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The relationship between teachers' critical thinking disposition and teachers' autonomy support: a moderated mediation model of teacher autonomy and self-efficacy

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Abstract

Teachers' autonomy support has attracted increased scholarly attention due to its positive effects on students and educational outcomes. This study examined a moderated mediation model to explore the underlying mechanisms linking critical thinking disposition and teachers' autonomy support. In this study, we proposed teacher autonomy as a mediator and self-efficacy as a moderator of the relationship between critical thinking disposition and teachers' autonomy support. Data collected from 417 teachers in Türkiye were analyzed utilizing bootstrapping tests. The results revealed both significant direct and indirect effects of critical thinking disposition on teachers' autonomy support through teacher autonomy. Self-efficacy significantly moderated the relationship between critical thinking disposition and teacher autonomy. In addition, self-efficacy significantly moderated the strength of the mediated relationship between critical thinking disposition and autonomy support. When teachers experienced higher self-efficacy, the positive indirect effects of critical thinking disposition on teachers' autonomy support were found to be stronger than on counterparts who experienced low self-efficacy. Our discussion emphasizes the benefits of comprehending the functions of teacher autonomy and self-efficacy in contributing to the effectiveness of critical thinking disposition on teachers' autonomy support. Our findings provide practical recommendations for enhancing teacher autonomy and self-efficacy.

Keywords

Critical thinking
Autonomy support
Teacher autonomy
Self-efficacy
Moderated mediation
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Introduction

Contemporary educational environments should be designed in a way that empowers students to act on from an internal locus of causality and have a sense of choice over their learning activities. Such an environment can be achieved by autonomy supportive practices implemented by teachers. In the most general sense, autonomy refers to the internal endorsement of actions, characterized by high volition and the flexibility in self-regulating one's behavior (Reeve & Jang, 2006). In the literature

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autonomy occupies a central place in Self-Determination Theory (SDT), as proposed by Ryan and Deci (2000, 2017). According to this theory, autonomy, competence, and relatedness are among the factors that facilitate or hinder individual's flourishing. Therefore, autonomy is regarded as one of the basic psychological needs that promote motivation, growth, and well-being. In this view, autonomy is not equivalent to independence or individualism. Instead, it corresponds to individuals self-regulating their behaviors in alignment with their authentic values and interests (Ryan & Deci, 2017).

The development of autonomy from the early years of life is affected by the approaches of teacher and parents, whose behavior can be either controlling or autonomy supportive (Deci & Ryan, 2000). Teachers who are autonomy-supportive engage and foster students' psychological needs, preferences, and interests. SDT has also been widely investigated in terms of educational setting and the research has emphasized that students receiving more autonomy support from their teachers demonstrated more autonomous motivation, competence, and performance (Black & Deci, 2000). Some research showed links between autonomy supportive teaching and students' satisfaction, well-being, and higher grades (Sheldon & Krieger, 2007). In addition, the satisfaction of autonomy has been found to enhance the intrinsic motivation and thereby performance of the students (Guay et al., 2001). As can be seen, teachers' autonomy support is recognized as a pivotal element in ensuring the success of learners. International organizations such as Organization for Economic Co-operation and Development (OECD) and European Union also underline the importance of autonomy supportive environments in education. For example, in order to promote lifelong learning, European Union (2019) emphasizes creating learning environments that foster the development of key competencies, such as entrepreneurship and learning to learn, which can be promoted by supporting students' autonomy. In addition, OECD (2018) underlines autonomy as one of the skills that students should acquire to shape and thrive in their future world. Thus, exploring the underlying factors of teachers' autonomy support can provide a better understanding of the concept, its connections with other variables, and the mechanisms through which it can be cultivated.

Recent literature has extensively investigated teachers' autonomy support, including its antecedents (Basri, 2023; Reeve & Cheon, 2016) and its outcomes (Jang et al., 2010; Shen et al., 2009). There are also studies that have examined the relationships between teachers' autonomy support and self-efficacy beliefs (Akçil & Oğuz, 2015), teacher autonomy (Yazıcı, 2016), and educational beliefs (Oğuz et al., 2014). Although limited research has tested the link between critical thinking disposition and teachers' autonomy support (Bolaños-Medina & Núñez, 2022; Koçoğlu & Kanadlı, 2019; Sevari & Farzadi, 2022), they were conducted with samples drawn from students and did not employ teachers' autonomy support as dependent variable. In addition, to the authors' knowledge, no prior research examined teacher autonomy as a mediator and self-efficacy as a moderator in this relationship. In order to address this gap in the literature, this study aimed to examine the mediating role of teacher autonomy and moderating role of self-efficacy in the relationship between teachers' critical thinking disposition and their autonomy support. The current study adds to the literature in certain aspects. First, the study developed a unique moderated mediation model of teacher autonomy support affected by critical thinking disposition, including teacher autonomy as a mediating variable and self-efficacy as a moderating variable (see Figure 1). By considering the mediating effect of teacher autonomy and moderating effect of self-efficacy, we strived to enhance the understanding of the underlying mechanisms and limiting factors that influence the connection between critical thinking disposition and teacher autonomy support. Second, this study extends the scope of the literature on teacher autonomy by explaining the conditions under which teachers' critical thinking disposition may influence their autonomy differently.

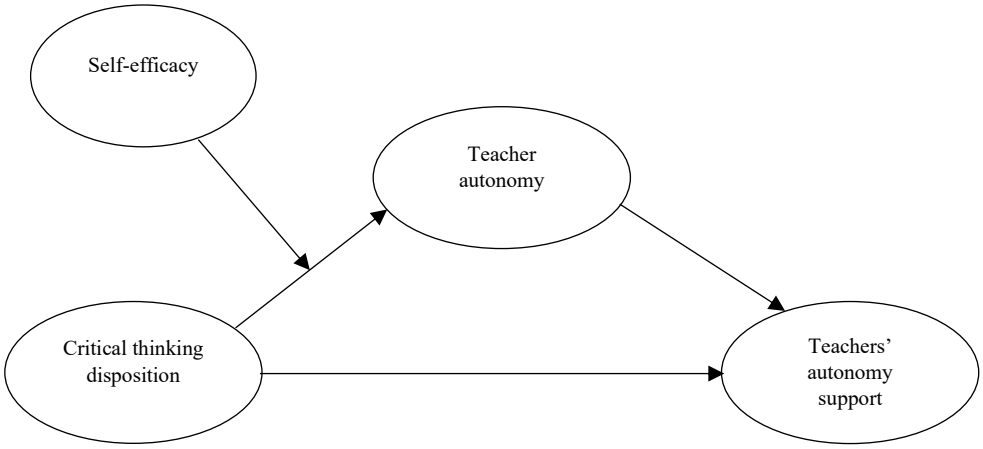

Figure 1. Conceptual model illustrating moderated mediation

Conceptual Framework

Teachers' Autonomy Support

Teachers' autonomy support is defined as teachers displaying behaviors in their professional work that build and actuate their students' sense of autonomy and internal motivation resources (Huéscar Hernández et al., 2020). Autonomy support involves teachers supporting learners to make appropriate choices and to minimize the pressure that their students may experience in fulfilling their duties, and supporting the personal initiative of learners rather than fostering a controlling environment in which external rewards and punishment are the essence (Deci & Ryan, 1991). Autonomy support also requires creating an environment in which students are not pressured to behave in a desired way, but are instead encouraged to be themselves, which in turn helps to develop their internal motivation (Ryan & Deci, 2004). Supporting learner autonomy is considered to have multifaceted benefits, such as enhancing the quality of education (Reeve & Jang, 2006) by helping students develop a positive attitude towards learning and enhancing their capacity to learn (Little, 1995). Teachers' autonomy support also promotes students' satisfaction, well-being, and academic achievement (Sheldon & Krieger, 2007; Tunçeli et al., 2022). A literature review conducted by Yang et al. (2022) demonstrated that teachers' autonomy support served as a foundation for student engagement and motivation. A study by Alkın-Şahin et al. (2015) found a positive and moderate correlation between classroom teachers' autonomy support and their critical thinking supportive behaviors. In addition, Núñez et al. (2015) concluded that teachers' autonomy support is a significant predictor of students' autonomy. Thus, the literature emphasizes positive outcomes for students as well as for the overall teaching environment when autonomy is supported.

In the academic setting, an autonomy-supportive environment is characterized by the following: Teachers understand and accept students' decisions, offer alternative solutions to problems and the opportunity to choose between different activities, and avoid controlling feedback or the use of explanatory logic (Núñez et al., 2015; Su & Reeve, 2011). On the other hand, the establishment of the agenda, providing solutions and answers, asking controlling questions, praising as a contingent reward, and criticizing the students are among the controlling behaviors exhibited by teachers. For a better learning environment, it is essential for educators to embrace an autonomy-supportive approach in their teaching (Reeve et al., 2004). However, this style requires a shift from the teacher's role as a conveyer of knowledge to that of a facilitator of learning and a manager of learning resources. Teachers need to determine areas in which they can develop learner autonomy. In other words, teachers must decide to what degree their students can decide their own learning goals, select their own learning materials, and contribute to the methods used by students to self-evaluate their own learning (Little, 1995). In order to achieve this, it is considered that teachers should be instructional leaders who follow the changes and developments in their profession, remain free from prejudice when making decisions, are willing to solve problems with their students in the learning environment, and to offer options to their students as and where possible and appropriate.

Critical Thinking Disposition and Teachers' Autonomy Support

Critical thinking is described as the process of questioning one's own thinking as well as that of others, involving a set of cognitive abilities and tendencies supporting decision making and problem solving in different situations (Çolak et al., 2022; Kılıç & Şen, 2014). According to another definition, critical thinking is regarded as an advanced kind of reflective thought that entails an increased awareness of individuals' perceptions, emotions, and actions (Phan, 2008). It can be characterized as one's internal drive in problem solving and decision making (Zhang & Lambert, 2008), and includes both emotional and cognitive components (Salsali et al., 2013). It refers to self-regulated judgment in making evaluation, inference, interpretation, and analysis in the cognitive system (Facione, 1990). In other words, while ordinary thinking is based upon guesswork, preferences, and assumptions, critical thinking is based on prediction, evaluation, and logical inference (Çolak et al., 2022). A critical thinker is an individual characterized by curiosity, extensive knowledge, a reliance upon logic, open-mindedness, flexibility, honesty in addressing personal biases, caution in making judgments, a willingness to rethink, diligence in seeking relevant information, as well as an aptitude for problem clarity and the ability to manage complex situations (Salsali et al., 2013). In particular, teachers with strong critical thinking skills are expected to go beyond their traditional teaching roles by supporting their students' independent learning and encouraging their autonomous actions.

Teachers' autonomy supportive behaviors encompass a set of instructional practices such as identifying students' needs, permitting students' interests and preferences to direct classroom activities, providing a meaningful rationale for rules and expectations, being responsive to students' questions, and offering performance-based praise (Reeve & Jang, 2006). This shows that autonomy supportive behaviors require teachers to have attributes such as flexibility, openness, the ability to create opportunities, innovativeness, cognitive skills, the capacity to stimulate motivation, and sensitivity to students' needs. Therefore, to foster student autonomy, teachers need to employ higher-order thinking abilities, which are also inherent in critical thinking. Correspondingly, Kılıç and Şen (2014) asserted that three dimensions make up critical thinking disposition, innovation, participation, and cognitive maturity. Innovation refers to continuous pursuit of new ideas, openness to change, and a willingness to investigate developments in the educational environment. Participation is defined as the willingness of individuals to solve problems as they are encountered, while cognitive maturity indicates making evaluations based upon scientific data when exercising judgement. Thus, teachers with strong critical thinking skills, as they have necessary abilities to analyze, reflect, and make sound decisions, are more likely to promote autonomy in educational settings. Empirical research conducted with students supports this view by showing that critical thinking disposition has a moderate to strong correlation with teachers' autonomy support (Bolaños-Medina & Núñez, 2022; Koçoğlu & Kanadlı, 2019; Sevari & Farzadi, 2022). Therefore, it is predicted that teachers' critical thinking tendency will affect their autonomy support. Thus, we hypothesize that:

Hypothesis 1: Critical thinking disposition is positively and directly related to teachers' autonomy support.

Teacher Autonomy as a Mediator Between Critical Thinking Disposition and Teachers' Autonomy Support

Teacher autonomy refers to the teachers' ability and power to make their own decisions concerning teaching environment and school-wide matters (Çolak, 2025b; Strong & Yoshida, 2014). The term also represents the freedom of teachers to develop a unique pedagogy that requires harmony between training, personality, experience, and the requirements of a particular educational setting (Hoyle & John, 1995). Such freedom is important for both a school's development and fostering teachers' professionalism and the professional growth, as well as in solving school-related problems (Çolak 2025a; Çolak & Altınkurt, 2017). Furthermore, teacher autonomy acts as a cornerstone in helping students gain autonomy (Jiang & Ma, 2012). Thus, the literature points to the dependence of teachers' autonomy support on their own autonomous decision making. For example, in a study by Yazıcı (2016), teacher autonomy was proved to be a significant predictor of teacher autonomy support, whilst Basri

(2023) explored the factors affecting learner autonomy in a study conducted with teacher educators and revealed teacher autonomy as a facilitator for learner autonomy support. On the other hand, when teachers have limited autonomy over their professional activities and learning environment, they may provide less autonomy support to their learners, thereby exhibiting more controlling behaviors during the teaching process. For example, administrative pressures and accountability standards on curriculum or assessment may compel teachers to adopt a controlling pedagogical approach, which may result in teachers' strict conformity to regulations (Pelletier et al., 2002). Thus, teacher autonomy may serve as a strong predictor of teachers' autonomy support, such that teachers with greater discretion are more likely to promote students' autonomy in the learning process, whereas those with restricted autonomy may exhibit more controlling behaviors toward students.

Teacher autonomy has also close links with teachers' critical thinking disposition. Critical thinking supports the reasoning abilities of those who are independent thinkers (Cuypers, 2004; Kamii, 1991). Therefore, critical thinking may help enable teachers to exercise discretion within the processes of their profession. The literature underscores the existence of positive connections between critical thinking disposition and teacher autonomy. For example, Çolak et al. (2022) found moderate and positive links between critical thinking and teacher autonomy, with their study revealing that such a thinking style plays a crucial role in teachers' ability to exercise discretionary judgment. In addition, Lu and Wang (2021) concluded that teachers with more teaching, curriculum, and assessment autonomy are better able to utilize instruction that emphasizes critical thinking. These research examples highlight the interdependence established between teacher autonomy and critical thinking in the context of educational environments. Therefore, it can be asserted that higher levels of critical thinking disposition enable teachers to make independent decisions and display autonomous behaviors.

As has been seen, teacher autonomy may serve as both a predictor of teachers' autonomy support and an outcome of critical thinking, thereby suggesting its potential mediating role between these variables. It may be predicted that teachers having critical thinking skills such as being able to interpret and make inferences are more likely to exercise autonomy and make independent decisions. With higher autonomy, teachers may be better able to support their students' independence by creating a more self-directed learning environment. In other words, teachers with high critical thinking tendencies tend to exercise greater autonomy in their educational practices, and this in turn, may increase their level of support for learner autonomy. Thus, we hypothesize that:

Hypothesis 2: Teacher autonomy mediates the relationship between critical thinking and teachers' autonomy support.

Moderating Role of Teachers' Self-Efficacy Beliefs

Self-efficacy, initially introduced by Bandura, is conceptualized as an individual's belief in their ability to effectively complete tasks using the resources available, even when faced with challenging situations (Bandura, 1977). Self-efficacy beliefs impact the quality of human functioning across motivational, cognitive, emotional, and decision-making domains (Burić & Kim, 2020). Furthermore, self-efficacy beliefs have a domain-specific nature and manifest diversely according to the field of activity and specific context (Bandura, 2012). On the other hand, self-efficacy belief in teaching indicates a teacher's confidence in their own ability to plan, implement, and manage instruction effectively within their subject area (Burić & Kim, 2020).

Teachers' self-efficacy beliefs can impact upon their teaching processes as well as the learning processes, attitudes, achievements, and performance of their students (Tschannen-Moran & Hoy, 2007). This link is important since the teaching quality levels of teachers relate to their students' learning and achievement level (Hattie, 2009). Teachers with high self-efficacy beliefs tend to persist in the face of challenges, demonstrate greater perseverance, and are thereby generally more likely to achieve successful outcomes (Linnenbrink & Pintrich, 2003; Pajares, 1996). In addition, self-efficacy is closely associated with individuals' thinking skills. For example, higher levels of self-efficacy have been found to be positively related to the use of deep processing strategies, which involve analysis, reflection, and

integration of new knowledge (Fenollar et al., 2007). Other studies have shown clear links between teachers' self-efficacy and both creative and critical thinking (Orakci & Durnali, 2023; Zangenehvandi et al., 2014). Thus, teachers' confidence in their abilities may enable them to more effectively reflect their critical thinking skills into educational decisions and practices. In other words, teachers' higher levels of self-efficacy may strengthen the association between their critical thinking disposition and the degree of autonomy they display. We therefore put forward the following hypothesis:

Hypothesis 3: Teacher self-efficacy moderates the link between critical thinking disposition and teacher autonomy, such that the strength of the relationship is higher for individuals with high self-efficacy compared to those with low self-efficacy.

The links between self-efficacy and autonomy can be explored within the framework of social cognitive theory. According to the tenets of this theory, self-efficacy is recognized as a pivotal factor for human agency (Bandura, 1986) which acts as a positively motivating psychological mechanism (Stajkovic & Luthans, 1998). In addition, as Bandura (2012) suggested, teachers' self-efficacy beliefs can affect the choices they make and thereby shape their professional life. A systematic review conducted by Çolak (2024) points out that self-efficacy, together with professionalism, professional development, and leadership, constitutes a major component of teacher autonomy. Accordingly, choices that teachers make freely, and the initiatives and decisions they take, will increase their level of autonomy during the teaching process. Therefore, it can be concluded that teachers with high self-efficacy beliefs are more inclined to act autonomously in their educational practices. Empirical research in the literature have pointed out clear links between these variables. For example, Çolak (2025b) found that self-efficacy directly and positively influenced all dimensions of teacher autonomy, including teaching, curriculum, professional development, and communicative autonomy. Other studies have also revealed positive correlations between teachers' self-efficacy and their autonomy (Skaalvik & Skaalvik, 2014; Yukselir & Ozer, 2022). Thus, greater self-efficacy may facilitate teachers in effectively demonstrating autonomy in their professional practices. This influence may promote the impact of critical thinking on teachers' autonomy support through the mediating role of teacher autonomy. On the other hand, lower self-efficacy may constrain teachers' ability to take initiatives and make their own decisions, thereby reducing the mediated effect of autonomy. That is, self-efficacy may conditionally influence the strength of the indirect effect of critical thinking disposition on autonomy support via teacher autonomy, implying that an indirect effect via teacher autonomy becomes stronger with high self-efficacy. Thus, the final hypothesis of the study is as follows:

Hypothesis 4: Teacher self-efficacy moderates the strength of the mediated link between critical thinking disposition and teachers' autonomy support, such that the mediated relationship is stronger when teachers' self-efficacy is higher.

Method

Study Design

This research, which examines the role of teacher autonomy and self-efficacy in the relationship between teachers' critical thinking disposition and autonomy support, was designed in the survey model.

Participants

The population of the research consisted of 13,877 teachers working in elementary, lower secondary, and upper secondary schools in the Muğla province of Türkiye during the 2021-2022 academic year. The study's sample was chosen using the disproportionate cluster sampling technique. The number of samples capable of representing the population was determined as being at least 374 at a 95% confidence level. Measurement tools were applied based on the voluntary participation of teachers. Within the context of the study, data were gathered from a total of 440 teachers. Of the data initially obtained, 23 sets of data (16 one-way, 7 multi-directional) were removed since they were assessed to represent extreme values. Therefore, the study's analysis was conducted with 417 valid sets of data. Of the teachers participating in the research, 62.4% identified as female (n = 260) whilst 37.6%

(n = 157) identified as male. In terms of the school type where the participants worked, 36.9% were from elementary schools (n = 154), 30% from lower secondary schools (n = 125), and 33.1% worked in upper secondary schools (n = 138). From examining the teachers' seniority (length of teaching service), 15.8% (n = 66) had 9 years of seniority or less, 36.9% (n = 154) had 10-19 years of seniority, and 47.2% (n = 197) had 20 years or more of seniority.

Data Collection Measures

Prior to collecting the data, ethics approval was granted by the Social and Human Sciences Research Ethics Committee of Muğla Sıtkı Koçman University (Decision number 39, dated 10 March 2022), as well as institutional permission granted by the Muğla Provincial Directorate of National Education. The UF/EMI Critical Thinking Disposition Scale, Teacher Self-Efficacy Beliefs Scale, Teacher Autonomy Scale, and Learner Autonomy Support Scale were utilized as data collection tools in the study.

Critical Thinking Disposition Scale. The UF/EMI Critical Thinking Disposition Scale, originally developed by Irani et al. (2007), was adapted to the Turkish context by Kılıç and Şen (2014). The scale consists of 25 Likert-type items, with responses in a range from 1 (*Strongly disagree*) to 5 (*Strongly agree*) and is structured into three factors: Participation, Cognitive Maturity, and Innovativeness (Kılıç & Şen, 2014). In the current study, Cronbach's alpha internal consistency coefficients were determined to be .85 for the Participation dimension, .74 for the Cognitive Maturity dimension, .75 for the Innovativeness dimension, and .92 for the overall total score of the scale. We checked the construct validity of the scale using CFA (Confirmatory Factor Analysis) which indicated an acceptable fit: χ^2 / df = 3.99, RMSEA = .09, RMR = .03, SRMR = .06, CFI = .87, GFI = .85, and IFI = .87 (Schermelleh-Engel et al., 2003). We also checked validity using average variance extracted (AVE) results (AVE = 0.59), which indicated that the observed variables adequately represented the construct.

Teacher Self-Efficacy Beliefs Scale. The current research also employed the Teacher Self-efficacy Beliefs Scale developed by Çolak et al. (2017). The scale consists of 27 items and four factors, with scale item responses in a range from 1 (*Disagree*) to 5 (*Agree*). These four factors are Intellectual Self-Efficacy, Professional Self-Efficacy, Academic Self-Efficacy, and Social Self-Efficacy. Within the framework of the current research, we concluded that the Cronbach's alpha internal consistency coefficients were .88 for the Professional Self-Efficacy dimension, .82 for the Academic Self-Efficacy dimension, .88 for the Intellectual Self-Efficacy dimension, .87 for the Social Self-Efficacy dimension, and .93 for the entire scale. We checked the construct validity of the scale using CFA which indicated a good fit: χ^2 / df = 2.87, RMSEA = .07, RMR = .03, SRMR = .07, CFI = .90, GFI = .85, and IFI = .90 (Schermelleh-Engel et al., 2003). We also checked validity using average variance extracted (AVE) results (AVE = 0.66), which indicated that the observed variables adequately represented the construct.

Teacher Autonomy Scale. In the study, we measured teacher autonomy using the Teacher Autonomy Scale developed by Çolak and Altınkurt (2017). There are 17 items in the scale, with item responses in a range from 1 (*Strongly disagree*) to 5 (*Strongly agree*). The scale consists of four factors: Teaching Autonomy, Curriculum Autonomy, Communicative Autonomy, and Professional Development Autonomy (Çolak & Altınkurt, 2017). In the current study, Cronbach's alpha internal consistency coefficients were determined as being .71 for the Teaching Autonomy, .79 for the Curriculum Autonomy, .69 for the Communicative Autonomy, and .73 for the Professional Development Autonomy, and .83 for the overall total score of the scale. We checked the construct validity of the scale using CFA which indicated an acceptable fit: χ^2 / df = 3.27, RMSEA = .07, RMR = .06, SRMR = .08, CFI = .90, IFI = .90, and GFI = .91 (Schermelleh-Engel et al., 2003). We also checked validity using average variance extracted (AVE) results (AVE = 0.50), which indicated that the observed variables adequately represented the construct.

Learner Autonomy Support Scale. This scale was developed by Oğuz (2013) to measure teachers' autonomy support. The scale comprises 16 Likert-type items, with responses in a range from 1 (*Never*) to 5 (*Always*). The scale consists of two subscales: necessity and display of behaviors (Oğuz,

2013). For the current research, the display subscale was used. This subscale includes three dimensions: Support for Learning Process, Support for Feelings and Thoughts, and Support for Assessment. Cronbach's alpha internal consistency coefficients were determined to vary between .84 and .87 in the sub-dimensions and are .93 for the overall display scale. We checked the construct validity of the scale using CFA which indicated a good fit: χ^2 / df = 2.72, RMSEA = .06, RMR = .02, SRMR = .04, CFI = .96, GFI = .93, and IFI = .96 (Schermelleh-Engel et al., 2003). We also checked validity using average variance extracted (AVE) results (AVE = 0.72), which indicated that the observed variables adequately represented the construct.

Data Analysis

First, we performed CFA in order to determine the construct validity of the four scales used in the study's data collection. IBM's AMOS 22 software was used for this analysis. Then we carried out descriptive statistical analysis and tested correlations between the study's variables. The mediation and moderation hypotheses of the study were examined using a macro (named PROCESS) that was developed by Hayes (2013) for IBM's SPSS. Hayes' Model 4 was then utilized to test the mediation (Hypothesis 2) along with the direct effect of critical thinking disposition on teachers' autonomy support (Hypothesis 1). Hayes' Model 7 was employed for testing moderation in the study. The moderation of an effect either to or from a mediator can be tested by this model (Hayes, 2013). Model 7, which was described as a first-stage moderation model by Edwards and Lambert (2007), enabled us to test both Hypothesis 3 as the moderator hypothesis and Hypothesis 4 as the moderated mediation hypothesis. While conducting our analyses, we used a 5,000 bootstrap count and 95% confidence interval (CI), as well as opting for mean-centering when estimating the effect.

Prior to conducting the data analysis, the collected data were examined in terms of the requirements for performing multivariate analysis. In this respect, we analyzed the data regarding single and multiple outliers, as well as for the problems of normality and multicollinearity. Having removed 23 outliers from the dataset, the study's analysis was subsequently conducted using data from a total of completed 417 scales. We examined kurtosis and skewness coefficients in order to assess the normality assumption of the variables in the study. The examination indicated that the skewness and kurtosis coefficients fell within the range of -1 to +1 (skewness -.48 to -.24; kurtosis -.83 to .26), which indicated normality of the distribution. Regarding multicollinearity, we calculated tolerance index (Tl > .10) and variance inflation factor (VIF) values (VIF < 10), which both demonstrated that no multicollinearity problem existed (Kline, 2016) among the variables. In the data set, the smallest tolerance value was .41, and the largest VIF value was 2.46.

Results

Descriptive Analysis

Descriptive statistics, scale reliabilities, and scale correlations are presented in Table 1. The average scores indicated that the participant teachers had high levels of critical thinking disposition (M = 4.32, SD = .45), self-efficacy beliefs (M = 4.27, SD = .43), and autonomy support (M = 4.40, SD = .47), whilst they demonstrated autonomy at almost a high level (M = 4.15, SD = .48). Cronbach's alpha coefficients indicated strong internal consistency for the scales. Correlations among the variables prove that critical thinking relates positively and significantly to teacher autonomy (r = 0.51, p < .01), self-efficacy (r = 0.75, p < .01), and teachers' autonomy support (r = 0.53, p < .01). The results further indicate that teacher autonomy correlates positively and significantly to self-efficacy (r = 0.53, p < .01) and teachers' autonomy support (r = 0.68, p < .01).

Table 1. Descriptive analysis results

Variable	*M*	*SD*	*α*	1	2	3	4
1. Critical thinking disposition	4.32	.45	.95	-			
2. Teacher autonomy	4.15	.48	.85	.51**	-		
3. Self-efficacy	4.27	.43	.93	.75**	.53**	-	
4. Teachers' autonomy support	4.40	.47	.93	.53**	.68**	.56**	-
Skewness	-	-	-	-.24	-.43	-.38	-.48
Kurtosis	-	-	-	-.83	.26	-.58	-.63
Tl	-	-	-	.42	.69	.41	-
VIF	-	-	-	2.39	1.44	2.46	-

Note. *: p < .05, ** p < .01, M: Mean, SD: Standard deviation, α: Cronbach's alpha coefficient, VIF: Variance inflation factor, Tl: Tolerance index.

Validity Analysis

We utilized IBM's AMOS 22 software to perform CFA as part of our analysis to evaluate the validity of the four scales employed in the study. The hypothesized four-factor model demonstrated a strong fit with the data, χ^2 = 186.61, df = 71, RMSEA = .06, RMR = .01, SRMR = .04, CFI = .97, GFI = .94, and IFI = .97 (Hu & Bentler, 1999). We also observed that the hypothesized four-factor model exhibited a significantly better fit with the data compared to the three-factor model where self-efficacy and teacher autonomy were combined into a single factor, χ^2 = 353.68, df = 74, RMSEA = .10, RMR = .02, SRMR = .06, CFI = .92, GFI = .88, and IFI = .92. The examination of factor loadings revealed that all indicators in the model significantly loaded onto their respective factor with standardized coefficients falling between .53 and .97 (p < .001).

Mediation Analysis

Initially, we found that critical thinking disposition had a positive and significant effect on teacher autonomy support (b = .25, SE = .04, 95% CI [.17, .34]), which confirmed Hypothesis 1. Our second hypothesis predicted that teacher autonomy mediated the relationship between critical thinking disposition and autonomy support. We observed that teacher autonomy had a significant, positive, and direct effect on autonomy support (b = .53, SE = .04, 95% CI [.46, .62]). In terms of mediation, as depicted in Table 2, indirect effects of critical thinking on teacher autonomy support via teacher autonomy were significant and positive (b = .28, SE = .03, 95% CI [.23, .34]). Thus, Hypothesis 2 was supported.

Moderation Analysis

Our third hypothesis predicted that teacher self-efficacy moderated the link between critical thinking disposition and teacher autonomy. Analysis revealed that the interaction between critical thinking and self-efficacy was significant when predicting teacher autonomy (b = .22, SE = .10, 95% CI [.03, .42]), which confirmed Hypothesis 3. To further understand the nature of the moderation, simple slope analysis was performed (Aiken & West, 1991) which revealed that the positive relationship between critical thinking and teacher autonomy was stronger (simple slope = .37, p < .01) under high self-efficacy (+1 SD) but weaker (simple slope = .18, p < .05) under low self-efficacy (-1 SD) (see Figure 2).

Table 2. Findings on mediation and moderation effects

	Outcome Variable: Teachers' Autonomy Support				
				Bootstrapped 95% CI	
Predicting variables	**Coefficient**	***SE***	***p***	**LL**	**UL**
	Mediation model (Model 4)				
Teacher autonomy	.53	.04	<.01	.46	.62
Critical thinking disposition	.25	.04	<.01	.17	.34
Indirect effect via teacher autonomy	.28	.03	<.01	.23	.34
	Outcome Variable: Teacher Autonomy				
	Moderated mediation model (Model 7)				
Critical thinking disposition	.27	.07	<.01	.14	.40
Self-efficacy	.40	.07	<.01	.26	.53
Critical thinking disposition x Self-efficacy	.22	.10	<.01	.03	.42

Note. N = 417, CI = Confidence interval.

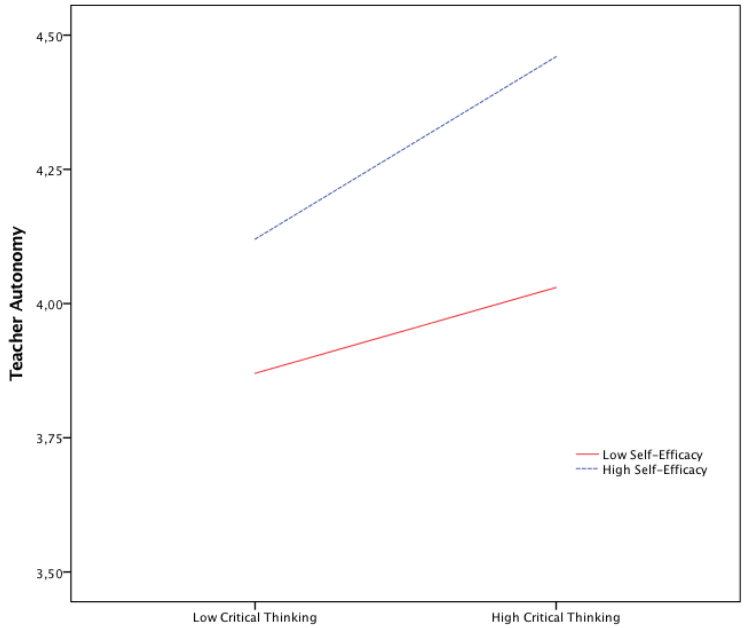

Figure 2. Effect of self-efficacy on relationship between critical thinking and teacher autonomy

Moderated Mediation Analysis

Our fourth hypothesis further predicted that teacher self-efficacy moderated the mediated relationship between critical thinking disposition and teachers' autonomy support. The indirect effects of critical thinking on teachers' teacher autonomy support (b = .20, 95% CI [.11, .28]) via teacher autonomy were found to be stronger for those exhibiting a high level of self-efficacy (see Table 3). Nevertheless, the indirect effects of critical thinking on teachers' autonomy support (b = .09, 95% CI [.01, .18]) were determined to be weaker for teachers who exhibited a low level of self-efficacy. Furthermore, when predicting teachers' autonomy support, the index of moderated mediation also proved to be significant (index = .12, 95% CI [.01, .22]). Thus, Hypothesis 4 was confirmed.

Table 3. Conditional indirect effect of critical thinking on autonomy support via teacher autonomy at levels of self-efficacy (PROCESS, Model 7)

			Bootstrapped 95% CI	
Conditional indirect effects (via teacher autonomy)	**Coefficient**	***SE***	**LL**	**UL**
	Critical thinking to teachers' autonomy support			
Low self-efficacy (-1 *SD*)	.09	.05	.01	.18
High self-efficacy (+1 *SD*)	.20	.04	.11	.28
Index of moderated mediation	.12	.05	.01	.22

Discussion

While earlier research conducted with students has explored the connections between critical thinking disposition and autonomy support (Bolaños-Medina & Núñez, 2022; Koçoğlu & Kanadlı, 2019; Sevari & Farzadi, 2022), there exists a generally limited understanding of teachers' critical thinking disposition as a predictor of their autonomy support. In addition, no prior study has examined the possible mechanism that explains the association between these variables. In the current study, we examined the mediating role of teacher autonomy and the moderating role of teachers' self-efficacy beliefs in the relationship between teachers' critical thinking disposition and autonomy support along with the moderating function of teachers' self-efficacy beliefs in the relationship between critical thinking disposition and teacher autonomy. We determined that teacher autonomy mediated the links between critical thinking disposition and teachers' autonomy support, with self-efficacy moderating the mediated effect of teacher autonomy in this relationship. Furthermore, we concluded that self-efficacy was a significant moderator in the link between critical thinking disposition and teacher autonomy.

Our results illustrate the significant relationship between critical thinking disposition and teachers' autonomy support. Teachers with higher levels of critical thinking disposition are more likely to display autonomy support for their students. Although to the best of our knowledge, the literature has not directly examined the effect of teachers' critical thinking disposition on their autonomy support, some studies have found a moderate to strong correlation between students' critical thinking disposition and autonomy support (Bolaños-Medina & Núñez, 2022; Koçoğlu & Kanadlı, 2019; Sevari & Farzadi, 2022). Concerning teachers' thinking skills, a study conducted by Orakci and Durnali (2023) showed that teachers' creative thinking has a positive and strong relationship with their autonomy support. Higher-order thinking abilities, including critical thinking involves a decision-making process that includes analysis, interpretation, evaluation, and inference (Çolak et al., 2019). These skills may enable teachers to interpret, make independent decisions, search for innovations, and be more readily accepting of change (Kılıç & Şen, 2014). In addition, critical thinking abilities have been shown to be essential for teachers' effectiveness (Birjandi & Bagherkazemi, 2010) and professional development (Liao et al., 2022), both of which may encourage teachers to assist students in making their own decisions. Thus, as suggested by the current study, teachers with higher critical thinking disposition tend to provide more support for students' autonomy by identifying their needs and permitting their interests and preferences to direct classroom activities.

Another contribution of the current research to the literature lies in confirming the mediating effect of teacher autonomy in the relationship between critical thinking disposition and teachers' autonomy support. This indicates that critical thinking disposition promotes teachers' autonomy support through the enhancement of their autonomy. The mediating effect arises from teacher autonomy being linked to both critical thinking and autonomy support. This finding corresponds with the results of earlier studies which established a positive relationship between teachers' critical thinking disposition and their autonomy (Çolak et al., 2022; Lu & Wang, 2021). Critical thinking generally leads to a higher level of reasoning (Kamii, 1991), thereby enabling teachers to make independent yet

informed decisions. Some studies have shown positive outcomes of critical thinking for educators in areas such as teaching success (Nosratinia & Zaker, 2017) and reflective thinking (Erdoğan, 2020). In addition, regarding teacher candidates, Tunçeli et al. (2022) concluded that critical thinking promoted their autonomy levels, explaining nearly one-third of the variance in leaners' autonomous behaviors. The literature further suggests a positive and significant link between teacher autonomy and teachers' autonomy support (Yazıcı, 2016). Drawing on the perspectives of academics and university students, Basri (2023) found teacher autonomy as a facilitator for learner autonomy support, indicating that when teachers exercise increased autonomy in their decision making, they also tend to be supportive of their students' autonomy. Pelletier et al. (2002) showed that the more teachers are self-determined in their work, the more they demonstrate supportive behaviors toward students. As evidenced in the literature, teacher autonomy is closely associated with both critical thinking and autonomy support. The current study extends upon this by having explored teacher autonomy as an essential mechanism through which critical thinking disposition positively affects teachers' autonomy support. Thus, teacher autonomy is crucial for conveying the positive impact of critical thinking on the autonomy supportive actions displayed by teachers.

Our results also revealed teacher self-efficacy as a significant moderating role in the relationship between critical thinking disposition and teacher autonomy. This suggests that self-efficacy strengthens the effect of critical thinking disposition on teacher autonomy; that is, teachers with high self-efficacy beliefs are more inclined to exhibit critical thinking disposition, consequently demonstrating greater autonomous behaviors. In addition to indicating confidence in one's abilities, self-efficacy beliefs also influence individuals' cognitive, emotional, and decision-making processes (Burić & Kim, 2020), which emphasizes the key role of self-efficacy in developing thinking skills. For example, Orakci and Durnali (2023) concluded that teachers' self-efficacy is significantly and positively correlated with their creative thinking, while Zangenehvandi et al. (2014) found significant and positive correlation between teachers' self-efficacy and critical thinking. Regarding university students, Phan (2009) found that academic self-efficacy influenced critical thinking positively by making students more inclined to participate in learning activities that aim to challenge their presumptions, beliefs, and awareness. In addition, higher self-efficacy beliefs have been shown to positively linked to deep processing strategies, including reflection, analysis, and incorporation of new knowledge (Fenollar et al., 2007). When strengthened by self-efficacy, higher critical thinking levels lead teachers to exhibit greater autonomy. Therefore, it may be concluded that teachers will exercise higher autonomy when they have strong belief in their own capabilities and are convinced that their skills will enable them to attain favorable outcomes.

Finally, our study highlights that self-efficacy moderates the strength of the mediated relationship between critical thinking disposition and teachers' autonomy support. This implies that when teachers experience higher levels of self-efficacy, it fosters an increased sense of higher professional autonomy, and which may ultimately lead to increased autonomy support for their learners. In contrast, for teachers with low self-efficacy, the mediation effect of teacher autonomy in the link between critical thinking disposition and autonomy support becomes weaker. Our finding corresponds with the results of earlier studies examining the connection between teachers' self-efficacy and autonomy (Çolak, 2025b; Skaalvik & Skaalvik, 2014). For example, Sokmen and Kilic (2019) established self-efficacy as a positive predictor of teacher autonomy, and similarly, Lu et al. (2015) revealed significant and positive links between self-efficacy and teacher autonomy. Kasapoğlu Tankutay and Çolak (2025) concluded that academic optimism, with self-efficacy recognized as one of its key components, enable teachers to make their own decisions by promoting their autonomy. The current study's results also align with the principals of social cognitive theory, which asserts that self-efficacy serves as the underlying psychological mechanism that provides positive motivation for individuals (Stajkovic & Luthans, 1998). According to this theory, in order to activate human agency and persuade people to take action, they should be sufficiently convinced that they are able to reach the

desired results (Bandura, 1986). The theory suggests that self-efficacy can be considered as a motivating mechanism that triggers individuals to take action and influences their choices. As shown in this study, higher levels of self-efficacy lead teachers to provide greater autonomy support to their students by enhancing their own autonomy.

Overall, our study suggests that self-efficacy together with critical thinking play a crucial role in guiding teachers to make their own decisions, thereby fostering increased support for their students' autonomous behaviors. Teachers' autonomy support is of crucial importance in educational settings, as it offers considerable benefits for both student development and instructional outcomes. In their experimental study, Reeve et al. (2004) found that teachers' autonomy support improved students' engagement in the teaching process, which serves as a key indicator of their underlying motivation. Some studies have shown the interconnection between teachers' autonomy support and student autonomy, indicating that greater support form teachers enabled students to make independent decisions and act accordingly (Basri, 2023; Núñez et al., 2015). Other studies have reported that such support contributes to students' well-being and satisfaction (Black & Deci, 2000; Sheldon & Krieger, 2007). Most importantly, a longitudinal study by Fu et al. (2023) concluded that teachers' autonomy support positively and directly influenced students' academic performance both immediately and over time. Therefore, in order to benefit from teachers' autonomy supportive behaviors in educational environments, it is essential to uncover their underlying mechanisms. This study provided evidence for how the improvement of critical thinking, along with self-efficacy and teacher autonomy, contributes to the development of autonomy supportive teachers.

Practical Implications

Our study results have several practical implications. First, our study shows that critical thinking disposition positively affect both teacher autonomy and teachers' autonomy support. Critical thinking refers to a cognitive process during which individuals systematically interpret, analyze, and evaluate information in order to make their own reasoned judgements and decisions (Facione, 1990). Therefore, it can be inferred that the improvement of critical thinking skills requires a relatively long period of time to cultivate. In order to develop the critical thinking skills of teachers, preservice teacher training programs should be structured in such a way that they offer significant possibilities and opportunities for teacher candidates to apply their knowledge during the processes of decision making and problem solving. In addition, students' interest in acquiring new knowledge will help motivate them to relate it to their prior knowledge, fostering critical thinking in the process (Bolaños-Medina & Núñez, 2022). Thus, teacher candidates should also be motivated by being exposed to engaging activities and effective learning methods in order to acquire new knowledge during the education process.

Second, the mediating role of teacher autonomy proposes that teachers' autonomy support is partly affected by their own levels of autonomy. Türkiye has a highly centralized education system, implying that the autonomy levels of teachers in domains like shaping course content, curricula development, and influencing school-related policies are significantly lower than the OECD average (Schleicher, 2020). Within such a system, teachers have limited opportunity to exercise discretion in their professional activities. In order to enhance teacher autonomy in countries such as Türkiye, national-level regulatory changes are needed that grant teachers the right to organize their own teaching and to tailor the curriculum they teach as required. In addition, as a positive school environment fosters the development of teacher autonomy (Çolak & Altınkurt, 2017), we suggest that school principals should endeavor to establish and cultivate a motivating and supportive school environment, since this would enhance teacher autonomy, which in turn would promote autonomy support provided to the students.

Third, our study concluded that the indirect effect of critical thinking on autonomy support is contingent upon self-efficacy belief levels. Thus, there is a need for teachers' self-efficacy beliefs to be developed and strengthened. The principles of social cognitive theory may serve as a guide for how teachers' self-efficacy beliefs can be increased. Bandura (1997) asserted that mastery experience constitutes an important component of an individual's self-efficacy belief. In this regard, school principals should create appropriate opportunities for teachers to develop their professional abilities and thereby enhance the instructional quality offered at their school. We recommend that school principals support teachers' professional learning by helping to motivate them to attend seminars as well as setting school-wide instructional objectives. This approach will support teachers to accomplish challenging tasks and develop mastery skills, which in turn will develop their self-efficacy beliefs.

Limitations and Future Research

Despite having implications at practical level, it is crucial to recognize that the current study presents certain limitations. First, this study relied upon a teacher sample from one province in Türkiye; hence, future research could consider expanding the sample source to enhance a wider representation of the population or through drawing samples from different countries in order to compare the current study's results with diverse cultural environments. Second, the study was conducted across three different school levels, which limits the generalizability of the results. Third, the data of the study originated from a single source, teachers' self-reports, which may have excluded the perspectives of students, administrators, and trained raters. Thus, forthcoming studies could consider including different sources of data collection in order to bolster the credibility and validity of the results gained from the current study. Fourth, this study's focus was on critical thinking disposition as a single construct rather than analyzing its dimensions separately. We recommend that future studies investigate the multifaceted nature of critical thinking disposition by considering its various dimensions, such as participation, cognitive maturity, and innovativeness. Finally, this study explored the mediating effect of teacher autonomy between the study variables. Future research could also investigate other possible mediators such as academic optimism, teacher innovativeness, subjective well-being, and teacher professional learning

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