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Exploring the relationship between flow experience and passive learning resistance in learning German

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This study examines the correlation between students' flow experience and passive resistance to learning in the context of German as a foreign language education. A quantitative, descriptive-correlational research design was employed. Data were collected from 378 high school students enrolled in their second German course, utilizing the Turkish versions of the "Flow Short Form Scale" and the "Passive Resistance to Learning Scale." Data analysis was conducted using quantitative methods. The findings reveal a weak negative correlation between flow experience and passive resistance to learning. Positive psychological factors such as happiness, enjoyment, interest, perceived necessity of the course, and the student-teacher relationship were found to significantly impact both variables. The study suggests that educators should consider these factors when developing instructional strategies aimed at enhancing flow experiences and reducing passive resistance to learning, ultimately leading to improved educational outcomes.

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Introduction

The concept of flow, which has been a subject of numerous studies since 1975, is characterized by Csikszentmihalyi as an "optimal experience." It is defined as a state in which individuals become fully immersed in a task and simultaneously experience intense enjoyment (Csikszentmihalyi, 1975, 1990). Individuals experiencing a flow state develop the ability to establish a balance between what they are currently doing and the required task; their perceptions, actions, and emotions are finely coordinated (Khajavi and Abdolrezapour, 2022). An individual has focused his attention on the current task and is temporarily oblivious to other things (Csikszentmihalyi, 1990). According to flow theory, individuals experience their highest happiness when they find themselves in a flow state characterized by intense concentration and complete immersion in the task at hand and the surrounding environment (Amini et al. 2016).

The flow state, according to the principles of flow theory, should have the following characteristics for an individual: the task should be challenging enough to require the individual to apply their skills but not so intimidating as to trigger excessive anxiety. In contrast, if the task is overly simplistic, it can lead to feelings of boredom in the individual (Csikszentmihalyi, 1975). It is believed that the perfect alignment between the challenges posed by the task and the individual's current skills contributes to the optimal experiential state (Ak Şentürk, 2012).

"Flow theory suggests that flow experiences (characterized by the balance between challenge and skills and an individual's interest, control, and focused attention during a task) can lead to optimal learning" (Egbert, 2004). In the academic context, flow theory has served as a valuable model for understanding students' levels of interest and enjoyment in learning (Ljubin-Golub et al. 2020). Therefore, flow is a kind of intrinsic motivation (Ryan and Deci, 2000).

Conversely, some factors can limit students' engagement in the learning and teaching processes, unlike flow theory (Seidel and Tanner, 2013). One of these factors is learning resistance. Resistance theory in education refers to the intentional, systematic, and conscious reactive behaviors exhibited by students towards teachers, peers, classes, and their environments in the learning-teaching process (Sever, 2012; Yıldız and Sarı, 2019). Flow theory, on the other hand, represents an experience individuals have during a task, and this experience is not only dependent on individual characteristics but also on environmental conditions. Furthermore, the relevant flow experience can be associated with other participants in the learning environment (Egbert, 2003). Following two theories, it can be argued that students should not exhibit passive resistance to flow states that enable effective engagement in the learning process. Behaviors such as reluctant compliance, cheating, ignoring demands, non-participation in the teaching process, or avoidance of learning can be cited as examples (Sever, 2018). Flow theory, influenced by individual and environmental conditions, also affects resistance behaviors toward learning, which are shaped by these same factors. The common intersection of these two theories lies in individual characteristics and environmental factors. Among these individual characteristics, gender has emerged as a notable factor influencing learning behaviors. Studies suggest that female students often demonstrate higher engagement in language learning (Durmuşçelebi and Kuşuçuran, 2015), which may facilitate flow states, while male students may be more prone to passive resistance in such contexts. Therefore, examining gender as an individual factor within this framework could yield a deeper understanding of its role in shaping both flow experiences and resistance behaviors in the language learning process.

Improving environmental conditions is a significant condition for how students interact with others in the learning process, which is also crucial for self-determination theory (SDT). According to SDT, it is essential for teachers to exhibit a friendly and accessible attitude, strive to get to know their students closely, responds to students' questions, accept their negative emotions and disappointments, provide suitable environments for group work, and support the development of relationships among students (Haukås et al. 2022).

STD offers a compelling lens through which to examine classroom dynamics, particularly in relation to the phenomena of flow and passive resistance. Central to SDT is the idea that individuals are more motivated and engaged when their needs for autonomy, competence, and relatedness are fulfilled (Ryan and Deci, 2000). Autonomy refers to feeling in control of one's actions and decisions, allowing for a sense of choice in activities. Competence involves the need to feel effective and capable in tasks, fostering a sense of mastery and confidence in one's skills. Relatedness is about feeling connected and valued within a social group, emphasizing supportive and meaningful social interactions with others (Ryan and Deci, 2017). These elements are crucial for fostering the flow state, described by Csikszentmihalyi as an optimal experience where individuals are fully immersed and derive intense enjoyment from their tasks (Csikszentmihalyi, 1990). In classrooms that satisfy these psychological needs, students are likely to experience flow, characterized by deep engagement and a harmonious balance between challenge and skill (Nakamura and Csikszentmihalyi, 2002).

Conversely, when these needs are not met, students may exhibit passive resistance, such as disengagement or defiance, which undermines learning (Seidel and Tanner, 2013). Conversely, when viewed from the opposite perspective, passive resistance behaviors can also hinder the formation of key conditions for flow, such as concentration and clear goals. Johnson et al. (2016) indicated that the passive behaviors exhibited by students negatively impact their learning experiences and potentially obstruct their capacity to achieve flow. Passive resistance in students, characterized by reluctance and disengagement in the learning process, is often linked by SDT to unmet psychological needs. According to SDT, It has been proposed that when students' needs for autonomy, competence, and relatedness are not sufficiently supported, their motivation might decrease, potentially leading to passive resistance behaviors (Ryan and Deci, 2000). Such resistance may manifest when students lack choice in their learning process, when their achievements are not sufficiently acknowledged, or when they feel socially isolated (Deci et al. 1991; Skinner and Belmont, 1993). By promoting an environment that aligns with SDT's principles, educators can minimize resistance and enhance the likelihood of flow experiences, thereby supporting more effective and enjoyable learning (Dewaele et al. 2018).

In light of the theories discussed above, it can be anticipated that under certain conditions, the flow state during learning could increase, and consequently, it is conceivable that passive resistance to learning could be overcome. When the flow state is achieved, and simultaneously students' resistance to learning is broken, their positive participation in the educational process can be encouraged, thus supporting their academic achievements.

Based on this information, the study will seek answers to research questions focused on testing specific hypotheses.

Research Question 1: What is the relationship between passive learning resistance and the flow experience in German language learning?

Hypotheses related to this question will be tested to examine how passive learning resistance affects students' flow experience.

Research Question 2: Are positive psychological factors effective in enhancing the flow experience and reducing passive learning resistance among students learning German?

Hypotheses related to this question will be tested to evaluate the impact of positive psychological factors, such as interest, enjoyment, and the perception of necessity, on students' flow experience and learning resistance.

Research Question 3: What impact do gender differences have on the flow experience and passive learning resistance among students learning German?

Hypotheses related to this question will be tested to investigate the effects of gender on flow experience and learning resistance.

This paper is structured as follows: The next section reviews relevant literature on flow experience and passive resistance in learning, providing the theoretical foundation for the study. Following this, the "Present Study" section outlines the specific research hypotheses. The methodology section details the research design, participants, data collection instruments, and data analysis procedures. The results section presents the key findings from the study, followed by a discussion that interprets these findings in the context of existing research. Finally, the conclusion summarizes the study's contributions and implications for future research.

Literature review

Classroom flow is an effective experience for managing hyperactivity or learning difficulties in the classroom (Chamba et al. 2020). The flow experience can be encountered in various settings and contexts, yet it is highly dependent on the individual's own experience. Particularly in learning environments, flow is closely related to engagement and thus holds substantial potential for enhancing learning (Shernoff, 2013). In this context, a strong relationship between flow experience and passive resistance to learning can be anticipated. Additionally, MacIntyre and Vincze's (2017) study on Italian students learning German found that negative emotions had a weaker and inconsistent influence on motivation.

Engagement in learning, which is the opposite of resistance to learning, is key to the learning process as it requires psychological investment and effort. Flow and engagement—or, more precisely, the act of being in flow rather than resisting learning—support and enhance the learning process. Flow provides a sense of progress in an environment where skills are balanced with challenges. Learning environments should offer opportunities that promote learning (Zollars, 2018). In the context of engagement, gender appears to have significant effects on students' class participation, achievement levels, and their flow experiences and passive resistance in the learning process. While Gelbal (2008) states that female students perform better in language-based subjects, Durmuşçelebi and Kuşuçuran (2015) found that female students participate more actively in lessons compared to male students. For example, female students reportedly attend classes at nearly twice the rate of male students across various grade levels, particularly in private schools. Similarly, female students are noted to have higher participation rates in language-focused subjects like Turkish compared to male students. These high participation rates suggest that female students may have a greater potential for experiencing flow during the language learning process, as flow is associated with a student's full concentration and intrinsic motivation in the task at hand. On the other hand, lower participation rates among male students suggest a higher likelihood of developing passive resistance, especially in language learning. Limited engagement and lower achievement in language-based subjects may lead male students to exhibit resistance behaviors in language learning, such as disinterest, lack of motivation, or avoidance of in-class activities. This contrast in participation reflects how gender can lead to different learning experiences in language education, potentially impacting the relationship between flow and passive resistance. Other Studies on language learning support these observed differences. For instance, Dewaele et al. (2016) found that women enjoy language learning more and perform better. Similarly, Eriksson et al. (2012) noted that women excel in language skills. These findings suggest that gender influences both flow experiences and passive resistance in language learning, potentially impacting male and female students' learning environments and outcomes differently.

The flow experience and resistance to learning are also influenced by a range of positive and negative emotions. Studies by Dewaele et al. (2019, 2023) suggest that positive psychology practices may lead to more successful language learning outcomes. Furthermore, it is emphasized that positive psychology can reduce resistance factors like anxiety and create learning environments that support students' autonomy and motivation (Dewaele et al. 2023; Dewaele et al. 2019).

Flow

Flow is an experience that enhances students' performances and encourages them to persist in tasks (Csikszentmihalyi, 1990). The internal motivation in flow, pleasure, and intense concentration can lead individuals to push themselves to achieve more (Csikszentmihalyi, 1990, 1997).

"Egbert (2004) was among the first to explore the application of flow theory in foreign language learning, suggesting that the flow state may be present in language classrooms and that language learning activities could be designed according to the principles of flow theory. Some researchers who have researched flow theory have discovered that certain prerequisites are necessary for the emergence of the flow experience. These prerequisites include (a) a balance between skill and challenge, (b) intense concentration, (c) clear goals, (d) immediate feedback, (e) a sense of control, and (f) interest (Egbert, 2003). Other flow conditions outlined by Egbert (2003) include a "deep sense of enjoyment," "lack of self-consciousness," "awareness," and a perception of "time passing more quickly." Based on these relevant prerequisites, it is expected that students will experience pleasure, concentrate on the activity, lose self-awareness, and have a sense of control over their actions during learning activities.

Krashen's (1989) "The Monitor Model" can be considered one of the significant theories supporting the prerequisites of flow. This theory advocates that knowledge should be acquired unconsciously in the most effective way and is based on implicit teaching methods. When related to the flow experience, students experiencing a fluent, automatic, and unaware process in language learning enables them to reach a state of "flow" in their language acquisition process. Krashen's "i + 1 input hypothesis" supports the flow experience by providing learners with language inputs that are just above their current level, but not overly challenging. This balance can make the learning process motivating and effective.

A number of studies have explored the flow experiences of students in foreign language learning (Abbott, 2000; Ak Şentürk, 2012; Amini et al. 2016; Azizi and Ghonsooly, 2015; Belce, 2019; Çelik and Aşik, 2023; Kirchhoff, 2013; Tardy and Snyder, 2004). A common finding in these studies suggests that experiencing a state of flow during learning tends to positively influence

students' motivation and may contribute to their academic success. Additionally, Smith et al. (2023) have examined the relationship between deep effortless concentration (DEC) and classroom participation and learning, arguing that student engagement can be associated with the flow state. Findings suggest that those who have a more general tendency to experience flow are more likely to have high engagement and understanding during classroom learning.

In the educational context, flow theory provides a foundation for students to engage more effectively in their learning processes (Shahian et al. 2017) and represents optimal learning and performance opportunities (Csikszentmihalyi, 1975).

Based on the positive conditions that the flow theory offers to the field of education, such as "expressing unawareness of boredom or anxiety, often being absorbed in activities unrelated to their tasks" (Csikszentmihalyi, 1975), and considering the negative states of passive resistance to learning in educational environments, it can be concluded that the individual experience of flow is significant to students' passive resistance to learning in foreign language education settings.

Positive psychological factors that support flow states, such as interest and motivation, enhance students' flow experiences and also play a supportive role in mitigating the lasting effects of negative emotions (Ritz, 2023; Alrabai, 2022; MacIntyre and Gregersen, 2012). In the literature, it has been discussed that through positive psychology (e.g., positive emotions, engagement, and resilience), students achieve better outcomes in language learning. Conversely, positive psychology can reduce passive resistance factors like anxiety and create supportive learning environments that enhance autonomy and motivation (Dewaele et al. 2019, 2023).

Moreover, MacIntyre and Vincze (2017) found that in their study on Italian students learning German, positive emotions showed a strong and consistent relationship with motivation, whereas negative emotions had a weaker and more inconsistent relationship. It was determined that positive emotions are more pervasive and influential on motivation compared to negative emotions. They also found that emotions like joy and enjoyment are positively associated with intrinsic motivational structures. In this context, the interaction between SDT (Self-Determination Theory) and positive psychology was emphasized. In a more recent study, it was concluded that experiencing enjoyment in a foreign language (English, German, French, and Spanish) could serve as a buffer against motivational decline, thereby enhancing intrinsic motivation (Dewaele et al. 2023).

In their study, Linnenbrink-Garcia and Pekrun (2011) emphasized that negative emotions increased students' levels of social loafing, while positive emotions were associated with positive social behaviors by enhancing the quality of group interactions and participation. In this context, positive emotions were linked to increased social engagement, whereas negative emotions were associated with social disconnection and withdrawal.

Passive resistance to learning

According to Alkateb-Chami, (2023), resistance has been theorized by education researchers for actions ranging from student walkouts to academic disengagement and from teachers' maintenance of teaching practices to curricular subversion. Scientific discussions regarding student resistance have gained increased attention following Kearney and colleagues' initial studies (Kearney et al. 1991). Kearney et al. (1991) have addressed resistance behaviors constructively and destructively. Destructive student resistance is seen as potentially impeding learning, whereas constructive resistance is viewed as offering opportunities for improving teaching practices. Destructive student resistance refers to behaviors that hinder students' learning processes and potentially the learning of other students in their surroundings (Seidel and Tanner, 2013). McLaren (1985) and Alpert (1991) classified resistance behaviors as passive and active. Passive resistance behaviors are less risky reactions compared to active resistance behaviors, exhibited by students toward class activities they dislike (Spaulding, 2000). Active resistance is often defined as unwanted and destructive behaviors; whereas passive resistance (unwilling compliance, deception, ignoring requests) is defined as non-participation or avoidance of learning, and students prefer passive resistance techniques over active ones (Sever, 2018).

Following the increase in online classes, particularly after the COVID-19 pandemic, there has been a shift in the types of unwanted behaviors exhibited by students. For instance, the most commonly encountered unwanted behaviors in online classes include disengagement, non-participation, turning off the webcam, using profanity, and even more disturbing behaviors such as making noise, absenteeism, and distraction, as revealed by the research conducted by Akkaş Baysal and Ocak (2021). Some of these findings appear to overlap with inappropriate behaviors observed in face-to-face settings.

Johnson et al. (2016) have emphasized that whether in face-to-face or online education, the common denominator of all these misbehaviors is the harm they inflict on students' learning experiences. Additionally, unwanted student behaviors not only affect the academic success of the students exhibiting such behaviors but also create negative situations for their peers and the overall learning environment (Bingham et al. 2009). These negative situations impact student behaviors in the classroom by causing a loss of motivation, which can lead to problems such as lack of participation and ignoring tasks (Debreli and Ishanova, 2019). It is argued that paying attention to these misbehaviors can enhance student success (Johnson et al. 2016).

Engaging in behaviors such as nagging, challenging, and making excuses are not always perceived as negatively impacting the learning environment; on the contrary, such actions can sometimes be viewed as indicators of disruptive dynamics within the classroom (Johnson et al. 2016). Research conducted by Kerdikoshvili (2012) demonstrates a strong relationship between students' motivation for language learning and classroom management. Specifically, it is highlighted that motivated students tend to show increased interest in classes, which effectively reduces behavior problems in the classroom.

Critical theorists and resistance theorists emphasize the role of individual backgrounds in students' resistance to learning (McFarland, 2001). Therefore, educators can provide students with more meaningful and enriching experiences by understanding the root causes of unwanted student behaviors, addressing these problematic behaviors, and the conditions that promote them with care (Johnson et al. 2018). Undesirable student behaviors can hinder classroom education and learning and may also create a negative atmosphere in the classroom. Responding to such behaviors professionally is the responsibility of the teacher to maintain the flow of the learning process and create a positive classroom atmosphere (Chang and Taxer, 2020; Croom and Moore, 2003). In this context, the teacher's effective management of the flow process plays a crucial role in preventing unwanted behaviors. Shernoff et al. (2003), in a study, found that when the difficulty of tasks assigned by the teacher is balanced with students' skill levels, students feel more motivated and participate more actively in class.

While the importance of the flow experience in enhancing learning and engagement is well-documented, it is equally

important to consider how passive resistance can hinder these processes. Passive resistance behaviors, such as disengagement and avoidance, can obstruct the formation of key flow conditions, such as concentration and clear goals. For example, Johnson et al. (2016) emphasize that disengagement, a significant indicator of passivity in both online and face-to-face environments, disrupts the learning experience and potentially hinders students' ability to achieve flow. Additionally, negative psychological factors such as lack of motivation observed in students can contribute to passive resistance by hindering flow states, manifesting in behaviors like not participating in class, not answering questions, or not attending classes regularly (Debreli and Ishanova, 2019; Kerdikoshvili, 2012). In summary, it is assumed that, unlike positive emotions, negative emotions have a weakening effect on motivation (Dewaele et al. 2023).

Psychological factors that drive motivation and engagement may also vary significantly across genders, influencing the degree of flow or passive resistance experienced. Research by Dewaele et al. (2016) found that women are more likely to perceive language learning as enjoyable, to take pride in their achievements, and to engage deeply in the learning process, yet also experience heightened anxiety and lower confidence, especially when facing the risk of mistakes. This intense emotional involvement among women can lead to both positive outcomes, such as increased flow, and challenges, such as elevated resistance behaviors. Similarly, Eriksson et al. (2012) concluded from a review across ten different language communities that women consistently outperform men in language skills, notably in communicative gestures and productive vocabulary. These findings underscore how gender and psychological factors shape both flow experiences and passive resistance in language learning, potentially altering the learning environment and outcomes for male and female students differently.

The present study

According to theories existing in the literature, there may be a connection between passive resistance to learning and the flow of experience. However, no study directly investigating the relationship between these two concepts has been found in the literature. Furthermore, considering that German is one of the most important foreign languages after English in Turkey, this study focuses on learners of German. However, compared to English, German is less prominent in Turkey, and it can be said that studies related to German are fewer in comparison to those on English. This study aims to uncover the link between the flow experience and passive resistance to learning, to understand the learning process, and to contribute to students' learning journeys. Based on findings from studies in the literature and theories, the following hypotheses were formulated and tested in the study:

Hypothesis 1: There is an inverse relationship between students' passive resistance to learning and flow states.

It is assumed that there is a significant relationship between passive resistance behaviors and the emergence of flow states during learning activities, indicating that passive resistance behaviors may hinder or facilitate the flow experience. Student resistance behaviors may negatively impact the formation of flow states, preventing students from fully immersing themselves in learning tasks (Johnson et al. 2016).

Hypothesis 2: It is anticipated that positive psychological factors among German learners enhance the flow experience and reduce passive learning resistance.

Positive psychological factors such as interest, good relationships, enjoyment, and the perception of necessity in the German learning process are predicted to strengthen students' flow state. These interactions may make the learning process more effective and enjoyable, allowing students to experience a more integrated learning experience. Additionally, these factors may reduce passive learning resistance and enhance students' learning motivation (Dewaele et al. 2019).

Hypothesis 3: It is expected that gender will create significant differences in the flow experience and passive learning resistance during the German learning process.

Gender is anticipated to influence students' flow experience and levels of resistance to learning. Previous research suggests that female students, who typically perform well in foreign language learning, may be more likely to experience flow due to their engagement and motivation in the learning process (Dewaele et al. 2016; Eriksson et al. 2012). However, this hypothesis will be further explored to understand the extent to which gender differences impact the flow experience and resistance levels.

These hypotheses explore in depth the potential negative impact of passive student resistance on flow states, investigating whether elements of flow theory can act as protective factors and examining the specific relationship between passive resistance behaviors and the disruption of flow states during learning activities.

Method

Research design. In this study, the relationship between the flow experiences of high school students learning German as a second foreign language and the passive resistance they exhibit in their German language classes is being investigated. Therefore, a quantitative research design was employed. This design aims to capture and describe the perspectives and attitudes of large groups concerning events and phenomena (Karakaya, 2012; Karasar, 2011).

Participants. The participants of the study consisted of high school students in the 9th, 10th, 11th, and 12th grades who took German as their second foreign language course during the spring semesters of 2022–2023. The participants are receiving education at three different public high schools located in the province of Ankara, Turkey. According to the prior G Power analysis, it was determined that a minimum of 210 students would be required for evaluation, with an effect size of 0.5, an alpha value of 0.05, and a theoretical power of 95%. However, to further enhance the study's robustness, additional participants were included. The study was conducted with 378 participants. The age range of the participants is between 14–17. All students are learning German at the beginner level, specifically at the A1 level. Participants were not selected based on any specific criteria. However, only students who had regular attendance in the German language course during the spring semesters of 2022–2023 were included to ensure they were adequately exposed to the language instruction. Additionally, students who had prior knowledge of German as a mother tongue or at an advanced level were excluded, as this could skew the study's results. The study, conducted with all necessary ethical approvals, was entirely based on willingness. Detailed information about the participants is presented in numerical and percentage format in Table 1 below.

In Table 1, we observe a higher percentage of female participants (58.5%) compared to males (41.5%). The majority of the participants are students in the ninth and eleventh grades. While a substantial proportion of participants expressed that they are happy to learn German (79.4%) and enjoy it (77.5%), it is noteworthy that nearly half of the participants (43.1%) do not

Table 1 Characteristics of participants.

Descriptive characteristics	*n*	%
Gender		
Female	221	58,5
Male	157	41,5
Class		
9th	125	33,1
10th	88	23,3
11th	130	34,4
12th	35	9,3
School		
High School a	64	16,9
High School b	49	13,0
High School c	265	70,1
Happy to learn German		
Yes	300	79,4
No	78	20,6
Interested in German		
Yes	215	56,9
No	163	43,1
Good Teacher Rapport		
Yes	329	87,0
No	49	13,0
Enjoying German		
Yes	293	77,5
No	85	22,5
Finding German Necessary		
Yes	218	57,7
No	160	42,3

have a strong interest in the German language, and 42.3% do not find the German lesson necessary. Additionally, most participants (87.0%) mentioned that they have a good relationship with their German language teachers.

Data collection instruments. The data for the study were collected using the flow short form scale (FSS) and the (passive resistance to learning scale) PRLS. Permission to use these scales was obtained via email from the owners of the scales.

Flow short form scale (FSS). The FSS was developed by Rheinberg et al. (2003) and adapted into Turkish by İşigüzel and Çam (2014). The Turkish version of the FSS was used in this study. This Turkish scale consists of 13 items and two sub-dimensions. The scale employs a 7-point Likert scale for responses (1 = strongly disagree, 2 = disagree, 3 = partially disagree, 4 = undecided, 5 = partially agree, 6 = agree, 7 = strongly agree). The first dimension is "flow experience" with ten items, and the second dimension is "anxiety" with three items. An example item from the flow experience sub-dimension includes: "I think the difficulty level of the lesson is appropriate for my skill level." An example item from the Anxiety sub-dimension is: "I am afraid of failing in the lesson".

The sample adequacy coefficient (KMO) of the scale was determined to be 0.88. The first factor explained 34.27% of the variance with ten items, while the second factor explained 9.79% of the variance with three items. In total, the analysis revealed that the two factors with eigenvalues greater than 1.00 explained 44.06% of the variance. The Turkish adaptation of the scale by İşigüzel and Çam (2014) demonstrates a Cronbach's alpha of 0.67 for the anxiety experience dimension, 0.88 for the flow experience dimension, and 0.78 for the entire scale. In this study, the Cronbach's Alpha value for the scale was calculated as 0.85. It is expected that the reliability coefficient, such as Cronbach's Alpha, should be above 0.70 for data analysis (George and Mallery, 2003). In current study, the Cronbach's Alpha value for the whole scale was calculated as 0.85. This result shows that the scale is reliable (Hinton et al. 2014).

Passive resistance to learning scale (PRLS). The PRLS was developed by Yavuz (2019). The scale consists of 21 items and five sub-dimensions. The scale employs a five-point Likert scale for responses (ranging from 1 = never to 5 = always). The first dimension is "Cheater" with five items, the second dimension is "Troublemaker" with four items, the third dimension is "Absent-minded" with four items, the fourth dimension is "Irresponsible" with four items, and the fifth dimension is "Passive" with four items. For example, the Cheater sub-dimension includes items like "I pretend to understand the topic even when I don't." The Troublemaker sub-dimension contains items such as "I enjoy causing trouble to disrupt the flow of the lesson." An example from the Absent-minded sub-dimension is "I daydream to myself during the lesson." The Irresponsible sub-dimension includes items like "I do my homework by copying from my friends' assignments." Finally, the Passive sub-dimension has items like "I don't answer a question even if I know the answer to avoid standing out from my friends."

An increase in the score on this scale indicates an increase in passive resistance to learning. It was determined that the factor loadings were distributed between 0.47 and 0.79. The variance explained by the five factors together is 65.13. The Cronbach's Alpha value for the scale is 0.88. for the Cheater dimension of 0.85, for the Troublemaker dimension of 0.86, for the Absent-minded dimension of 0,85, for the Irresponsible dimension of 0.74, and for the Passive dimension of 0.80. In this study, the Cronbach's Alpha value for the whole scale was calculated as 0.92. This result shows that the scale is reliable (Hinton et al. 2014).

Data collection. The data were collected between April-June 2023, from students who agreed to participate in the research through an online platform using Google Forms. Ethical permissions were obtained before data collection, and only the forms of students who completed all the questions were included in the study. The average time for filling out the data collection forms was ~10 min. The data collection schedule was planned after consulting with the teachers of the students beforehand. In the groups where the application was carried out, data collection for the FSS was conducted according to the experience sampling method (ESM) during the class hours determined for data collection (the researcher entered the class during the 15th minute of the lesson, explained the purpose and instructions of the study, and conducted the application). However, the ESM was not employed for the other measurement tool, the PRLS.

Data analysis. For data analysis, SPSS 25.0 statistical software was used. Before analyzing the main data, a pilot study was conducted with 68 participants with similar characteristics to those of the larger sample. In the pilot study, the reliability of the scales was evaluated using Cronbach's Alpha coefficients, and feedback from participants was gathered to identify any potential issues with the scale items. Participants in the pilot study were not included in the main study. Following the pilot study, the scales were administered to the main sample.

Descriptive and inferential statistical methods were used for the main data analysis. Reliability analyses were conducted, and Cronbach's alpha coefficients were calculated to ensure the

Table 2 Findings about participants' scale scores.

	Mean-SD	Min.	Max.
Flow short scale—experience sub-dimension (1)	45,65-14,06	10	70
Flow short scale—anxiety sub-dimension (2)	11,53-4,62	3	21
Passive learning resistance scale—cheater sub-dimension (1)	11,55-4,69	5	25
Passive learning resistance Sc.—troublemaker sub-dimension (2)	6,74-4,28	4	20
Passive Learning Resistance Sc.—absent-minded sub-dimension (3)	9,50-4,71	4	20
Passive Learning Resistance Sc.—irresponsible sub-dimension (4)	8,27-4,47	4	20
Passive Learning Resistance Sc.—passive sub-dimension (5)	6,61-3,74	4	20
Flow short scale total score	57,18-15,22	13	91
Passive learning resistance scale total score	42,68-17,55	21	105

Table 3 Correlation between the mean scores of scales.

Scales and subscales	1	2	3	4	5	6	7	8	9
1 Flow scale	**1**								
2.Resistance scale	**−0,318****	1							
3.Flow-F1	0,953**	−0,358**	1						
4.Flow-F2	0,392**	0,042	0,096	1					
5.Resistance-F1	−0,305**	0,781**	−0,356**	0,077	1				
6.Resistance-F2	−0,220**	0,804**	−0,211**	−0,083	0,500**	1			
7.Resistance-F3	−0,356**	0,798**	−0,427**	−0,128**	0,576**	0,485**	1		
8.Resistance-F4	−0,238**	0,853**	−0,240**	−0,056**	0,534**	0,672**	0,603**	1	
9.Resistance-F5	−0,123**	0,766**	−0,165**	0,099	0,473**	0,583**	0,482**	0,607**	1

**Correlation is significant at the 0.01 level (two-tailed). *Correlation is significant at the 0.05 level (two-tailed).

measurement tools' consistency. Descriptive statistics were used to determine the number, percentage, mean, standard deviation (SD), and the range of values. Data normality was assessed through skewness and kurtosis values. Inferential statistics were applied to explore relationships between variables and assess group differences. A significance level of $p < 0.05$ was accepted in all tests.

Results

Results of pilot application. A pilot study was conducted to determine whether the items in the scale forms were correctly understood by students. Based on the reliability analysis results of the pilot study conducted with 68 participants, the Cronbach Alpha value for the FSS was calculated as 0.88, and the Cronbach Alpha value for the PRLS was calculated as 0.89. Both scales have Cronbach Alpha reliability coefficients above 0.70, indicating that the scales have sufficient reliability coefficients (George and Mallery, 2003). These results indicate that the scales are reliable and consistently measure the intended constructs. High-reliability coefficients suggest that the items within each scale are well-aligned and comprehensible to participants. Therefore, no modifications to the scales were deemed necessary following the pilot study. The findings from the pilot study confirm the robustness of the methodology and validate that the scales are capable of effectively collecting the targeted data in the main study.

Results of scale point and normal distribution. As shown in Table 2, the total score for the FSS ranges from 13 to 91, with a mean of 57.18 (SD = 15.22). For the PRLS, the total score ranges from 21 to 105, with an average of 42.68 (SD = 17.55). When examining the general scores of the sub-dimensions of the scales, it is evident that there is a notable difference in mean scores between the sub-dimensions of the FSS. The first dimension has a higher mean score compared to the second dimension. In the Passive Resistance to Learning Scale, four of the five dimensions have equal total scores ranging from 4 to 20. However, the "Cheater" sub-dimension stands out with higher scores compared to the other four sub-dimensions.

After calculating the total scores for the scales, the normal distribution of the dataset was assessed using Skewness and Kurtosis values. For the FSS, the Skewness value was "−0.496," and the Kurtosis value was "0.458." The Skewness value for the PRLS was also "−0.496," and the Kurtosis value was "0.458." The Skewness and Kurtosis values for both scales fall within the range of +1.5 and −1.5, indicating that the data follows a normal distribution (Tabachnick and Fidell, 2013).

Results about Pearson correlation analysis. According to the Pearson correlation analysis results presented in Table 3, there is a moderate negative relationship ($r = -0.318$; $p < 0.05$) between the flow in the class and resistance to learning. A correlation of 0.31 indicates mostly a weak relationship (Schober et al, 2018). Correlation coefficient values range between −1 and +1, with 0 indicating no relationship (Pearson's correlation coefficient, 2008). Furthermore, a negative correlation implies that as one variable increases, the other decreases. Therefore, it is possible to say that as the class flow improves, the resistance to learning decreases.

Results about independent *T*-test, one-way ANOVA, and post hoc analyses (See appendix). The findings obtained based on the average scores of the scales have shown that there is no statistically significant difference between the flow experience and gender. However, there is a statistically significant difference between the gender factor and the "Troublemaker" ($t(376) = -2.52$, $p = 0.012$), "Irresponsible" ($t(376) = -2.26$, $p = 0.008$), and "Passive" ($t(376) = -1.99$, $p = 0.048$) sub-dimensions. The results indicate that male students have higher average scores in the mentioned three sub-dimensions compared to female students. Therefore, male students exhibit

more problematic learning behaviors in terms of resistance to learning compared to female students.

The happiness of students when learning German creates a statistically significant difference in both flow experience ($t(376) = 12.34$, $p < 0.000$/ $t(376)$ 12.87, $p < 0.000$) and resistance to learning, including all sub-dimensions ($t(376) = -5.79$, $p < 0.000$). Therefore, it is observed that students who are happy to learn German have higher averages in both flow experiences and experience anxiety about failing and making mistakes in learning German. In addition, students who are happy to learn German have lower averages in terms of resistance to learning and exhibiting problematic learning behaviors compared to those who are not happy.

Similarly, students' interest in the German class creates a statistically significant difference in both flow experience and resistance to learning. Students who are interested in the class have a higher average in flow experience ($t(376) = 9.01$, $p < 0.000$). Likewise, students who are interested in the German lesson have significantly lower resistance to learning rates, including all sub-dimensions ($t(376) = -5.22$, $p < 0.000$) compared to those who are not interested.

Furthermore, students having good relationships with their teachers also create a statistically significant difference in both flow experience ($t(376) = 9.50$, $p < 0.000$) and resistance to learning ($t(376) = -3.32$, $p = 0.002$). This suggests that students who have good relationships with their teachers have higher flow experiences. Similarly, students with good relationships with their teachers exhibit lower averages of problematic behavior within the classroom.

Students deriving enjoyment from their German lessons also create a statistically significant difference in both flow experience ($t(376) = 10.90$, $p < 0.000$) and resistance to learning ($t(376) = -5.44$, $p < 0.000$). It was observed that students who enjoy their German classes have higher flow experience rates. Furthermore, students who enjoy the class exhibit fewer problematic behaviors within the classroom, which is another finding of this study.

The students' perception of the necessity of German lesson also results in a statistically significant difference in both flow experience ($t(376) = 9.08$, $p < 0.000$) and resistance to learning ($t(376) = -4.70$, $p < 0.000$), including all sub-dimensions. Students who consider the lesson essential tend to have higher average scores in both flow experience and anxiety experience in class. Furthermore, those who see the German class as necessary show less resistance to learning.

When examining the class factor, a significant difference was found between the class factor and the fear of class flow [$F(374) = 7.08$, $p = 0.000$]. The post hoc analyses conducted to determine which groups caused the significant difference indicate that the significant difference is mainly between the 12th graders (senior students) and the other classes. Therefore, 12th graders experience less fear of not being able to learn German and failing compared to students in other classes. Regarding resistance to learning and the class variable, a significant difference was found in only the third sub-dimension, i.e., displaying irresponsible behaviors [$F(374) = 3.36$, Welch $= 0.021$). The post hoc analysis revealed that 11th-grade students exhibit more irresponsible behaviors when it comes to learning compared to 9th-grade students.

In general, while there are not significant differences, it can be observed that the teacher factor has a slightly stronger influence on the resistance to learning compared to other factors (interest, perceiving the course as necessary, and others). In the context of the flow experience, the most significant differences are found to be associated with having an interest in German and perceiving German lessons as necessary.

Discussion

The aim of this study was to investigate the relationship between the flow state in foreign language classes and passive resistance to learning a foreign language. It is widely accepted that resistance to learning and being in a flow state in foreign language classes significantly affect foreign language learning outcomes. A review of the existing literature reveals no direct studies examining the relationship between these critical psychological factors in the context of foreign language education. This research aims to expand the horizons of this field and address a significant gap in the literature, potentially offering a new perspective. Furthermore, examining the relationship between students' flow experiences in foreign language classes and passive resistance to learning provides valuable insights into reducing students' resistance to learning and enabling them to experience more effective learning processes. Such research could lay a critical foundation for enhancing practices and strategies in the field of foreign language education.

In the study, when the sub-dimensions of the foreign language class flow scale are examined, an inverse relationship is observed between the flow experience and anxiety sub-dimensions. In light of these findings, it appears that our first hypothesis has been confirmed.

The literature also suggests that the flow experience and the experience of anxiety are inversely related (Allison and Duncan, 1988). In this case, students with higher flow experiences tend to experience less anxiety, and the opposite can also be true. One of the fundamental characteristics of the flow experience is a balance between the level of task difficulty and an individual's ability to perform that task (Csikszentmihalyi, 1975). If a task surpasses students' abilities, it can create feelings of anxiety, or if the given task is below an individual's ability, they may experience boredom.

When the sub-dimensions of the PRLS are examined, the sub-dimension "Passive" stands out with higher scores compared to the other sub-dimensions. This result suggests that students often pretend to "understand" the material being taught in the foreign language learning process. Griffin et al. (2015) emphasized in their study, which examined how university students deceive their instructors, that the majority of students (82%) cheated on their instructors. They mentioned that this was often due to academic performance anxiety and the attempt to present themselves positively to others. In terms of the 'Cheater' subscale, it is followed by the "Absent-minded" subscale. This result suggests that, although students are physically present in the learning environments, their thoughts are elsewhere, indicating that they are not fully engaged in the learning environment. When looking at the subsequent subscales, the "Irresponsible," "Troublemaker," and "Passive" subscales follow one another. The 'Passive' subscale, in general, involves peer relationships. The average score of this subscale indicates that students attach relatively lower importance to peer relationships. However, some studies in the literature suggest that students' peer relationships can influence their interest in any given class (Caspi et al. 2020; Kapoor et al. 2022; Robnett and Leaper, 2013).

The study revealed that there were no statistically significant differences in the flow experience in foreign language and the passive resistance to learning a foreign language between female and male students. However, significant gender differences were observed in specific dimensions of resistance to learning. Male students scored higher on the "Troublemaker," "Irresponsible," and "Passive" sub-dimensions, indicating a greater propensity among male students to exhibit problematic learning behaviors. These findings suggest that while gender may not significantly influence overall flow or resistance levels,

it plays a critical role in specific behavioral aspects of resistance. As a result, the third hypothesis, which posited gender differences in overall flow and resistance levels, could not be confirmed.

Similarly, Alenezi (2020) in their study found that the gender factor did not create significant differences in foreign language classroom anxiety and the enjoyment of learning English as a foreign language. Dewaele et al. (2016) also explored gender differences in anxiety and enjoyment in foreign language classes and generally noted that the gender factor did not create significant differences. However, they emphasized that female participants' positive or negative emotions could lead to significant differences in language learning. On the other hand, our study also indicates that male students are more prone to exhibit problematic behaviors in the context of learning resistance. Our study suggests that male students are more prone to exhibit disruptive behaviors related to resistance to learning, which may be influenced by social and cultural expectations surrounding gender roles.

It's evident from the study that students who are happy to learn German, enjoy it, show interest in the class, and consider the German necessary tend to have a higher flow experience in foreign language learning, while their passive resistance to learning a foreign language is lower. According to Shernoff et al. (2003), students with intrinsic motivation tend to become deeply engaged in their learning, and they are more likely to experience the flow state. Resnik and Dewaele (2023) suggested that positive emotions, such as happiness in foreign language classes enhance student performance and motivation. Moreover, it is generally believed that individuals need to have an interest in a particular area to be successful in it.

Previous studies suggest that the main reason for the rarity of flow and engagement in traditional classrooms is the lack of enjoyment. Therefore, it is difficult to observe the presence of flow in such environments (Shernoff, 2013). Bricteux et al. (2017) argued that interest is one of the fundamental prerequisites for experiencing flow, and if individuals do not have intrinsic interest in an activity, it is impossible for them to achieve a state of flow. Ainley et al. (2002) also found that positive affect plays a crucial role in interest-based learning.

However, Dan (2021) emphasized that individual interest alone doesn't lead to flow experiences and highlighted the importance of creating enjoyable classroom environments. In this context, the high levels of students enjoying the German class also demonstrate the significant relationship between flow experiences and enjoyment. The average scores suggest that students not only experience higher flow states when they enjoy the class but also reduce their passive resistance to learning. Csikszentmihalyi (1990, 1997) also emphasized that enjoyment is a crucial building block of the flow experience. All these findings support the confirmation of the second hypothesis.

When looking at the teacher factor, it is observed that positive relationships established between teachers and students have a positive impact on both the flow experience and passive resistance to learning. Specifically, our findings indicate that students who have strong, positive relationships with their teachers tend to experience higher levels of flow and lower levels of resistance to learning. In the literature, there are many studies emphasizing the importance of teacher–student relationships. In our study, it has been also observed that the most crucial factor influencing the resistance to learning is the teacher factor. Bergin (1999) pointed out that the classroom atmosphere is largely under the control of teachers, and teachers are expected to have a significant impact on students' flow experiences. Kapoor et al. (2022) found that students resist learning due to teachers who are ineffective in managing their classrooms and handling student behavior, and students generally prefer teachers who are engaging and encourage them to perform better in class. Additionally, positive teacher–student relationships are associated with various factors such as peer bullying (ten Bokkel et al. 2022), students' academic achievement (Longobardi et al. 2021), school engagement (Martin and Collie, 2019; Roorda et al. 2019), class attendance (Anderson et al. 2004), and motivation (Robinson, 2022).

When examining the grade variable in the study, no significant difference was found between the overall flow state and resistance. However, a statistically significant negative association was observed between class level and anxiety experiences, particularly among senior-year students. Specifically, the anxiety experience decreases significantly in the 12th grade. On the resistance side, the "Irresponsible" subscale increases in the 11th grade compared to the 9th grade. This negative correlation indicates that as students progress to higher grade levels, their engagement in the flow state decreases, which is associated with increased resistance to learning. Based on this, it can be said that as grade levels increase, students' anxiety experiences in German language learning decrease while their resistance to learning increases. Decreased flow and increased resistance to learning, especially in foreign language acquisition, are closely tied to anxiety. High anxiety disrupts the flow state, essential for deep engagement and effective learning, reducing motivation and causing disconnection from the learning process. This disruption impairs cognitive functions necessary for language acquisition and can lead to passive resistance, where students may avoid or disengage from their studies (Dörnyei, 2005; Csikszentmihalyi, 1990). However, a lack of sufficient anxiety can also lead to avoidance of learning and irresponsible behavior (Pekrun et al. 2007). This situation may become more pronounced, particularly when the student perceives the course as unimportant or easy. Therefore, we can say that maintaining a balanced level of anxiety is an important factor in preserving motivation and a sense of responsibility in the learning process. In the lower grades, students might experience the novelty and excitement of learning a new language like German, but as they progress to higher grades, this excitement and fear are likely to diminish over time. This is because the learning process becomes more repetitive. The fact that the German curriculum in Turkey is not as progressive as English and that German resources can be more limited compared to English resources may reduce students' motivation. It is also worth noting that in Turkey, English is the first and compulsory foreign language course, while German is the second foreign language. Additionally, as students age, their anxiety tends to decrease, which may also reduce their interest in learning. These factors may help explain the decreasing anxiety and increasing resistance to learning German in higher grades. However, we believe that the findings we obtained are closely related to the university entrance exam. In Turkey, students preparing for university exams often prioritize subjects that are directly relevant to the entrance exam, such as English, over other subjects, like German. As they advance to higher grades, their focus shifts increasingly toward their future career goals, leading to a decreased interest in subjects not directly tied to these goals. This reduced focus on non-core subjects, like German, may contribute to a lack of responsibility and engagement in these areas. Additionally, the level of support and motivation teachers provide may play a crucial role in mitigating or exacerbating these trends. Understanding these dynamics is essential for developing strategies to maintain or improve student engagement, particularly as they

progress through higher grades and focus more on their future career goals.

The study makes significant contributions to the literature by examining the relationship between German flow experience and resistance to learning and by addressing important psychological factors that affect flow experience and resistance.

Conclusion

This study was conducted to explore the relationship between the flow experience in foreign language learning and passive resistance to learning. The research findings indicate a weak negative association between the flow experience and passive resistance to learning. The discovery of a weak relationship between the two variables was found to be quite surprising.

Specifically, positive psychological factors, such as student engagement, enjoyment, and good rapport with teachers, play a significant role in fostering flow and minimizing resistance. Therefore, more comprehensive studies should be conducted on the psychological factors that are effective in foreign language education. Additionally, creating a classroom environment by teachers that enhances students' flow experiences and reduces resistance to learning, and developing strategies will increase the success of foreign language learning. Pedagogically, the results underscore the importance of creating supportive learning environments where students feel motivated and enjoy the learning process. Educators should prioritize strategies that enhance student motivation and enjoyment, as these factors contribute to more effective learning outcomes. Instructors should aim to balance challenge and skill while fostering both interest and perceived necessity in the language course. Furthermore, it is essential for educators to offer students challenging yet achievable tasks, ensuring their full engagement in the learning process. Strengthening intrinsic motivation by fostering emotions such as interest and enjoyment is also crucial. Making lessons more engaging and relevant is another key factor in increasing students' interest in the course. Additionally, creating a supportive classroom atmosphere will help to minimize student anxiety, enabling them to learn more effectively. Providing timely and constructive feedback is equally important in supporting students' continuous development.

Although these findings are significant, the study has certain limitations, particularly its focus on a specific group: students learning German as a second foreign language in selected high schools in Turkey. Consequently, the findings may not be fully generalizable to other student populations. Future research should aim to include a more diverse sample, incorporating learners of different languages and from varied educational settings.

Data availability

The datasets generated during and/or analysed during the current study are available in the [OSF] repository, [https://osf.io/sw9tx/?view_only=4afe1e3c6ec745beb13227227d956ce0].

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Appendix

Table 4.

Table 4 Findings about independent *T*-test, one-way ANOVA, and post hoc analyses.

Characteristics	Flow experience subscale mean ± SD	Flow anxiety subscale mean ± SD	Flow scale mean ± SD	Resistance cheater subscale mean ± SD	Resistance troublemaker subscale mean ± SD	Resistance absent-minded subscale mean ± SD	Resistance irresponsible subscale mean ± SD	Resistance passive subscale mean ± SD	Resistance scale mean ± SD
Gender									
Female	45,91 ± 13,48	11,88 ± 4,27	57,80 ± 14,02	11,52 ± 4,55	6,26 ± 3,88	9,66 ± 4,85	7,74 ± 4,03	6,27 ± 3,16	41,47 ± 16,05
male	45,28 ± 14,88	11,03 ± 5,04	56,32 ± 16,77	11,59 ± 4,90	7,42 ± 4,72	9,26 ± 4,51	9,01 ± 4,94	7,08 ± 4,40	44,38 ± 19,39
t/p	0,929/0,354	1,715/0,870	0,427/0,670	−0,141/0,888	**−2,525/0,012**	0,830/0,407	**−2,267/0,008**	**−1,991/0,048**	−1,543/0,124
Happy to learn German									
Yes	49,61 ± 11,64	11,73 ± 4,48	61,35 ± 12,50	10,88 ± 4,38	6,40 ± 4,01	8,56 ± 4,16	7,70 ± 4,00	6,28 ± 3,41	39,84 ± 15,89
No	30,41 ± 12,06	10,76 ± 5,09	41,17 ± 14,14	14,14 ± 4,99	8,05 ± 5,00	13,11 ± 4,98	10,46 ± 5,43	7,85 ± 4,63	53,62 ± 19,37
t/p	**12,342/0,000**	**12,878/0,000**	1,644/0,101	**−5,671/0,000**	**−2,693/0,008**	**−7,427/0,000**	**−4,195/0,000**	**−2,804/0,006**	**−5,797/0,000**
Interested in German									
Yes	50,99 ± 11,63	11,91 ± 4,54	62,90 ± 12,39	10,51 ± 4,22	6,10 ± 3,87	8,35 ± 4,21	7,44 ± 3,89	6,17 ± 3,39	38,60 ± 15,21
No	38,61 ± 13,93	11,03 ± 4,69	49,65 ± 15,35	12,93 ± 4,94	7,58 ± 4,64	11,00 ± 4,92	9,36 ± 4,93	7,19 ± 4,10	48,07 ± 18,97
t/p	**9,174/0,000**	1,827/0,068	**9,014/0,000**	**−5,000/0,000**	**−3,281/0,001**	**−5,503/0,000**	**−4,081/0,000**	**−2,570/0,011**	**−5,226/0,000**
Good Teacher Rapport									
Yes	48,15 ± 12,46	11,61 ± 4,38	59,76 ± 13,24	11,29 ± 4,55	6,51 ± 4,09	9,12 ± 4,49	8,07 ± 4,34	6,39 ± 3,52	41,40 ± 16,85
No	28,87 ± 12,75	10,97 ± 5,99	39,85 ± 16,37	13,34 ± 5,26	8,28 ± 5,15	12,00 ± 5,39	9,61 ± 5,08	8,06 ± 4,80	51,30 ± 19,81
t/p	**10,069/0,000**	0,716/0,477	**9,500/0,000**	**−2,884/0,004**	**−2,298/0,025**	**−3,549/0,001**	**−2,013/0,049**	**−2,337/0,023**	**−3,325/0,002**
Enjoying German									
Yes	49,77 ± 11,48	11,78 ± 4,34	61,56 ± 12,17	10,88 ± 4,36	6,20 ± 3,77	8,68 ± 4,28	7,75 ± 4,00	6,21 ± 3,30	39,74 ± 15,44
No	31,44 ± 12,88	10,65 ± 5,40	42,10 ± 15,09	13,88 ± 5,08	8,60 ± 5,32	12,29 ± 5,08	10,05 ± 5,46	7,97 ± 4,74	52,81 ± 20,50
t/p	**12,593/0,000**	1,768/0,080	**10,901/0,000**	**−4,936/0,000**	**−3,873/0,000**	**−5,948/0,000**	**−3,616/0,000**	**−3,206/0,000**	**−5,443/0,000**
Finding German necessary									
Yes	50,60 ± 12,28	12,11 ± 4,50	62,71 ± 12,95	10,74 ± 4,25	6,12 ± 3,84	8,45 ± 4,21	7,53 ± 3,99	6,15 ± 3,33	39,01 ± 15,09
No	38,91 ± 13,56	10,75 ± 4,67	49,66 ± 14,88	12,66 ± 5,04	7,58 ± 4,69	10,91 ± 4,99	9,27 ± 4,89	7,23 ± 4,17	47,68 ± 19,39
t/p	**8,744/0,000**	**2,852/0,005**	**9,080/0,000**	**−3,913/0,000**	**−3,227/0,001**	**−5,049/0,001**	**−3,684/0,001**	**−2,716/0,007**	**−4,707/0,000**
Grade									
9	45,42 ± 13,86	12,42 ± 4,85	57,84 ± 14,83	11,43 ± 4,42	6,45 ± 3,88	9,42 ± 4,68	7,44 ± 3,54	6,27 ± 3,21	41,03 ± 14,94
10	46,57 ± 13,90	11,76 ± 4,47	58,34 ± 15,43	11,12 ± 4,75	6,19 ± 4,30	9,40 ± 4,94	8,10 ± 4,89	6,20 ± 3,83	41,03 ± 19,30
11	46,06 ± 13,33	11,34 ± 4,26	57,41 ± 13,61	11,85 ± 4,61	6,99 ± 4,08	10,02 ± 4,71	9,08 ± 4,77	7,02 ± 3,96	44,97 ± 17,40
12	42,60 ± 17,63	8,48 ± 4,25	51,08 ± 20,24	12,00 ± 5,82	8,22 ± 5,83	8,05 ± 4,03	8,62 ± 4,80	7,31 ± 4,29	44,22 ± 21,49
	0,724/0,538	**7,082/0,000**	1,267/0,289	0,552/0,647	1,571/0,200	1,656/0,176	**3,361/0,021**	1,630/0,182	1,500/0,216
	F/p	**F/p**	F/Welch	F/p	F/Welch	F/p	**F/Welch**	F/p	F/Welch
		1,2,3 > 4					**3 > 1**		

t independent *t*-test, *$p < 0,05$, F/Welch one-way variance analysis, > post hoc.

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Author contributions

FC was responsible for data analysis and the writing of the article, while MÇ contributed to data collection and the drafting of the manuscript. Both authors reviewed and provided critical feedback on the final manuscript.

Competing interests

The authors declare no competing interests.

Ethical approval

The questionnaire and methodology for this study were approved by the Gazi University Research Ethics Committee (Date: 13.12.2022, Decision No: 2022-1438) and the Ministry of Education.

Informed consent

Informed consent was obtained from all individual participants involved in the study.

Additional information

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