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Research Article

Adaptive and Affective Support of Mathematics Teachers from the Perspective of Secondary School Students*

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Abstract – This study aimed to investigate the effect of affective support perceived by students on adaptive support in mathematics lessons and to examine both forms of support in terms of some variables. The correlational research method was used in this study. The study was conducted with secondary school students. Two scales measuring the perception of adaptive support and affective support were used. The relationship between students' perceptions of support was explained with a structural equation model. According to the results, affective support is significantly related to adaptive support. Therefore, in affective supportive environments, students think that they receive cognitive support that is compatible with their learning. In addition, it was determined that students' perceptions of adaptive support were independent of gender. In terms of grade level, it was observed that students in higher grades perceived that the teacher provided less adaptive support to students. There was a significant difference in perceived affective support based on both the gender and grade level of the students.

Key words: Adaptive support, affective support, student perception.

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Introduction

One of the most significant challenges worldwide is to enhance mathematics learning (Roschelle et al., 2010). Traditional mathematics instruction, where teachers demonstrate skills and students imitate and practice until proficiency, has been questioned by studies in mathematics education (Baxter & Williams, 2010). Most students have struggled with

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mathematics and performed poorly in this instruction (Masinading & Gaylo, 2022). Different methods can be used to improve academic performance in mathematics. One of these is the teacher support strategy (Anghileri, 2006). Studies have shown that the support provided by teachers significantly impacts the academic performance of students in mathematics (Dagoc & Tan, 2018; Masinading & Gaylo, 2022; Stender et al., 2017). Therefore, it is crucial to determine the factors that account for and distinguish teacher support. This study focuses on identifying the factors that contribute to teacher support in mathematical classrooms.

As opposed to traditional teaching, teachers' changing support strategies and roles in the mathematics classroom have long been discussed (Burkhardt, 2006). Among these roles, teachers' roles of guiding, supporting or sharing authority rather than instructing students have been taken as a basis (Forman et al., 2017; Sun et al., 2022; Tabak & Baumgartner, 2004). In this context, it has become one of the frequently used concepts in education that teachers provide adaptive support suitable for students' comprehension levels (Pol et al., 2010). In particular, to support students' mathematical skills, teaching should be adapted to the needs of the students (Gallagher et al., 2022; Stender et al., 2017). Recent studies link adaptive support in mathematics education to the scaffolding theoretical framework (Bakker et al., 2015; Schukajlow et al., 2012; Smit et al., 2016).

Theoretical framework: What is scaffolding?

The concept of scaffolding is one of the concepts that emerged as a result of the adaptation of the concept of the zone of proximal development to teaching (Puntambekar, 2022). Belland (2011) defined scaffolding as bridging the gap between what students can do independently and what they can do with the help of another, more skilled person. Smit et al. (2013) define scaffolding as a teacher's temporary support that helps students complete a task that they cannot do on their own and aims to gradually provide students with the competence to complete a similar task independently. The concept of scaffolding is a metaphor for temporary support (Bakker et al., 2015). When the student reaches the potential development level, the scaffolding disappears. In order to explain scaffolding, it is first necessary to define the tool used by the teacher to scaffold. When the studies were examined, it was determined that there are different scaffolding tools in mathematics teaching. Worksheets, digital learning tools, solution plans, or material can be used as a scaffolding tool (Dove & Hollenbrands, 2014; Schukajlow et al., 2015; Tropper et al., 2015). However, in classrooms, the dialogue between the teacher and the student is often used as a scaffolding tool (Bakker et al., 2015; Stender, 2018; Stender & Kaiser, 2015; Stender et al., 2017; Tropper et al., 2015; Wischgoll

et al., 2015). The use of more dialogue can be explained by the concepts of adaptive and fixed scaffolding as defined by Azevedo, Cromley & Seibert (2004). Fixed scaffolding is static and does not change according to individual student needs. On the other hand, adaptive scaffolding is dynamic and adapts instantaneously according to student learning. Therefore, scaffolding with dialogue seems to be a very effective and appropriate tool for adaptive support (Bakker et al., 2015).

Adaptive and Affective Support

Adaptive support is defined as when a teacher adapts his/her support to the level of students' understanding (Pol et al., 2014). Adaptability of teacher support means adapting a teacher's organisation of the learning environment to the learner (Pol et al., 2022). Wood et al. (1978) also explained this concept with a degree of support. That is, when the teacher increases the degree of support in response to student failure or decreases the degree of support in response to student success, support is provided conditionally (Pol et al., 2015). Otherwise, the problem arises that the teacher does not adapt the support according to the student's needs (Pol et al., 2022). Adaptive scaffolding was found to give more favourable results than fixed scaffolding (Avezado & Hadwin, 2005). It is generally accepted in the literature that effective learning is enhanced when the teacher's support is adapted to the student's current level of understanding (Hardy et al., 2019; Pol et al., 2010; Wood et al., 1978).

Studies on dialogue support as an adaptive support tool have found that some teachers tend to provide more support than students need (Tropper et al., 2015). On the other hand, Broza and Kolikant (2015) point out that the learning processes of disadvantaged students who need more support regress with the teacher support provided. Therefore, it is important to provide adapted support to increase students' self-esteem on the one hand and to help them progress to higher levels on the other. However, providing adapted support requires the teacher to make instantaneous decisions about the support to be provided to the student and is a highly sensitive process (Bakker et al., 2015). It is a challenge for teachers to know how to support students without reducing the cognitive demand when initiating a task (González & Eli, 2015). Providing higher levels of support by the teacher to students who can only progress with lower levels of support and providing lower levels of support to students who need higher levels of support can lead to unsuccessful outcomes.

Adaptive support is a complex construct that considers two situational factors, namely teacher regulation and student understanding (Pol et al., 2022). There are studies in which adaptive support is analysed, especially regarding teachers. It has been found that variables such as the teacher's years of experience, the training received about support, and the structure of participation in the environment affect the way they support students (Gürel, 2023; Stender et al., 2017; Tropper et al., 2015). The perception of adaptive support for students was examined by Pol et al. (2022), and they found that adaptive support was related to diagnostic competence and interpersonal warmth. It was also found that teacher support was positively related to mathematics achievement (Klem & Connell, 2004; Masinading & Gaylo, 2022) and participation in mathematics lessons (Liu et al., 2018). Affective support, as well as adaptive cognitive support, which is among the types of teacher support, is an effective tool in teaching (Patrick et al., 2007; Yang et al., 2021). In the studies, it has been determined that affective support has a positive and significant relationship with academic enjoyment and academic self-efficacy (Sakız, 2017; Sakız et al., 2012). It is also mentioned that the teacher's affective support positively affects the students' cognitive and affective participation in the lessons (Klem & Connell, 2004; Liu et al., 2018). In addition, studies in the literature show that affective support is negatively related to academic anxiety (Beghetto, 2009) and hopelessness (Sakız, 2017).

Since there are gender and grade level differences in students' attitudes towards mathematics achievement, it may be important to examine these variables in adaptive and affective support (Rice et al., 2012). Pol et al. (2022) and Wang et al. (2020)'s studies show that adaptive support provided by mathematics teachers is independent of the gender and education level of the student. When the results of affective support concerning gender and grade level were analysed, it was found that in some regions, girls tended to perceive learning environments more positively than boys (Brok et al., 2006; Fusco, 2008), while in some regions, boys had more affective support perceptions than girls (Kim et al., 2000). Sakız (2017) associates this situation with cultural differences. According to grade level, it was determined that primary school students had a higher perception of social support than secondary and high school students (Demaray & Malecki, 2002; Rice et al., 2012). This study aims to examine the effect of affective support on adaptive support provided by mathematics teachers and to investigate these forms of support in terms of gender and grade variables. Within the scope of the study, the following sub-problems were included:

1. Do secondary school students' perceptions of affective support affect their perceptions of adaptive support provided by mathematics teachers?
2. Do secondary school students' perceptions of adaptive support provided by mathematics teachers differ depending on gender and grade level?
3. Do secondary school students' perceptions of affective support provided by mathematics teachers differ depending on gender and grade level?

Method

In this study, the correlational study method was used among quantitative study methods. A correlational study examines the relationship between two or more variables and how they vary together (Leedy & Ormrod, 2021). Firstly, a study was conducted to adapt a scale. Then, the direction in which the affective support variable affects the adaptive support variable was explained with the structural equation model. It was also explained how these variables were affected by gender and grade level.

Research Group

The research group consists of secondary school students studying in the first semester of the 2022-2023 academic year in central secondary schools affiliated with the Ministry of National Education in a medium-sized province of the Eastern Anatolia Region in terms of population. The study was conducted with fifth, sixth, seventh, and eighth grade students from schools selected randomly among central secondary schools. A total of 425 students and 14 teachers from five schools were included in the study. 217 students were female, 203 were male, and five students did not express an opinion. 91 of these students were fifth grade, 132 were sixth grade, 121 were seventh grade, 77 were eighth grade students. Four students did not express an opinion.

Data Collection Tools

Two data collection tools were used in this study. The first is the teacher's adaptive support scale developed by Pol et al. (2022). The second is the teacher's affective support scale developed by Sakız (2017). Information about the validity and reliability studies of the scales is given below.

Teacher's Adaptive Support: Student Perceptions Scale

Pol et al. (2022) investigated how secondary school students perceive their teachers' adaptive support. The scale consists of 21 items in total and is prepared in a five-point Likert type. The scale, which was applied to a total of 2730 secondary school students, was found to produce highly valid and reliable results. When the structure of the scale was analysed, one, two, four and six-factor structures were tested, and it was concluded that the four-factor structure of the scale was appropriate for the data. In the first level of confirmatory factor analysis, it was determined that the measurement model showed good fit values. The scale consists of 21 items in total. Information about the structure of the scale is given in Table 1.

Table 1 The Questionnaire on Teacher Support Adaptivity (QTSA): Student Perceptions

Factors	Definition	Cronbach Alpha	Items	Example Item
A+	adaptive support with much regulation upon low understanding	.88	2, 3, 7, 9, 18, 21	When I don't know how to continue, this teacher helps me to find the correct answer.
A−	to adaptive support with little regulation upon high understanding	.83	1, 4, 11, 15, 16	When I am doing well, this teacher lets me do a difficult exercise.
NA+	non-adaptive support with much regulation upon high understanding	.80	6, 13, 17, 19	When I am already able do it, this teacher still helps me.
NA−	non-adaptive support with little regulation upon low understanding	.87	5, 8, 10, 12, 14, 20	This teacher tells me to do it on my own, even though I am unable to continue.

According to the reliability analysis results conducted by Pol et al. (2022), Cronbach Alpha's internal consistency coefficient varies between .80 and .88 on a factor basis. Total reliability was determined as .85. This shows that the scale is reliable. When the scale is used depending on the student variable, it is recommended to evaluate the four factors separately. When it is used for the teacher variable, it is stated that the NA+ and NA- factors are reversed and evaluated over the scale's total score (Pol et al., 2022).

Construct Validity Study of The Adaptive Support Scale. Firstly, exploratory factor analysis was performed in the statistical package for the social sciences (SPSS) package programme and the factor structure of the scale translated into Turkish was examined. When the number of factors was released using the principal components method, it was seen that the scale had a six-factor structure with eigenvalues above one. This structure was also found in the original scale. However, the researchers decided that a four-factor structure based on the theoretical framework was appropriate. For this reason, the scale was fixed to four factors

to be suitable for the structure in the original scale and factor analysis was performed again. In the analysis, the Kaiser Meyer Olkin (KMO) test value was found to be 0.821, and Barlett's test of sphericity was significant (p<.001). Based on the analysis, it was concluded that the data collected was suitable for factor analysis. When the item-total correlations were analysed, it was found that they ranged between .289 and .609. However, there was one item below .30. It was concluded that it was acceptable to not differ from the original scale. The explained variance of this scale, which has a four-factor structure, was found to be 47%. The rotated principal components analysis is given in Table 2.

Table 2 Rotated Principal Component Analysis Results: Factor Loadings

	Factors			
Item no	A+	NA-	A-	NA+
I3	.766			
I2	.755			
I9	.723			
I7	.660			
I18	.626			
I21	.567			
I8		.690		
I5		.652		
I10		.533		
I12		.498		
I1		.428	.352	
I14		.412		
I20		.406	.356	
I15			.707	
I16			.666	
I4			.547	
I11			.498	
I13				.707
I19				.631
I6				.629
I17				.518
Total Explained variance: %47.02 Factor-1: %16.39 Factor-2: %10.87; Factor-3: %9.88; Factor-4; %9.88				

When the factor loadings were analysed, it was found that all items were loaded on the factors in the original scale. The first and twentieth items loaded on both A- and NA- factors. It was deemed appropriate to decide whether the items should remain in the scale as a result of confirmatory factor analysis. If the fit values of the structure tested in confirmatory factor analysis are sufficient and the standardised loadings produce significant results, the structure is already confirmed. Therefore, it was decided that first-level confirmatory factor analysis

should be conducted. In the analyses, the four-factor structure in the original scale was examined. The measurement model is given in Figure 1.

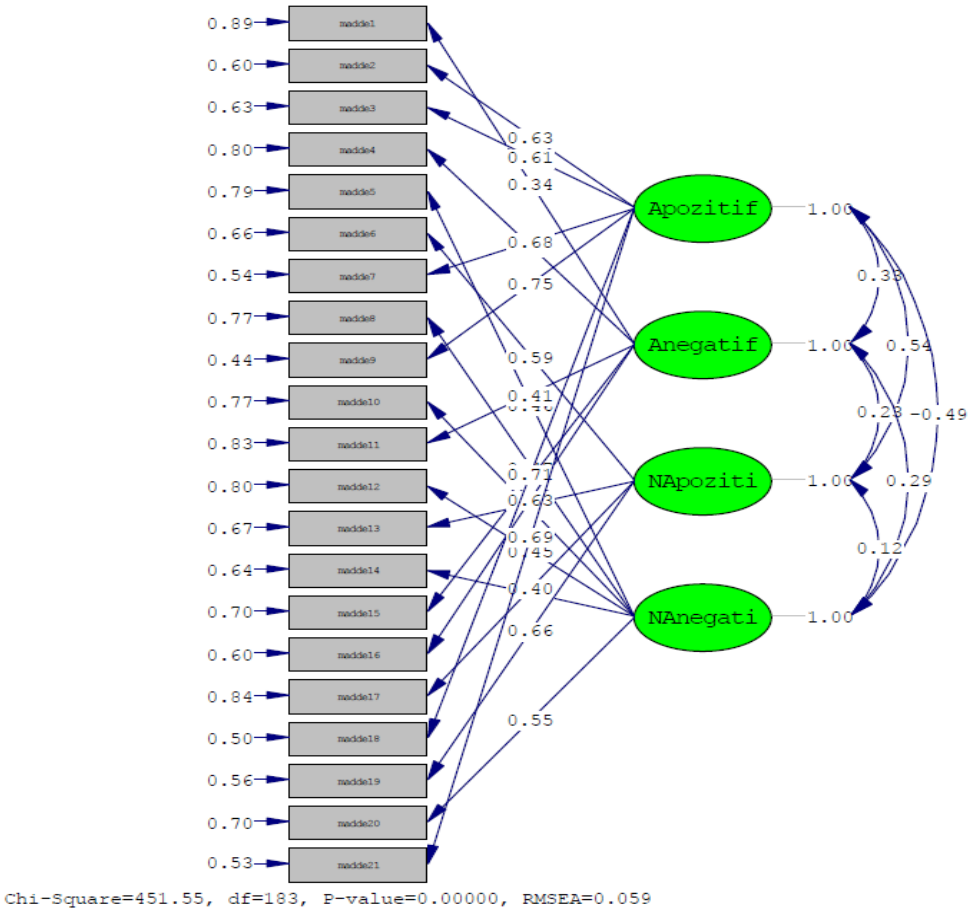

Figure 1 Path Diagram for The Measurement Model

The measurement model in Figure 1 includes standardised loadings. In addition, the error variances of the observed variables are included in the path diagram. Firstly, by looking at the fit indices, it is decided whether the measurement model is validated or not. The χ^2=451.55 and sd=183, and the data show a perfect fit with χ^2⁄sd=2.48 (Çokluk et al., 2010). The p-value of the chi-square was found to be significant. It is an expected result that this value is significant (p<.001) when the sample size is high (Çokluk et al., 2010). It was observed that RMSEA produced a good fit with a value of 0.059; GFI produced a good fit with a value of 0.91; SRMR produced a good fit with a value of 0.065, which is less than 0.08; CFI produced good fit values with a value of 0.93 and NNFI produced good fit values with a value of 0.92, which is greater than 0.90 (Çokluk et al., 2010). It was found that the

standardised loadings in the measurement model were high, and the error variances were low. In addition, the t-value of each item is given in Table 3.

Table 3 T-values for The Measurement Model

Items	t value	Items	t value
I1	5.76	I12	8.34
I2	13.63	I13	10.61
I3	12.98	I14	11.56
I4	7.83	I15	9.63
I5	8.59	I16	11.06
I6	10.86	I17	7.21
I7	14.86	I18	15.73
I8	8.85	I19	12.33
I9	17.05	I20	10.46
I10	8.85	I21	15.09
I11	7.17		

According to the t-values in Table 3, it was determined that the effect of all items on the factors was significant. Thus, a four-factor structure was confirmed with 21 items in the scale. According to the reliability analysis results, Cronbach's Alpha coefficient was determined as .840 for the first factor, .590 for the second factor, .627 for the third factor and .661 for the fourth factor. The total reliability analysis result was found to be .715. These values show that the scale is moderately and sufficiently reliable.

Perceived Teacher's Affective Support Scale

The scale developed by Sakız (2017) was used in this study. The scale was developed to determine the perceptions of students regarding the emotional support of the teacher. The validity and reliability studies of the scale prepared in Turkish form were conducted by Sakız (2017). Since this scale was used in the native language of the students, no adaptation study was conducted.

Construct Validity Study of Affective Support Scale. The measurement model of the confirmatory factor analysis is given in Figure 2.

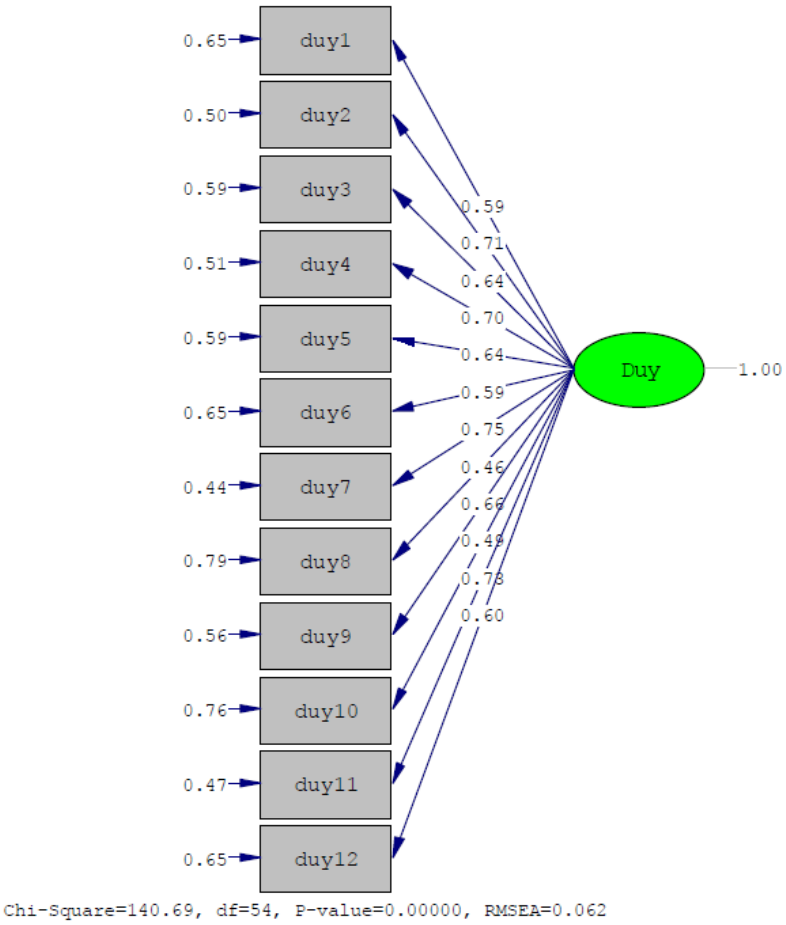

Figure 2 Confirmatory Factor Analysis Results of Affective Support Scale

According to Figure 2, χ^2=140.69 and sd=54, and the data show a perfect fit with χ^2⁄sd=2.61 (Çokluk et al., 2010). It was observed that RMSEA produced good fit with a value of 0.062; GFI produced excellent fit with a value of 0.95; SRMR produced excellent fit with a value of 0.04 and less than 0.05; CFI produced excellent fit values with a value of 0.98 and NNFI produced excellent fit values with a value of 0.98 and greater than 0.95 (Çokluk et al., 2010). In the confirmatory factor analysis (CFA), it was determined that the fit indices related to the measurement model were appropriate. It was determined that the standardised loadings in the measurement model were high, and the error variances were low. When the t values in the model were analysed, it was found that all items were significant for the scale. The reliability analysis result in the current study was found to be 0.88. The scale consists of 12 items in total and is given in a five-point Likert type.

Data collection

Both scales were given to the students simultaneously, and they were asked to fill out the scales by reflecting their real feelings. The scale was administered in the mathematics class. The mathematics teachers were present when the scale was administered in class. The students were told to think about their mathematics teachers while filling out the scales. It was especially stated that teachers would not see the answers given to the questionnaires, and the questionnaires would be mixed while collecting them. It was also emphasised that personal information would not be included in the questionnaires. The data were collected at the end of the first semester in January so that the students could get to know their teachers sufficiently. The students completed the questionnaires within 15 minutes at most.

Data Analysis

This study aims to determine the effect of perceived affective support on perceived adaptive support and examine the two forms of support in terms of different variables. Missing data analysis was performed for both scales, and it was determined that the missing data were randomly distributed. Then, the missing data assignment process was carried out using the series averages method. When outlier analyses were performed, it was decided not to remove any data from the data set. Since the adaptive support scale was different from the native languages of the students, a scale adaptation study was carried out. In the scale adaptation study for the adaptive support scale, exploratory factor analysis with SPSS software and confirmatory factor analysis with linear structural relation (LISREL) software were performed. Since the affective support was prepared in the students' mother tongue, confirmatory analyses were carried out using only LISREL software. All results were shared in the data collection tools. The effect of affective support on adaptive support was explained by structural equation modelling using the LISREL programme.

In order to perform variance analyses related to the data analysis of the study, kurtosis and skewness values were examined in the normality analyses of the two scales and it was determined that the Skewness value of adaptive support was -0.162 and the Kurtosis value was 0.436. The skewness value of affective support was -1.148 and the Kurtosis value was 1.623. The fact that these values are between +2 and -2 indicates that the data are distributed. In the analyses, the assumption of equality of variances was ensured. For the multivariate analysis of variance (MANOVA) test, the Box M test was found to be 8.467 and the p-value was found to be .592 in the analysis according to gender. In the analysis according to grade

level, the Box M test was found to be 37.930, and the p-value was found to be .170. According to this test, the data can be considered suitable for MANOVA analysis. Thus, the demographic information of the students regarding the adaptive and affective support scores was examined with the parametric tests, which are t-test, analysis of variance (ANOVA) and MANOVA in the SPSS program.

Results

The structural equation model for the study question "Do secondary school students' perceptions of affective support affect their perceptions of adaptive support provided by mathematics teachers?" is given in Figure 3.

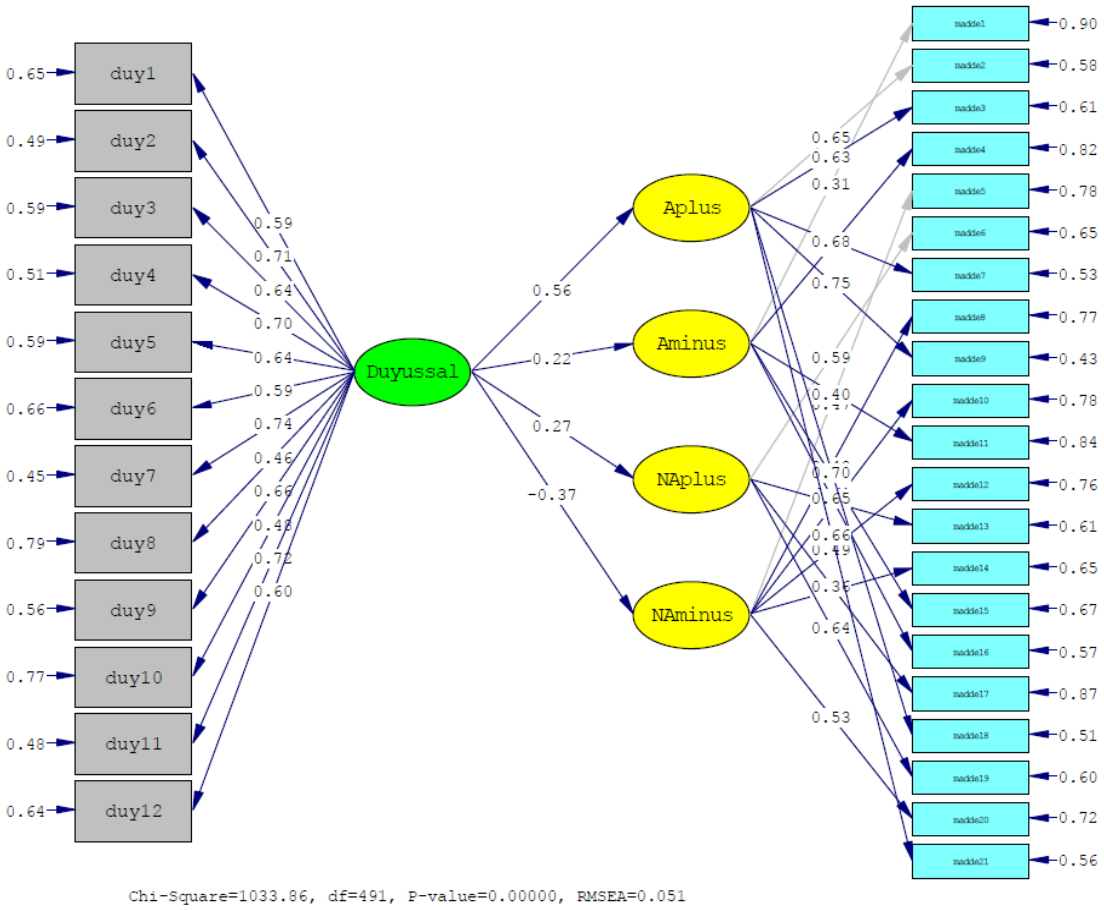

Figure 3 Structural Equation Model of Affective Support and Adaptive Support

According to the fit values given in Figure 3, it was determined that the data produced good fit values with the tested model, χ^2/df=2.10; RMSEA=0.051; CFI=0.95 NNFI=0.94

SRMR=0.07. In the structural model, the effect of affective support on adaptive support was significant in all sub-dimensions. While affective support is positively related to adaptive support types, it is negatively related to non-adaptive support types. It was concluded that affective support had the highest effect on the adaptive support sub-dimension, which includes more teacher regulation based on low student understanding. In this context, it was determined that the explained variance was 0.31. In this case, the students who receive affective support perceive receiving more adaptive support.

MANOVA results related to the study question "Do secondary school students' perceptions of adaptive support provided by mathematics teachers differ depending on gender?" are presented in Table 4.

Table 4 The MANOVA Results for Students' Adaptive Support Mean Scores by Gender

Factor	Gender	*f*	x̄	SD	F	p
A+	Female	217	24.84	5.47	1.566	.212
	Male	203	24.18	5.36		
A-	Female	217	15.67	4.04	2.303	.130
	Male	203	15.06	4.14		
NA+	Female	217	14.07	3.38	1.949	.163
	Male	203	13.58	3.76		
NA-	Female	217	14.18	4.59	0.496	.482
	Male	203	14.49	4.66		

Note. Wilk's Lambda (λ)=0.988, F(4, 415) = 1.218, p>.05, η^2=0.012

As a result of the analysis, no significant difference was found in the combined dependent variables according to gender, Wilk's Lambda (λ)=0.988, F(4, 415) = 1.218, p>.05, η^2=0.012. When the results for the dependent variables were analysed separately, no statistically significant result was found for any dependent variable depending on gender.

MANOVA results related to the study question "Do secondary school students' perceptions of adaptive support provided by mathematics teachers differ depending on grade level?" are presented in Table 5.

Table 5 The MANOVA Results for Students' Adaptive Support Mean Scores by Grade Level

Factor	Grade Level	*f*	x̄	SD	F	p	Tukey
A+	5	91	24.30	5.53	2.349	.072	
	6	132	25.53	5.01			
	7	121	23.91	4.93			
	8	77	24.01	6.41			
A-	5	91	15.52	4.48	0.548	.650	
	6	132	15.02	4.14			

	7	121	15.44	3.68			
	8	77	15.70	4.13			
NA+	5	91	13.91	3.56	0.383	.765	
	6	132	14.07	3.52			
	7	121	13.65	3.36			
	8	77	13.65	4.01			
NA-	5	91	13.87	4.94	4.762	.003	7>6
	6	132	13.37	4.51			8>6
	7	121	15.23	4.36			
	8	77	15.21	4.57			

Note. Wilk's Lambda (λ)=0.952, F(4, 414) = 1.719, p<.05, η^2=0.016, 6: sixth grade students, 7: seventh grade students, 8: eighth grade students.

According to Table 5, as a result of the analysis, a significant difference was found in the combined dependent variables according to the grade level, Wilk's Lambda (λ)=0.952, F(4, 414) = 1.719, p<.05, η^2=0.016. When the results for the dependent variables were analysed separately, a statistically significant difference was found for the NA- dependent variable depending on the grade level. When the source of this difference was analysed, it was found that students in upper grades received less adaptive support than students in lower grades. This shows that students in the upper grades perceive that the teacher provides less adaptive support for low student achievement.

The t-test results related to the study question "Do secondary school students' perceptions of affective support provided by mathematics teachers differ depending on gender?" are given in Table 6.

Table 6 The t-test Results for Students' Affective Support Mean Scores by Gender

	f	x̄	SD	t	df	p
Female	217	50.46	7.47	2.392	418	.017
Male	203	48.55	8.82			

As seen in Table 6, the mean scores of female students regarding affective support were 50.46 and the mean scores of male students were 48.55. According to the t-test result, the difference between these means was found to be significant, t(418)=2.392, p<.05. It was found that the mean scores of female students regarding affective support were significantly higher than the mean scores of male students.

ANOVA results related to the study question "Do secondary school students' perceptions of affective support provided by mathematics teachers differ depending on grade level?" are presented in Tables 7 and 8.

Table 7 Descriptive Analysis for Students' Affective Support Mean Scores by Grade Level

Grade Level	N	$\bar{x}$	SD	SE
5	91	51.68	7.01	0.74
6	132	52.27	6.69	0.58
7	121	46.36	8.28	0.75
8	77	47.18	9.38	1.10

According to Table 7, the mean scores of fifth grade students on the affective support scale were $\bar{x}$ =51.68, sixth grade students were $\bar{x}$ =52.27, seventh grade students were $\bar{x}$ =46.36 and eighth grade students were $\bar{x}$ =47.18.

Table 8 The ANOVA Results for Students' Affective Support Mean Scores by Grade Level

	Sum of Squares	df	Mean Square	F	p	Tukey
Between Groups	3056.217	3	1018.739	16.863	.000	5>7 5>8
Within Groups	25191.585	417	60.411			6>7 6>8
Total	28247.802	420				

Note. 5: fifth grade students, 6: sixth grade students, 7: seventh grade students, 8: eighth grade students.

According to Table 8, there was a significant difference in the mean scores of secondary school students regarding the affective support provided by the teacher by the grade level, $F(3, 420) = 16.863$, $p<.001$. Tukey test was conducted to determine which groups this difference originated in, and it was determined that eighth and seventh grade students had lower affective support scores than fifth and sixth grade students. It was concluded that the learning environment was perceived more positively in lower grades.

Discussion

In this study, students' perceptions of adaptive and affective support were analysed in terms of both the relationship between them and demographic variables. When the structural model is analysed, affective support has a direct and significant relationship with adaptive support. As a result, in affective supportive environments, students think that they receive cognitive support that is compatible with their learning. These results revealed that affective support positively affects the perception of adaptive support. Considering that affective support positively affects variables such as mathematics achievement, lesson participation, attitude, and self-efficacy (Kaya, 2020; Sakız, 2017; Wilkins & Ma, 2003; Yang et al., 2021), the result obtained is consistent with previous theories and supports the literature. These results suggest that creating learning environments where students are affective supported can

lead to positive results in adaptive support. Considering that teacher support positively affects students' mathematics participation (Liu et al., 2018) and achievement (Masinading & Gaylo, 2022) and reduces negative behaviours (Wang & Eccles, 2012), the importance of affective support increases. In addition, in a study examining the effect in the opposite direction, it was found that teachers who cognitively harmonised with students were perceived to be more likeable and friendly in affective terms (Fauth et al., 2014).

According to the results of demographic variables, it was determined that students' perceptions of adaptive support were independent of gender. Pol et al. (2022) also determined a similar result. In studies examining teacher support, students' mathematics achievements do not differ by gender (Dagoc & Tan, 2018; Wang et al., 2020). This result may be because teachers' adaptive support does not differ by gender. Regarding grade level, a significant difference was found in one of the sub-factors of adaptive support, "support with very little teacher regulation based on low student understanding". In this context, it was observed that students in upper grades perceived that the teacher provided less adaptive support to students with low achievement. This situation can be explained by the increase in students' perceptions that teacher support decreases due to the decrease in affective support based on the structural model. Studies have also stated that in the years following the transition to secondary school, students' perceptions of teacher support declined (Lazarides et al., 2019; Rice et al., 2012; Wit et al., 2010). According to Eccles and Roeser (2009), the decline in teacher support may be linked to students' decreased academic interest after transitioning to upper grades. This might be due to the new organizational structures (i.e., attendance) that hinder close relationships between students and teachers (Wit et al., 2010). However, according to Tao et al. (2022), teacher support had a stronger impact on upper-secondary students than lower-upper and elementary students due to high-stakes testing and accountability in upper-secondary schools.

For the perceived affective support, it was found that there was a significant difference according to both gender and grade level of the students. Regarding gender, it was determined that female students perceived affective support more positively than male students. Various studies have found that in some regions, girls perceive learning environments more positively than boys (Fusco, 2008), while in some regions, boys perceive more affective support than girls (Kim et al., 2000). As Sakız (2017) stated, this situation can be associated with cultural differences. There are findings that perceived affective support decreases in the upper grades. In this context, it can be claimed that the learning environment is perceived more positively in smaller classes. These results are also supported by the studies of Demaray and Malecki

(2002) and Rice et al. (2012). Demaray and Malecki (2002) and Rice et al. (2012) found that primary school students perceived support more positively than secondary and high school students. In this study, this difference was found between the fifth and upper grades for secondary school students. Thus, this study analyses and extends the results of previous studies in more depth.

Conclusions and Suggestion

Perceived teacher support positively affects mathematics achievement. So, defining the concept of perceived teacher support is important. This study identifies the factors contributing to teacher adaptive support in mathematical classrooms. Based on the results, there is a significant correlation between affective support and adaptive support. In addition, it was determined that students' perceptions of adaptive support were independent of gender. In terms of grade level, it was observed that students in higher grades perceived that the teacher provided less adaptive support to students. There was a significant difference in perceived affective support based on both the gender and grade level of the students. It may be important to encourage teachers to eliminate gender and grade level differences in terms of affective support because a significant part of students' perceptions that they receive adaptive support are explained by affective support. It is thought that increases in perceived affective support will positively affect adaptive support. Therefore, corrective measures can be taken for students' perceptions of support at gender and grade level. The teacher factor is important in supporting students in mathematics classes, and it is recommended that studies on teachers' perceptions of supporting students should also be conducted. One limitation of this study is that students' perceptions of support were measured rather than actual support. Differences may occur between students' perceptions of support and actual support scores. It may be interesting to analyse the study questions with actual support scores and compare them with perceived support scores. Moreover, the study comprises numerical outcomes, and upcoming studies can explore this matter from a qualitative perspective.

Compliance with Ethical Standards

Disclosure of potential conflicts of interest

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CRediT author statement

The study was single authored and the whole process was carried out by the corresponding author.

Research involving Human Participants and/or Animals

The study involves human participants. Ethics committee permission was obtained from Erzincan Binali Yıldırım University, Educational Sciences Ethics Committee. (Reference number: E88012460-050.01.04-244148; Date: 28/02/2023).

Ortaokul Öğrencilerinin Bakış Açısından Matematik Öğretmenlerinin Uyarlamalı ve Duyuşsal Desteği

Özet:

Bu araştırmada matematik derslerinde öğrenciler tarafından algılanan duyuşsal desteğin uyarlanabilir desteğe etkisinin ve her iki destek biçiminin bazı değişkenler açısından incelenmesi amaçlanmıştır. Bu araştırmada korelasyonel araştırma yöntemi kullanılmıştır. Çalışma ortaokul öğrencileri ile yürütülmüştür. Uyarlanabilir destek ve duyuşsal destek algısını ölçen iki adet ölçek kullanılmıştır. Öğrencilerin destek algıları arasındaki ilişki bir yapısal eşitlik modeli ile açıklanmıştır. Elde edilen sonuçlara göre duyuşsal destek uyarlanabilir destek ile doğrudan ve anlamlı bir ilişki içindedir. Ayrıca öğrencilerin uyarlamalı destek algılarının cinsiyet değişkeninden bağımsız olduğu tespit edilmiştir. Sınıf seviyesi açısından bakıldığında, üst sınıflarda bulunan öğrencilerin öğretmenin düşük başarıya sahip öğrencilere daha az uyarlanabilir destek verdiği algısına sahip oldukları görülmüştür. Algılanan duyuşsal destek için ise öğrencilerin hem cinsiyete hem de sınıf düzeyine göre anlamlı farklılık olduğu tespit edilmiştir.

Anahtar kelimeler: Uyarlamalı destek, duyuşsal destek, öğrenci algısı.

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