDENCE

Jacob M. Marszalek
marszalekj@umkc.edu

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Self-concept and intrinsic motivation in foreign language learning: The connection between flow and the L2 self

Jacob M. Marszalek^{1*}, Diane Balagna², Alissa K. Kim¹ and Shivani A. Patel¹

¹Department of Psychology, University of Missouri-Kansas City, Kansas City, MO, United States,

²Division of Teacher Education and Curriculum Studies, University of Missouri-Kansas City, Kansas City, MO, United States

An increasingly globalized economy requires a workforce with multilingual capability. However, the United States education system has de-emphasized foreign language learning, such as in the No Child Left Behind Act (NCLB), hurting the recruitment and retention of foreign language learners. To compensate, educators may be able to increase the retention of foreign language learners by fostering intrinsic motivation, but not much currently is known about relevant factors. The present study examined the association of intrinsic motivation and one relevant factor, dispositional flow, in foreign language learners. A sample of 116 foreign language learners was administered the L2 Motivational Self Scale and the Dispositional Flow Scale-2. Good evidence of construct validity was obtained for the scale scores, and a significant positive correlation of .45 was found between the constructs using confirmatory factor analysis. The results suggest dispositional flow is an important factor to consider for increasing intrinsic motivation in foreign language learners.

KEYWORDS

flow, L2 self, motivation, confirmatory factor analysis, foreign language learning, self-concept

Introduction

Despite the increasing need for multilingual skills in today's economy and workforce, there is a lack of emphasis on foreign language learning in current mainstream curricula. In other words, opportunities to learn a language other than one's mainstream language of English is lacking in the United States education system. The No Child Left Behind Act of 2001 (NCLB) mandated assessment of elementary and secondary students in reading and math, which led to the prioritization of standardized test performance and a consequent shift in school district funding allocations to increase student scores (Menken and Solorza, 2014). Approximately one third of public elementary and secondary schools with language programs reported their foreign language instruction had been affected by the NCLB education legislation (Pufahl and Rhodes, 2011). Some cities, such as New York, have

chosen to remove foreign language education programs from their curricula altogether (Wiley and Wright, 2004). Responses obtained from surveyed individuals representative of 165 K⁻¹² school districts in the Northeast Conference on the Teaching of Foreign Languages reported reductions in funding for foreign language programs and time spent in foreign language classes, as well as elimination of 24% of foreign language teaching positions and 22% of specific foreign language courses (Rosenbusch and Jensen, 2005). Such actions have exacerbated the paucity of multilingual expertise.

Because of recent trends in international migration (Organization for Economic Cooperation and Development [OECD], 2019) and domestic employment (Bureau of Labor Statistics, 2010, 2019), more workers with multilingual skills are needed. In fact, much of the recent growth in the world working-age population can be sourced back to international migration (OECD, 2019). There were approximately 150.3 million migrant workers worldwide as of 2015, and 258 million individuals taking residence in a country other than their country of birth as of 2017 (International Organization for Migration [IOM], 2019). From the years 2006–2016, there was an increase in the immigrant population in the United States by four million individuals (International Organization for Migration, 2019), and as of 2017, immigrants constituted 44.5 million individuals, or 13.7% of the total population (Migration Policy Institute, 2019).

In consideration of these recent migration and employment trends, there are several benefits in fostering the development of multilingual skills. The process of learning a foreign language leads to a better understanding of different cultures and worldviews (National Standards in Foreign Language Education Project, 1999), which is especially important in educational environments. Possessing an understanding of different cultures may subsequently lead to reductions in ethnocentrism and stereotypes. In educational contexts, research examining the effects of foreign language learning on children has shown that it has beneficial outcomes for cognitive development (Woumans et al., 2019).

One way to increase the number of multilingual speakers is to recruit and retain foreign language students, but this has been problematic in the past because of recent U.S. educational policy (Pufahl and Rhodes, 2011). While the majority of students in the United States begin their foreign language study in high school, students in 21 out of 25 industrialized nations begin foreign language study in elementary school (i.e., by Grade 5). Furthermore, foreign language study is compulsory in most European Union countries, many of which also encourage study of a second foreign language (Pufahl and Rhodes, 2011). Although foreign language study is not compulsory in much of the United States, U.S. educators can focus on recruiting and retaining foreign language learners. Retention requires educators to motivate foreign language students to persist and succeed, especially by providing supportive conditions for student engagement and achievement (Umbach and Wawrzynski, 2005; Martin and Dowson, 2009). When such conditions include opportunities for students to make decisions, acknowledge their

feelings, and find avenues for self-direction, *intrinsic motivation*, the pursuit of an activity for the challenge and enjoyment obtained from performing the behavior itself, is more likely to result (Ryan and Deci, 2000).

Intrinsic motivation is an essential component of the success of any foreign language learner, because it affects how often students use foreign language learning strategies (Oxford and Shearin, 1994). *Learning strategies* are intentional thoughts and behaviors used to help learn new information (Richards and Platt, 1992). For example, foreign language learners use the strategies of asking native speakers questions and cooperating with friends or acquaintances through verbal communication (Oxford, 1990). The use of these learning strategies and others is positively associated with increased proficiency and achievement in foreign language learning (Hardan, 2013), which students are likely to find motivating (Oxford and Shearin, 1994). For example, students who use foreign language learning strategies to interact with native speakers persevere in learning the language and maintain their use of it in the long-term (Anjomshoa and Sadighi, 2015).

Flow

A possible method to increase intrinsic motivation in foreign language learners is to facilitate entry into *flow* (Rathunde, 2003; Tardy and Snyder, 2004; Anderson, 2010), a motivational state where (1) action and awareness are merged, (2) there is a match between the person's skill and the challenge, (3) unambiguous feedback and (4) clear goals are provided, and (5) the experience is *autotelic*, enjoyable in and of itself (i.e., intrinsically motivated; Csikszentmihalyi, 1990). Csikszentmihalyi (1990) identified nine dimensions of flow, including the five just mentioned. The remaining four are: (6) a high level of concentration, (7) possessing a sense of control, (8) a loss of self-consciousness, and (9) a transformation of time. Of these dimensions, the balance between skill and challenge is essential for entering and sustaining flow (Jackson and Eklund, 2002). If the amount of skill and challenge are not equally presented to the individual, then boredom (high skill, low challenge) or anxiety (low skill, high challenge) tend to result rather than flow (Csikszentmihalyi and Massimini, 1985). In order to enter and sustain flow, one must continually seek tasks that match one's level of skill. A beginning foreign language learner enrolled in a course to learn Japanese may find it difficult to enter flow at first due to little to no skill and the relative difficulty of entering a new subject; however, flow may be more readily attainable as competence in Japanese increases throughout the semester. In today's learner-centered instruction, an important component of the educator's role is to adjust the complexity and difficulty of tasks to match the ability of the learner, and thus, streamline the learning process (Moeller and Koubek, 2001). Recent research has supported the presence and measurability of flow in education (Rathunde, 2003; Tardy and Snyder, 2004; Anderson, 2010), and reports that learners who experience a high intensity of flow also tend to experience increasing levels of

self-esteem, time spent doing schoolwork, and intrinsic motivation. In addition, students who enter flow in both online and traditional classes experience improved academic performance (Ardura and Artola, 2017; Sumaya and Darling, 2018).

In particular, Egbert (2003) observed flow in foreign language students and teachers' ability to facilitate flow. By conceptualizing and analyzing foreign language learning activities, Egbert developed both a simplified model of flow and learning and a more refined model. The simplified model detailed the interactions between learner and classroom characteristics that can result in flow and highlighted the importance of the match between task challenge and student skill, one of the nine flow dimensions. The more refined model added key aspects of foreign language learning to the simplified model: sufficient time, tasks that are intriguing or that learners feel motivated to pursue, unambiguous feedback, and an environment learners control that encourages immersion. These aspects of the refined model include important dimensions of flow, such as a sense of control, unambiguous feedback, and the autotelic experience (Csikszentmihalyi, 1990). The model further specified that tasks should build on relevant foreign language skills, such as reading, writing, speaking, listening, typing, and pragmatics (Egbert, 2003). Theoretical support for these aspects of facilitating flow in foreign language learning contexts exist, as they are rooted in the nine dimensions integral to flow (Csikszentmihalyi, 1990).

Csikszentmihalyi posited that there are individual differences in the ability to experience flow (Jackson et al., 1998; Jackson and Eklund, 2002; Chirico et al., 2014). For example, some people may have a greater desire to be challenged than others, or have more capacity for concentration. Thus, certain types of people may be more psychologically equipped to experience flow, regardless of the situation (Jackson et al., 1998; Jackson and Eklund, 2002). This *autotelic personality*—one who enjoys activities for their own sake, rather than for the sake of external rewards—was conceptualized by Jackson et al. (1998) as a disposition to experience flow. Conceptualizing flow as having state and trait components falls in line with many other psychological constructs (Geiser et al., 2017). Jackson et al. operationalized the construct by developing the Trait Flow Scale, which Jackson and Eklund later revised as the Dispositional Flow Scale-2 (DFS-2), to assess the propensity of an individual to experience flow during a chosen activity. Dispositions are an important factor when looking to increase foreign language student recruitment and retention (Dewaele and Furnham, 1999; Ozanska-Ponikwia and Dewaele, 2012). For example, an extroversion/introversion dimension is apparent in the literature, with extroverts scoring higher in fluency of language and introverts scoring higher in accuracy (Dewaele and Furnham, 1999; Ozanska-Ponikwia and Dewaele, 2012).

The L2 self

Motivational theory in second language (L2) learning, closely related to and sometimes conflated with foreign language learning

(Peng, 2019), embodies a variety of models, but a major development was the incorporation of self-concept by Csizér and Dörnyei (Csizér, 2019; Cho, 2020). *Self-concept* is the image one has of one's material self (e.g., one's body, possessions, etc.), interpersonal self (e.g., how others view oneself), and intrapersonal self (e.g., one's values, feelings, desires, etc.; Epstein, 1973). As detailed in Cho (2020) and Csizér and Dörnyei (2005) drew on two prior theories involving the self-concept: Markus and Nurius' (1986) possible selves theory; and Higgins' (1987) self-discrepancy theory. Focusing on the intrapersonal self, Dörnyei (2005) proposed the L2 Motivational Self System, a theory positing that L2 learning is composed of three domains: the ideal L2 self, the ought-to self, and the L2 learning experience. The ideal L2 self refers to the self-concept of oneself as a capable speaker of the L2 and is considered to be a key motivator in learning it (Ryan and Dörnyei, 2013). For example, Ushioda (2001) detailed the accounts of Irish learners of French who dreamed of traveling to France and speaking the country's native language. An individual motivated to learn a L2 will thus work towards reducing the gap between the actual and ideal self in regards to L2 acquisition (Martinović, 2018). The ought-to self is motivated by the obligations set forth by external forces. For example, Irish learners of French who study in order to increase their prospects of obtaining employment in France would fall under the dimension of the ought-to self. The third domain, L2 learning experience, is associated with the aspects of an individual's prior learning environment that may have an impact on L2 motivation.

Piniel and Albert (2017) examined the third domain by operationalizing positive and negative language learning experiences as flow and anti-flow and associating them with students' motivation. As opposed to flow, anti-flow includes feelings of apathy and anxiety (Csikszentmihalyi, 1975). Piniel and Albert found that L2 motivation was positively associated with flow. Conversely, L2 motivation was negatively associated with anti-flow. The findings are reflective of previous literature regarding the association between the flow dimensions of autotelic experience and balance between skill and challenge (Csikszentmihalyi, 1990, 2014).

Levine (2003) investigated student anxiety that is related to target language and native language use in university-level foreign language classrooms using an anonymous, internet-based questionnaire. Their study found that the more the target language was used in the classroom, the less anxiety students felt when using it. Comparable results were found both with student self-report and instructor ratings of student anxiety. The findings support Csikszentmihalyi's (1990) theoretical framework of flow, which postulates that anxiety is present when the challenge is greater than one's level of skill. Conversely, flow occurs when a balance between challenge and skill exists. Their results support the need for further investigation in the role of flow in foreign language learning.

Lamb (2004) found strong evidence that L2 study is influenced by factors beyond affinity for other cultures or practical usefulness. One such factor may be Dörnyei and Csizér's (2002) contention

that the idea of the L2 learner is related to a “more basic identification process within the individual’s self-concept” (p. 454). According to Dörnyei (2009), a learner’s academic self-concept contributes to the development of future goals and desires, which underscores the association between the ideal L2 self and academic self-concept. Csizér and Dörnyei (2005) hypothesized that L2 motivation should be reframed in light of the ideal L2 self, leading to the development of the L2 Motivational Self System, using the concept of possible selves (Dörnyei, 2009). In addition, Spielmann and Radnofsky (2001) previously found that an emergent idealized L2 self contributed to intrinsic motivation and the control aspects of flow. Thus, Dörnyei and Ushioda (2011) posited that flow can be viewed as a tool in conceptualizing motivation, such that flow is essentially a heightened state of behavioral engagement. Empirical support was found when several aspects of flow, such as concentration, the transformation of time, skill and challenge balance, and especially the autotelic experience, emerged as themes in a study of Japanese idealized L2 learners (Nishino, 2007; Judge, 2011). Given these findings, there is theoretical support for a link between autotelic personality and the idealized L2 self.

Purpose

Previous studies lend evidence to support the hypothesis that possessing an idealized L2 self is associated with intrinsic motivation (Spielmann and Radnofsky, 2001) and important aspects of flow, such as the autotelic experience (Nishino, 2007; Judge, 2011). As a result, we hypothesize the L2 self to be related to the autotelic personality, and thus one’s disposition to experience flow and remain motivated for foreign language learning. By examining these constructs, a more efficient system can be developed to identify candidates most likely to persist and succeed in a foreign language learning program. The purpose of the present study is to test this hypothesis, and to collect evidence of the validity of the measures of these two constructs, in a population of foreign language students.

Materials and methods

Participants

We recruited 116 students from a total of 200 (58.0%) enrolled in undergraduate Spanish, French, and German courses at a large, urban university in the Midwestern United States. Of these, 52.6% were in a French course, 11.2% in a German course, and 36.2% in a Spanish course. Although most students majored in other subjects, 11.2% majored in French, 6.0% in German, 3.4% in Spanish, and 0.9% in Romance Languages. In addition, 6.9% minored in French, 6.0% in German, and 5.2% in Spanish. Overall, 36.2% of the students majored or minored in a foreign language. Of the total sample, 5.2% self-reported as native

speakers of a language other than English. In terms of gender and race/ethnicity, 66.4% self-identified as female, 66.4% as White, 12.9% Black/African American, 6.9% Latino/a, 2.6% Asian/Pacific Islander, 0% Native American, and 11.2% Other (not listed). For comparison, the university population was 56.2% female, 58.3% White, 14.9% Black/African American, 5.0% Hispanic, 6.2% Asian/Pacific Islander, 0.6% American Indian, and 15.0% Other (not listed). A chi-square test of goodness of fit ($\chi^2[5]=5.77$, $p=0.33$) failed to detect any significant difference in race/ethnicity. However, a binomial test indicated a significant difference in sex ($z=2.21$, $p=0.03$).

Instrumentation

Dispositional Flow Scale-2

The DFS-2 (Jackson and Eklund, 2002) was developed from the Trait Flow Scale (Jackson et al., 1998) to measure the trait part of the state–trait model of flow, which was defined by Jackson et al. (1998) as the disposition to experience flow and equated with the autotelic personality. The DFS-2 consists of 36 items rated on a five-point scale (1 = never, 5 = always). Within the instrument are nine subscales, each with four items. The subscales are based on Csikszentmihalyi’s (1990) nine-dimensional model of the flow state, which consists of clear goals, challenge-skill balance, merging of action and awareness, unambiguous feedback, concentration on the task at hand, time transformation, loss of self-consciousness, sense of control, and autotelic experience (i.e., enjoyment in the task for its own sake). However, the DFS-2 measures the disposition, or tendency, to experience each of these nine aspects of flow, which together, represent the overall disposition to experience flow (i.e., the autotelic personality). Several studies have found support *via* confirmatory factor analysis for a nine-factor structure corresponding to the nine dimensions of flow (Jackson and Eklund, 2002; Jackson et al., 2008; Marszalek, 2021). Cronbach’s alpha internal consistency reliabilities of the subscales have ranged in the studies from 0.78 to 0.92.

L2 Motivational Self Scale

The L2 Motivational Self Scale (L2MSS; Dörnyei, 2009) consists of 18 questions intended to measure present and future selves and motivation for L2 learning. In contrast to other approaches to measuring the L2 Self in separate unidimensional scales/subscales (e.g., Ryan, 2008; Taguchi et al., 2009; Aubry, 2014; see Al-Hoorie, 2008 for multiple examples), MacIntyre et al. focused their scale on what Dörnyei (2009, p. 29) termed “the desire to reduce the discrepancy between our actual and ideal selves.” Thus, the L2MSS measures characteristics about the self in terms of their present existence, possible future existence, desirability, likelihood of attainment, and salience. Each of the 18 items consists of a stated characteristic, and five responses are required for each question: (a) “Describes me now?” (1 = yes, 0 = no); (b) “Describes possible future?” (1 = yes, 0 = no); (c) “Is this desirable or undesirable?”

(1 = undesirable, 5 = desirable); (d) “How likely is this in the future?” (1 = not likely, 5 = very likely); and (e) “How often have you thought about this future?” (1 = never, 5 = very often). These responses are grouped into five 18-item subscales for scoring purposes. Example characteristics include, “Understand the views of French-speaking people,” “Enjoy speaking French,” and “Meet and converse with French-speaking people” (See [Supplemental materials](#) for an example of the instrument). We substituted “Spanish” and “German” for “French” depending on the language the participant was learning (see Procedure). [MacIntyre et al. \(2009\)](#) reported Cronbach’s alpha internal consistency reliabilities of the L2MSS ranging from 0.82 to 0.95. [Kay \(2011\)](#) employed a similar measure using 12 items and reported reliabilities from 0.81 to 0.97. [MacIntyre et al.](#) reported support for unidimensionality of each of the five subscales using principle components analysis (PCA) and examination of a scree plot.

The correlations among the five subscales were positive and very strong, ranging from 0.60 to 0.75, suggesting a hierarchical factor structure in which a single higher order factor was indicated by the five subfactors representing the subscales. Such a structure would also reflect the intent of [MacIntyre et al. \(2009\)](#) with greater fidelity than five separate PCAs for two main reasons. First, they emphasized the role of the discrepancy between the present and future selves in the motivation of language learners, and that discrepancy would be represented as a correlation between the subscales (e.g., the greater the discrepancy, the lower the correlation). Second, [MacIntyre et al. \(2009\)](#) included the other three subscales as important components of language learning motivation. Thus, a second-order factor representing intrinsic motivation to learn a language should emerge from the five subscales. Therefore, we chose to model the L2MSS in that way in our analysis (see Analytical Strategy).

Procedure

We sent emails en masse to students in the university’s foreign language department to solicit participation. Students interested in participating could access the online questionnaire through a link. We also contacted faculty *via* email for permission to administer the questionnaire to their students in person. With faculty permission, we visited nine classrooms in French, Spanish, and German, and invited students to complete a paper version of the questionnaire during class. We also recruited participants through flyers that had the link to the online questionnaire. All participants were entered into a drawing to win one of four \$25 gift certificates. The questionnaire took approximately 15 min to complete.

Analytic strategy

We used confirmatory factor analysis (CFA) to address the hypothesis that the L2 self would be correlated to the autotelic

personality (i.e., dispositional flow). CFA allowed us to account for measurement error in the estimation of the correlation of the two constructs, while at the same time providing evidence of the structural validity of the scores of the L2MSS and DFS-2. We fit a two-factor standard CFA model with unit loading indicators using maximum likelihood estimation in IBM SPSS Amos v26. The model was theoretically identified and specified the five subscales of the L2MSS as indicators of the L2 self, and the nine subscales of the DFS-2 as indicators of the autotelic personality (see [Figure 1](#)). Using subscales as indicators is a form of parcelization, which assumes the parcels are unidimensional. We used principal components analysis (PCA) in IBM SPSS v.26 to verify that assumption. To evaluate global model fit of the CFA, we used the following indices and criteria suggested by [Kline \(2016\)](#): model chi-squared with $p < 0.05$; CFI ≥ 0.95 ; SRMR ≤ 0.05 ; and RMSEA ≤ 0.05 . To evaluate local fit, we examined standardized residual covariances for values $> |2.00|$. To compare non-nested models, we used AIC.

Results

Preliminary analyses

Missing data

For the L2MSS, one case was missing 100% of the data for the fourth and fifth L2MSS subscales (i.e., responses to “How likely is this in the future?” and “How often have you thought about this future?”), and two cases had missing data on more than 5% of the items (5.6 and 6.7%); we dropped all three cases, reducing the sample from 119 to 116. Seven of the remaining cases had missing data on one item (0.8%), and one was missing data on three items (2.4%). The pattern of missing data appeared to be completely random (Little’s MCAR: $\chi^2[998] = 918.75$, $p = 0.97$), so we used expectation maximization to impute the missing data.

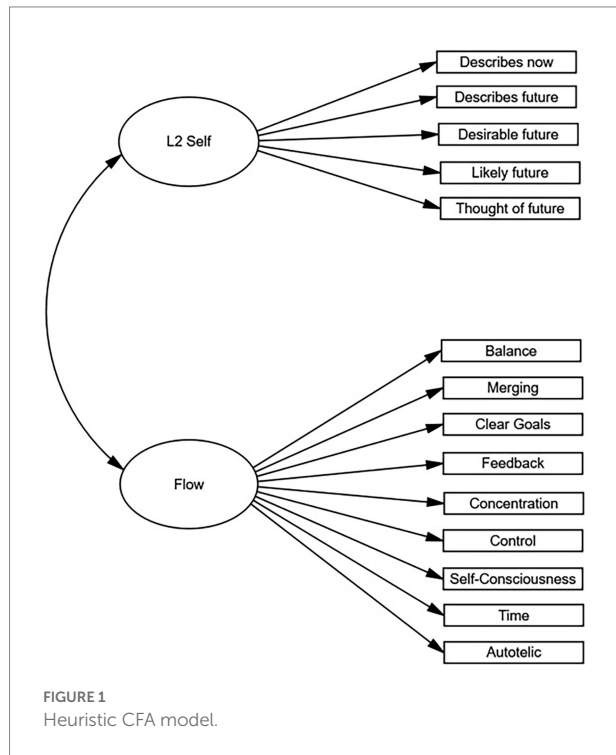
Subscale unidimensionality

We analyzed the items of each subscale of the DFS-2 and L2MSS using PCA and specifying one component (i.e., dimension) to be extracted. In each case the first eigenvalue extracted was three to six times larger than the second, and the variance explained ranged from 30 to 45%. In addition, subscale reliabilities were good to excellent, with Cronbach’s alpha ranging from 0.81 to 0.93 (see [Table 1](#)).

CFA

We specified a two-factor CFA model that consisted of a latent variable for the L2 self, indicated by the five L2MSS subscale scores, and a latent variable for dispositional flow, indicated by the nine DFS-2 subscale scores (see [Figure 1](#)). The global fit of the model was acceptable: $\chi^2(76) = 103.09$, $p = 0.02$; CFI = 0.97; SRMR = 0.07; RMSEA = 0.06, 95% CI = [0.02, 0.08]; AIC = 161.09.

Local fit was also good. However, the Time subscale of the DFS-2 had a nonsignificant factor loading ($b = -0.15$, $SE = 0.15$, $p = 0.29$)



and weak correlations with all other scales (see Table 1). We dropped the variable and refit the model, which had good global fit: $\chi^2(64) = 78.82$, $p = 0.10$; CFI = 0.98; SRMR = 0.06; RMSEA = 0.05, 95% CI = [0.00, 0.08]; AIC = 132.82. However, the respecified model fit less well as indicated by its larger AIC value. In addition, it had two standardized covariance residuals greater than |2.00|, reflecting poor local fit. Therefore, the original model with Time was retained. Parameter estimates are reported in Table 2. A medium-to-strong correlation of .45 was found between the latent variables of flow and L2 self.

Discussion

The present study was largely successful in accomplishing its two purposes of collecting additional evidence for the construct validity of scores obtained with the L2MSS and the DFS-2 from foreign language learners and testing the hypothesis that the L2 self would be correlated with the autotelic personality (i.e., dispositional flow). The strong PCA, reliability, and CFA results should give researchers additional confidence in the use of the L2MSS and the DFS-2 in studies going forward. Another strength of the study is that it provides a true score correlation between the L2 self and dispositional flow. The correlation between these constructs demonstrates that the association is medium-to-strong,

TABLE 1 Subscale correlations, reliabilities, means, and standard deviations (N=116).

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
L2MSS														
1. Describes now	0.93													
2. Describes future	0.51	0.92												
3. Desirable future	0.55	0.81	0.92											
4. Likely future	0.60	0.78	0.91	0.86										
5. Thought of future	0.47	0.64	0.74	0.77	0.86									
DFS-2														
6. Balance	0.32	0.37	0.44	0.44	0.34	0.84								
7. Merging	0.38	0.32	0.31	0.31	0.30	0.54	0.84							
8. Clear goals	0.33	0.20	0.24	0.27	0.20	0.51	0.49	0.83						
9. Feedback	0.22	0.18	0.23	0.23	0.28	0.52	0.49	0.56	0.91					
10. Concentration	0.33	0.22	0.31	0.32	0.30	0.53	0.44	0.46	0.52	0.90				
11. Control	0.33	0.19	0.28	0.28	0.23	0.68	0.61	0.58	0.63	0.69	0.82			
12. Self-consciousness	0.11	0.20	0.16	0.15	0.09	0.34	0.27	0.35	0.36	0.28	0.42	0.87		
13. Time	-0.17	-0.09	-0.15	-0.17	-0.10	-0.07	0.00	-0.19	-0.06	-0.11	-0.17	0.08	0.81	
14. Autotelic	0.41	0.39	0.43	0.41	0.35	0.69	0.57	0.54	0.55	0.49	0.61	0.36	0.08	0.91
M	9.36	14.23	71.96	67.09	60.31	14.69	12.76	15.7	14.99	13.62	14.87	13.06	12.09	13.34
SD	4.43	3.77	13.44	14.87	16.67	2.86	2.69	2.74	3.16	3.14	2.9	4.01	3.37	3.74

1 = How often have you thought about this future? 2 = How likely is this in the future? 3 = Is this desirable or undesirable? 4 = Describes possible future? 5 = Describes me now? 6 = Autotelic experience. 7 = Time transformation. 8 = Loss of self-consciousness. 9 = Sense of control. 10 = Concentration on the task at hand. 11 = Unambiguous feedback. 12 = Clear goals. 13 = Merging of action and awareness. 14 = Challenge-skill balance. Boldfaced figures are scale reliabilities.

TABLE 2 Parameter estimates of the confirmatory factor analysis model (N=116).

Factor	Subscale	Coefficient			Error		R ²
		Unstand.	SE	Stand.	Var.	SE	
L2 self					7.13*	2.02	
	1. Describes now	1.00		0.61	12.29*	1.66	0.37
	2. Describes future	1.17*	0.16	0.83	4.43*	0.65	0.69
	3. Desirable future	4.78*	0.62	0.95	17.68*	4.20	0.90
	4. Likely future	5.32*	0.68	0.96	17.41*	4.91	0.92
	5. Thought of future	4.90*	0.71	0.79	104.20*	14.74	0.62
Flow					5.13*	1.03	
	6. Balance	1.00		0.80	2.99*	0.48	0.63
	7. Merging	0.82*	0.11	0.69	3.72*	0.54	0.48
	8. Clear goals	0.83*	0.11	0.69	3.96*	0.57	0.47
	9. Feedback	1.00*	0.12	0.72	4.78*	0.71	0.52
	10. Concentration	1.00*	0.12	0.70	4.93*	0.73	0.49
	11. Control	1.10*	0.11	0.86	2.20*	0.41	0.74
	12. Self-consciousness	0.81*	0.17	0.46	12.63*	1.71	0.21
	13. Time	-0.15	0.15	-0.10	11.12*	1.47	0.01
	14. Autotelic	1.27*	0.14	0.77	5.61*	0.89	0.60
L2 self ↔ Flow		2.72*	0.77	0.45			

$\chi^2(76) = 103.09, p = 0.02; CFI = 0.97; SRMR = 0.07; RMSEA = 0.06, 95\% CI = [0.02, 0.08]; AIC = 161.09. *p < 0.001.$

suggesting that facilitating flow in the classroom is a viable route to greater retention of foreign language learners, an important goal in today's globalized economy. A question emerges in light of the findings: through what means can flow be facilitated in foreign language learners?

Classrooms remain a prime setting where language is taught, making it a practical medium for pedagogical intervention. Foreign language teaching has undergone a noticeable transformation from teacher-centered to the more current learner-centered instruction (Moeller and Koubek, 2001), which highlights the significance of the educator's role in the foreign language learning process (Krashen, 1982). It is the educator's role to facilitate learners' interests and to adjust the complexity of tasks to aid learning and reduce potential frustration (Moeller and Koubek, 2001). The learner takes on an active role and engages with the educator to promote language learning. In this collaborative process, the educator serves as a facilitator while the learner is viewed as a learning partner (Northern Arizona University, 2022). As active agents in students' learning, educators possess the ability to create or modify foreign language learning environments to facilitate flow in learners.

To maximize the chances of learners experiencing flow, we recommend modifications to foreign language learning environments to possess the dimensions integral to entering and sustaining flow itself (see Csikszentmihalyi, 1990). Educators can prevent boredom or frustration in the classroom, emotions that represent imbalances between challenge and skill, by attending to first foreign language learners' skill level in relation to the difficulty of assigned tasks. Foreign language educators also can incorporate learning activities that provide clear goals and unambiguous

feedback, being mindful that excessive delay in feedback introduces ambiguity in learners' self-assessment. Educators can also foster flow by increasing learners' sense of control, which can be accomplished by providing choices for learners. For example, providing multiple options of varying difficulty (within reason) for a reading assignment or other activity. In addition, the maintenance of classroom conditions conducive to all learning can facilitate flow, such as an environment that promotes concentration and a loss of self-consciousness (i.e., forgetting about conditions of the self external to the task at hand, such as the opinions of others or physical discomfort). In attending to important dimensions of flow, educators promote a learning environment that is conducive to the autotelic experience and, by extension, intrinsic motivation.

Supplementary use of foreign language learning apps (e.g., Duolingo, Babbel, Rosetta Stone, etc.) can foster flow by providing these conditions both inside and outside of the classroom. For instance, Duolingo allows users the flexibility to review and learn languages commensurate with their level of knowledge and skill (Munday, 2016). In addition, it provides unambiguous, immediate feedback to users about their performance. Incorporating progressively more difficult lessons provides clear goals and a sense of control, as users can adjust task difficulty to match their own skill. This gamification of foreign language learning is part of a larger well-documented trend in education that has been shown to foster flow and engagement (Oliveira et al., 2022).

Further, strategies as simple as extensive reading have been shown to increase learners' language capabilities (Yamashita, 2004). In the context of the current study, extensive reading is especially relevant as it shares key similarities with flow conditions,

such as concentration, loss of self-consciousness, clear goals, skills matching the challenge, and unambiguous feedback (Kirchhoff, 2013). In addition to extensive reading leading to improvements in vocabulary and reading speed, it has also been found to increase learners' motivation and positive attitude toward foreign language learning in a classroom setting (Al-Homoud and Schmitt, 2009). Learners' positive attitude towards foreign language learning impacts long term retention and increases overall learning quality by encouraging reading outside of the classroom (Al-Homoud and Schmitt, 2009). Although extensive reading has existed since the early 1900s (Bamford and Day, 1997), it is not implemented by all educators for reasons including, the perceived time cost, the misperception that it is an ineffective strategy, and an educational curriculum that does not include it (Grabe, 2011). Incorporating flow-based learning strategies in consideration of key flow dimensions in foreign language education can potentially increase the retention of foreign language learners, and subsequently the quantity of individuals who possess multilingual capabilities. As already discussed above, consideration of flow dimensions already exists in classroom best practices, such as fostering an environment that facilitates concentration, loss of self-consciousness, clear goals, and unambiguous feedback. What is potentially new is for educators is learning strategies focusing on the remaining dimensions (i.e., balancing challenge and skill, merging action and awareness, sense of control, time transformation, and autotelic experience), such as games and apps and providing choices to students throughout the curriculum.

Although our sample size was small by CFA standards (see Kline, 2016), it has the advantage of being representative of beginning and intermediate foreign language students at an urban U. S. university and covering three languages, Spanish, French, and German. However, our results are not generalizable to the L2 learning population, which has additional and different motivations for language learning, such as societal pressures to assimilate. It is an open question if how the presence of greater external motivations would affect flow. At the same time, cultural pressures may have a stronger effect on self-concept, and ultimately, intrinsic motivation, and therefore, flow. Another limitation to our study may be the use of self-report measures and the lack of a measure of actual foreign language performance. Direct observation could address both by allowing experts to ascertain behaviors related to foreign language performance, personality, and flow. Further research should also explore the predictive validity of this relationship by measuring not only dispositional flow, but the actual state of flow when engaged in foreign language learning. Finally, Egbert (2005) suggests that computer technology can be used as an effective tool for language learning. Future studies in foreign language research should continue to examine the effectiveness of computer-based foreign language learning strategies.

In conclusion, our study provides first-of-its-kind evidence of a moderate-to-strong relationship between the L2 Self and the

autotelic personality (i.e., dispositional flow). Such a relationship suggests a strategy for increasing the recruitment and retention of foreign language learners of identifying students with autotelic personalities and fostering flow within foreign language classrooms. Such an approach promises to make the future of foreign language learning more intrinsically motivating and inherently enjoyable than ever.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

The studies involving human participants were reviewed and approved by University of Missouri-Kansas City Social Sciences Institutional Review Board. The patients/participants provided their written informed consent to participate in this study.

Author contributions

JM and DB designed the study. DB collected the data. JM analyzed the data. JM, DB, AK, and SP wrote the manuscript. All authors contributed to the article and approved the submitted version.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Supplementary material

The Supplementary material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/feduc.2022.975163/full#supplementary-material>

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