

Article

Assessment of the Relationships between Prospective Mathematics Teachers' Classroom Management Anxiety, Academic Self-Efficacy Beliefs, Academic Amotivation and Attitudes toward the Teaching Profession Using Structural Equation Modelling

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Abstract: Academic self-efficacy, academic amotivation, attitude toward the teaching profession, and classroom management anxiety are four of the most significant factors for both teacher training and performance because these psychological and behavioral constructs are first developed during the initial training, and reflect on the actual teaching quality of teachers. Therefore, investigation into their development and relationships, particularly with regard to prospective teachers, is significant both for the theory and practice of teaching. Hence, the current study aims to explore the casual relationships between these variables with a sample of prospective mathematics teachers, using the structural equation modelling (SEM). The participants were selected using simple random sampling method from prospective mathematics teachers studying at educational faculties of seven universities in different regions of Turkey. The data were collected using the academic amotivation scale, academic self-efficacy scale, attitude toward the teaching profession scale, classroom management anxiety scale, and a personal information form developed by the researchers. Data obtained from 581 participants were analyzed using path analysis. The findings showed that prospective mathematics teachers had a positive attitude toward the profession, and were eager to teach. Their academic self-efficacy predicted their attitude toward the teaching profession. Similarly, prospective mathematics teachers' attitude toward the teaching profession correlated negatively with their academic amotivation. In other words, as prospective mathematics teachers' attitude scores toward the profession increased, their academic amotivation scores decreased. However, prospective mathematics teachers had a high level of classroom management anxiety. Interestingly, prospective mathematics teachers with a positive attitude toward the profession experienced higher levels of classroom management anxiety. The findings mostly supported previous results in the literature. Implications were suggested both for teacher training and practice of quality teaching.

Keywords: academic self-efficacy; classroom management anxiety; academic amotivation; attitude toward the teaching profession; prospective teachers; structural equation modelling

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1. Introduction

Teaching profession is considered as one of the challenging professions that requires creativity, patience, field expertise, teaching capability, and leadership as well as field-specific knowledge and skills [1,2]. Therefore, the rigorous and functional design of teacher

education programs is of great significance. One of the central discussions on teacher education today is the need for redesigning these programs so as to enable teachers to meet the changing demands of the 21st century and to adapt to their new roles in the face of the global changes. With this regard, equipping prospective teachers with the knowledge, skills, and expertise to cope with the ever-changing expectations and roles in the contemporary schooling environments is of crucial significance [3]. As emphasized by Ünsal [4], the roles and responsibilities of teachers vary depending on changes in the social structure and parent-student profile, new approaches in the field of educational science, legal regulations, and advances in science and technology. Social, economic, and political developments that have challenged classical educational approaches have undoubtedly had implications for teacher education programs [5]. Hence, updates in teacher education programs have been obligatory in recent years and there has been a significant increase in the number of scientific studies calling for such changes [6]. Several of these studies have also focused on the psychological aspect of the teaching profession both before and during the service, and drawn attention to the significance of understanding these psychological factors in developing prospective teachers' success in the profession.

Perceived self-efficacy, attitude toward the teaching profession, and classroom management anxiety are among these psychological factors that are frequently studied in the educational research field. Self-efficacy in the current study refers to prospective teachers' confidence in their abilities, and prospective teachers need to have strong efficacy beliefs to continue teaching [7]. Self-efficacy beliefs are believed to play an active role in the interpretation and assimilation of the information presented in teacher training programs [8]. Attitude toward the teaching profession, and academic amotivation, on the other hand, are two of the significant variables that can affect success in teaching profession. Lack of motivation, or amotivation as used in the current study, is recognized as an important problem for teacher and student success. A high level of academic amotivation can also lead to feelings of demoralization, dissatisfaction, and helplessness, which can in turn prevent productivity and emotional well-being [9]. In addition to these variables, classroom management anxiety, which refers to the concerns about maintaining classroom order and performing educational activities more effectively, can also be a significant barrier for successful enactment of teaching profession, and needs to be rigorously addressed during teacher education. Although undergraduate teacher education programs usually offer several courses on classroom management and student attitudes/behaviors, it is still considered that these courses could be insufficient to fully equip prospective teachers with classroom management skills [10].

A comprehensive review of the relevant literature shows that research addressing prospective mathematics teachers' perceived self-efficacy, their attitude toward the teaching profession, their academic amotivation, and their classroom management anxiety, all of which have significant effects on the professional lives of teachers, is very limited. In addition, most of the studies in the literature are based on the opinions of teachers who are on active duty. With this regard, studies addressing the self-efficacy beliefs, the attitude toward the profession, academic motivation/amotivation, and classroom management anxiety of prospective teachers would contribute greatly to our understanding, and some improvements could be made in teacher education programs with this respect.

2. Literature Review

This section offers a conceptual background on the four main variables investigated in the current study: academic amotivation, academic self-efficacy, attitude toward the teaching profession, and classroom management anxiety.

2.1. Academic Amotivation

While some students are willing to solve the problems they encounter in lessons or at school, others avoid seeking solutions to the problems they experience. Motivation comes first among the factors that affect students in the same school to exhibit different

behaviors. Motivation is significant in the effectiveness of the learning-teaching process as it enables students to actively participate in their learning process [11]. Amotivation, on the other hand, is an internal state that describes students' reluctance to participate in classroom instructional activities and being disengaged with the lesson [12–14]. In the case of amotivation, students do not have any reasons to act, and more significantly, amotivation can lead to disappointment, which negatively affect productivity and individual well-being [13]. Leroy and Bressoux [15] emphasize that amotivated students who lack the desire to spend the necessary energy to fulfill the tasks within the course are unlikely to achieve the desired educational outcomes because students with low intrinsic and extrinsic motivation do not feel confident in controlling their learning processes and tend to exhibit inappropriate behaviors that eventually inhibit their learning or achievement of the goals [16].

Amotivation is, in fact, one of the three dimensions of self-determination theory (SDT) developed by Deci and Ryan [17]. The theory defines three types of motivation; intrinsic motivation, extrinsic motivation, and amotivation (no motivation). Intrinsic motivation is a volitional form of motivation which develops over curiosity, self-interest, and enjoyment without requiring any other external incentives while external motivation occurs with the encouragement of an external stimuli or rewards [18,19]. Amotivation, on the other hand, is defined as a unidimensional state that is opposite to both intrinsic and extrinsic motivation [20,21]. As Deci and Ryan [17] (p. 143) initially defined, amotivation is “the relative absence of motivation that is not caused by lack of initial interest but rather by the individual's experiencing feelings of incompetence and helplessness when faced with the activity”.

Banerjee and Halder [20] make some distinctions between demotivation and amotivation while also presenting them as two interrelated constructs. Accordingly, demotivation occurs when external factors reduce the motivation of students rather than some innate reasons such as loss of interest or being allured by alternative task options [22,23]. As a result, a student who was previously motivated to learn could experience feelings of helplessness or incompetency in achieving desired goals, and develop unrealistic beliefs regarding task achievement. Hence, external factors demotivating students could result in negative internal orientations for amotivation [20].

SDT also offers some ways to facilitate motivation, and thus reduces the possibility of amotivation [21,24]. Based on the psychological needs theory which asserts that people act according to three basic needs, i.e., autonomy, competence, and relatedness. Ryan and Deci [18] state that learning environments that could satisfy these basic needs would support intrinsic and extrinsic motivation whilst reducing amotivation. Autonomy relates to “the need to self-regulate one's experiences and actions” [18] (p. 10), and enabling students to exhibit self-endorsed behaviors consistent with their self-interest and personal values could satisfy this need [21]. Competence, on the other hand, refers to the “need to feel effectance and mastery” which can be satisfied by enhancing students' perceived capability and efficacy to perform effectively and attain goals [18] (p. 11). The third basic need, relatedness, is about feeling socially integral to a social group, and could be supported through experiences of being cared by the group members and of contributing to the group [18,21].

Research has proven that academic motivation is the main determinant of academic performance/success, and closely related to an individual's attitude toward academic studies, spending the necessary time and energy, and making the necessary effort to complete academic studies [25]. Academic motivation of prospective teachers is particularly significant not only for their acquisition of teaching knowledge and skills but also for supporting their students' personal and social development in the future [26].

2.2. Academic Self-Efficacy

Self-efficacy, one of the key concepts in Bandura's Social Learning Theory, is an individual's belief that he or she can accomplish a task [27]. Bandura [28] defined self-

efficacy as people's judgments about their ability to organize and exhibit actions that will enable them to achieve a particular task. Studies on self-efficacy have emphasized its cognitive nature [29], and their results showed that students' perceived self-efficacy was positively associated with learning outcomes such as task choice, task persistence, effective student activities, and academic achievement [30–33].

Academic self-efficacy, which is closely related to the concept of general self-efficacy, expresses individuals' belief that they can successfully fulfill the given academic tasks at the specified levels [34,35]. Studies conducted on academic self-efficacy established a direct relation between students' academic self-efficacy and their perceived academic performance, stress, general satisfaction, school attendance, school adjustment, and problem coping behaviors [36]. According to Girelli et al. [37], students with higher academic self-efficacy and intrinsic motivation (as well as low amotivation) had less intention to drop out of university education, which also indicated the positive effect of academic self-efficacy on academic achievement/performance [38–40]. In addition, research revealed positive correlations between self-efficacy and several other variables such as tendency to engage in innovative behaviors [41], positive attitude toward work and teaching profession [42,43], and improved classroom management skills [44].

Academic self-efficacy is also related to student motivation, which is closely linked with students' judgment of their capabilities to learn. As mentioned earlier, amotivation occurs when students' autonomy needs are not satisfied because these students often feel that they lack control over the outcomes of their acts, and attribute these outcomes to environmental factors rather than their own efforts [20,45]. Students' disbelief in their capability to perform behaviors required to reach the desired outcomes, namely low self-efficacy, results in them putting less effort in attaining the goals considering that they are beyond their capacity [46]. As such, investigating the relationship between prospective mathematics teachers' academic self-efficacy and their amotivation could yield significant implications both for their training, and future teaching practice.

2.3. Attitude toward the Teaching Profession

Although the term attitude is defined in several ways in the literature, most of these definitions refer to social psychology studies of Gordon Allport [47,48]. In broader terms, attitude is defined as an individual tendency to evaluate a social phenomenon (an event, a person, or an object) positively or negatively. It is often emphasized that attitudes represent a psychological state that directs the thoughts, feelings, and behaviors of individuals [49–51]. In other words, attitudes are considered to have cognitive, affective, and behavioral aspects, which indicates that people's attitudes toward a person, a phenomenon, or an object could result from their cognitive evaluations as well as their perceptions of certain behaviors or the influence of their emotional states [52]. Accordingly, as Kavgacı [53] exemplified, in the cognitive domain, a prospective teacher with a positive attitude toward the teaching profession might believe that teaching is a socially valued profession, and offers convenient working conditions. In the emotional domain, the same prospective teacher might take pleasure from teaching and helping others to learn something new whilst in the behavioral domain, s/he can encourage other people to choose teaching as a profession.

Research shows that a positive attitude toward the teaching profession influences job performance positively by making the efforts of teachers meaningful [54,55], increases their awareness of their professional responsibilities, and urges them to adhere to teachers' code of professional conduct [56]. Hence, a positive attitude toward the teaching profession is significant for prospective teachers' success and resilience in teaching through enabling them to identify with their profession, to accept its requirements unconditionally, and to develop attachment with love and passion [57]. Indeed, people who do not like their jobs are less likely to enjoy and be successful in that job. Teachers with a positive attitude toward their profession will undoubtedly be more beneficial to their students [58], and studies on teacher attitudes have revealed that teacher effectiveness and in-class performance largely depend on their attitude toward the profession [59,60]. Positive attitudes can

not only encourage learning, but also contribute to the creation of a positive classroom climate [58,61].

Studies also report positive correlations between teachers' positive attitude toward teaching and their motivation to teach as well as their self-efficacy [54]. With regard to prospective teachers, their positive attitude toward the teaching profession could increase their motivation both during their faculty education and when they start working in a school through inoculating love of teaching, commitment to achieving the best performance, as well as social awareness of the profession [62]. On the other hand, developing perceived self-efficacy of prospective teachers could support their positive attitudes as suggested by the results of several studies addressing teachers on service [42,43,48,63–65].

2.4. Classroom Management Anxiety

Classroom management skills are accepted as one of the main competence areas for teachers [66], and have been the subject of many studies [44,67–71]. When performed well, classroom management skills affect teaching-learning positively; yet, poor classroom management may cause significant negative outcomes such as teacher attrition [71,72], loss of interest in teaching [73], or poor job performance [74]. In addition, different studies have emphasized that classroom management has significant impact on student success due to teachers' central position with this regard [75,76], and effective classroom management practices improve teacher-student relations with a positive effect on students' cognitive and affective learning outcomes [77]. Hence, classroom management is often considered to be a determining factor in the execution of in-class teaching as well as the development of healthy student-teacher relationships. Therefore, classroom management skills should be an integral part of under-graduate teacher education programs [78] since the mysterious nature of classroom management can cause prospective or novice teachers to experience classroom management anxiety. However, it is emphasized that the importance given to classroom management is insufficient in teacher education curricula and much research is necessary to reflect on the training and execution of classroom management skills [79] since it supports positive interactions that will help create an effective classroom environment for teachers/students [80].

Although there are many studies addressing classroom management in the literature, the strategic issues that may cause prospective teachers to feel unprepared to manage their own classrooms in the future have not been adequately researched. Mireles-Rios et al. [81] state that teachers experience uncertainty about classroom management practices and they need support in this regard. Without sufficient training and support, classroom management anxiety may arise. Classroom management anxiety, which is a concern experienced by in-service or prospective teachers while trying to manage their classrooms, may be related to both personal characteristics and professional competencies. With regard to professional competence, reasons such as lack of knowledge about classroom management and lack of sufficient practical experience may cause classroom management anxiety [82]. Similarly, classroom management skills are often cited as one of the defining components of teacher self-efficacy, and the teachers with higher self-efficacy are found to perform greater classroom management [83,84] while lower efficacy beliefs are likely to cause negative outcomes such as increased anxiety. Considering the significant and broad impact of classroom management on both teacher and student performance, investigations into prospective teachers' classroom management anxiety would yield significant results [85,86].

2.5. The Current Study and the Hypothesis

Self-efficacy, motivation, classroom management anxiety, and attitude toward the teaching profession are significant variables in determining the quality and successful performance of teaching, and thus crucially important for the design of teacher training programs. Although these variables have attracted research interest both with regard to prospective or in-service teachers, only one or two of them were addressed in a single study. To the best of our knowledge, the literature lacks research addressing the relationships

between all these four variables in combination. Considering this gap, the current study developed the following hypothesis regarding the relationships between these four variables based on the theoretical background previously elaborated:

Hypothesis 1 (H1). *Academic self-efficacy has a significant positive effect on the attitude toward the teaching profession.*

Hypothesis 2 (H2). *Academic self-efficacy has a significant negative relationship with academic amotivation.*

Hypothesis 3 (H3). *Attitude toward the teaching profession has a negative relationship with academic amotivation.*

Hypothesis 4 (H4). *Classroom management anxiety has a significant relationship with the attitude toward the teaching profession.*

Hypothesis 5 (H5). *Academic amotivation has a positive relationship with classroom management anxiety.*

Hypothesis 6 (H6). *Academic self-efficacy has a negative relationship with classroom management anxiety.*

Hypothesis 7 (H7). *Attitude toward the teaching profession has an indirect effect on the relationship between academic self-efficacy and academic amotivation.*

3. Materials and Methods

3.1. Study Design

The current study uses structural equation modeling (SEM) in order to test the causal relationships between academic amotivation, academic self-efficacy, attitude toward the teaching profession, and classroom management anxiety of prospective mathematics teachers. SEM combines different methods of analysis such as multiple regression, path analysis, and factor analysis, and confirms the causality between various variables [87]. SEM has the flexibility to model relationships between multiple variables, and causal relationships between variables are tested in this model [88]. One of the strengths of SEM is that the causal processes under investigation are represented by a set of structural (such as regression) equations, and these structural relationships can be modelled pictorially to provide a clearer conceptualization of the theory under study [89]. The conceptual model tested in the current study is shown in Figure 1.

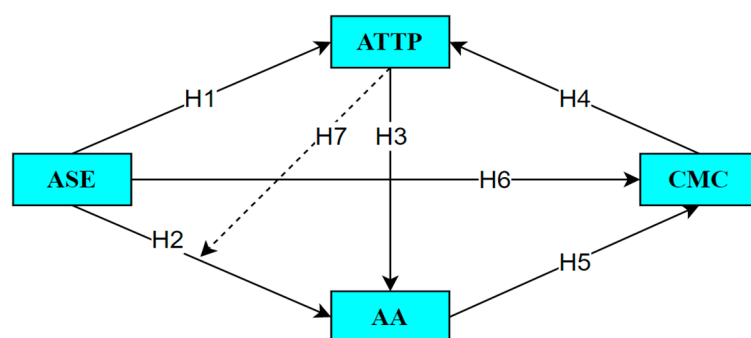


Figure 1. Hypothesized relationships of the research model [ASE = academic self-efficacy; AA = academic amotivation; ATTP = Attitude toward the teaching profession; CMC = classroom management concerns].

3.2. Participants

The current study was conducted with the participation of the third and fourth grade students studying at the Primary School Mathematics Teaching Departments of Educational Faculties at seven universities located in different regions of Turkey (Firat University,

Kutahya Dumlupinar University, Dicle University, Kahramanmaraş Sutcu Imam University, Bartın University, Atatürk University, and Inönü University) during the 2021–2022 academic year. The target population of the research consists of 7894 students, and the accessible population consists of 670 students. Therefore, 600 students were selected using the simple random sampling method. After the initial data collection process, data returned by 19 students were excluded from the data set because they had extreme values. Hence, a total of 581 prospective mathematics teachers were included in the final sample.

During sample selection, researchers also paid particular attention to including sufficient number of participants in the sample since SEM is sensitive to sample size [90] (pp. 11–12). It was stated that the sufficient sample size can be calculated roughly by multiplying the total number of items used to collect data on the study variables by 10 [91]. Accordingly, we concluded that a sample size of at least 580 participants would be sufficient for this study as our data collection instrument had a total of 58 items. Considering that some instruments could be improperly filled, or left incomplete, slightly higher number of participants were included in the final sample. Demographic variables for the study sample are presented in Table 1.

The participants for the study were particularly selected from the third and fourth grade students because in Turkey, prospective teachers start contacting real-life classroom environments during these last two years of their faculty training. In addition, many of the professional courses such as instruction and curriculum or classroom management are offered during these two years. Therefore, these prospective teachers were a better target for the current study.

3.3. Data Collection and Data Analysis

3.3.1. Research Instruments

The data were collected using the academic motivation scale (AA), academic self-efficacy scale (ASE), attitude toward the teaching profession scale (ATTP), classroom management anxiety scale (CMC), and a personal information form developed by the researchers. The scales used in the study were reviewed and their application was approved by the Social and Human Sciences Research Ethics Committee of Firat University, with legal permission granted for the study to be performed with undergraduate students (Permit no: 2022-12171).

Academic Amotivation Scale (AA)

The academic amotivation scale (AA) was developed by Legault et al. [13], and the scale was adapted into Turkish culture by Ilter [9]. After the Turkish translation of the scale, exploratory factor analysis and confirmatory factor analysis were performed to test its validity and internal consistency (Cronbach's Alpha), and test-retest coefficients were calculated to test reliability. The model for the scale consisting of 16 items and four factors (i.e., Task Value, Talent Beliefs, Task Characteristics and Effort Beliefs) showed good fit as the results of the confirmatory factor analysis showed [$\chi^2 = 127.54$, $DF = 98$, $RMSEA = 0.041$, $SRMR = 0.044$, $GFI = 0.92$, $AGFI = 0.89$, $CFI = 0.97$, $NFI = 0.90$]. The internal consistency coefficient of the whole scale was calculated as 0.84, and the test-retest coefficient as 0.80. There were no reverse coded items in the scale.

Academic Self-Efficacy Scale (ASE)

The academic self-efficacy scale (ASE) was developed by Jerusalem et al. [92], and the original form was in German. The scale was adapted into Turkish culture by Yılmaz et al. [93]. The Cronbach's Alpha reliability value was calculated 0.87. The factor analysis of the scale adapted into Turkish showed that the scale was unidimensional like the original scale and consisted of a total of seven items. The last item of the scale was reverse coded.

Table 1. Sociodemographic profile of the respondents.

Variable			f	Total (n = 581)	(%)
Institution	Description				
	Class	Gender			
Atatürk Univ.	3	Female	21	96	16.52
		Male	26		
	4	Female	24		
		Male	25		
Bartın Univ.	3	Female	17	85	14.63
		Male	24		
	4	Female	14		
		Male	30		
Dicle Univ.	3	Female	15	69	11.88
		Male	20		
	4	Female	12		
		Male	22		
Kutahya Dumlupınar Univ.	3	Female	14	75	12.91
		Male	22		
	4	Female	10		
		Male	29		
Fırat Univ.	3	Female	20	96	16.52
		Male	26		
	4	Female	17		
		Male	33		
İnönü Univ.	3	Female	13	84	14.46
		Male	20		
	4	Female	17		
		Male	34		
Kahramanmaraş Sutcuimam Univ.	3	Female	11	76	13.08
		Male	18		
	4	Female	16		
		Male	31		

Attitude toward the Teaching Profession Scale (ATTP)

The structural features of the attitude toward the teaching profession scale (ATTP) initially developed by Kahramanoğlu et al. [94] was first tested using exploratory factor analysis (EFA). To enable face and content validity, expert opinions were taken over the items, and concordance validity was tested through correlation values between the ATTP scale and another scale from the literature. The analysis revealed a significant positive correlation between both scales, which confirmed the concordance validity of the ATTP scale. The internal consistency coefficients were calculated to test reliability. The KMO value of the scale was 0.873, and the Bartlett test was statistically significant ($\chi^2 = 1465.611$, $SD = 78$, $p < 0.01$). These results showed that the scale was appropriate to apply EFA. First, the factor loading values of the items were evaluated, and items with a value below 0.45 were eliminated. These procedures yielded the final form of the scale, which was unidimensional and consisted of 12 items. The scale explained 57.597% of the total variance. There were no reverse coded items in the scale.

Classroom Management Concerns Scale (CMC)

The classroom management anxiety scale (CMC) was developed by Özkul et al. [95]. The scale consisted of three dimensions and twenty-three items in total. The factor loads of the items in the scale ranged from “0.449” to “0.828”. The total variance explained by the scale was 65,835%. The fit index values obtained from the confirmatory factor analysis (CMIN = 449.78, df = 221, RMSEA = 0.053, GFI = 0.91, AGFI = 0.88, CFI = 0.96, NFI = 0.93, IFI = 0.96, RMR = 0.044) demonstrated its validity. The Cronbach’s Alpha internal consistency coefficient of the scale was calculated as 0.960, which indicated that the scale was highly reliable. The test-retest reliability coefficient (0.827), which was calculated using data obtained from 30 prospective mathematics teachers with an interval of two weeks, showed that the scale was consistent over time. There were no reverse coded items in the scale.

3.3.2. Data Analysis

The data were collected electronically via Google forms, and were transferred to SPSS 22.0 data analysis program. AMOS 22.0 and SPSS 22.0 package programs were used to perform analysis. Maximum likelihood method was applied in AMOS package program. Sample size, multicollinearity problem, normality, and extreme values, which are the prerequisites of SEM analysis, [96] were initially calculated. First of all, data from 19 forms, whose Z score values of the variables were not between -1 and $+1$, were excluded from the data set because they were outliers. In the next step, a correlation analysis was performed to determine whether there was a multicollinearity problem between the variables. If the correlation values are below 0.90, it can be said that there is no multicollinearity problem [96]. The correlations between the variables were evaluated, and correlation coefficients were found to be below 0.90 (see Table 2), which confirmed that there was no multicollinearity problem between the variables. In order to determine whether there was a multicollinearity problem, the VIF and tolerance values of the independent variables were also evaluated and it was determined that these values did not cause multicollinearity problems. The normal distribution of the data is another prerequisite for SEM analysis, so we also performed normality tests. For this purpose, the Skewness and Kurtosis values of the variables were evaluated and it was determined that the data set exhibited a normal distribution, as the calculated values were between the expected range (e. g. -2 and $+2$) [97,98].

Table 2. Correlation values between scales.

Scale	AA	ASE	ATTP	CMC
Academic Amotivation (AA)	1	−0.399	−0.394	0.075
Academic Self-Efficacy (ASE)		1	0.177	−0.001
Attitude toward the Teaching Profession (ATTP)			1	0.342
Classroom Management Concerns (CMC)				1

Considering that the data were normally distributed, the sample size was sufficient, and linearity and multicollinearity problems were not observed, the covariance matrix and maximum likelihood methods were used in testing the structural model with the measurement models. In the analysis of the data, first, the measurement models of academic self-efficacy (ASE), academic amotivation (AA), attitude toward the teaching profession (ATTP), and classroom management anxiety (CMC) variables were tested with confirmatory factor analysis (CFA). Whether the measurement models were confirmed was evaluated with Chi-square (χ^2)/sd, GFI, AGFI, CFI, RMSEA, IFI, and TLI (NNFI) fit indices. The specified fit indices were also used to evaluate whether the proposed hypothetical model was confirmed.

4. Results

The relationship between the instruments used in the study was evaluated with Pearson correlation analysis and the results are presented in Table 2.

Table 2 shows that academic amotivation correlates negatively with academic self-efficacy ($r = -0.399$, $p < 0.01$), negatively with attitude toward the teaching profession ($r = -0.394$, $p < 0.01$), and positively with classroom management anxiety ($r = 0.075$, $p < 0.01$). A statistically significant correlation was found between academic self-efficacy and attitude toward the teaching profession ($r = 0.177$, $p < 0.01$), and a negative correlation between academic self-efficacy and classroom management anxiety ($r = -0.001$, $p < 0.01$). Finally, a significant positive correlation was found between attitude toward the teaching profession and classroom management anxiety ($r = 0.342$, $p < 0.01$). As can be seen, the correlations between the variables vary between -0.394 and 0.342 , which indicates that there is no multicollinearity problem.

It was also evaluated whether there was a multicollinearity problem between the independent variables in the measurement model. Multicollinearity can cause erratic estimates and erroneous variances that affect confidence intervals and hypothesis testing. Evaluation of the correlation matrix may be helpful in detecting multicollinearity, but it is not sufficient [88]. Examining VIF (Variance Inflation Factor) and Tolerance values are among the preferred methods to evaluate whether there is multicollinearity among the variables. The tolerance value should not be less than 0.1, and thus the VIF value should not be greater than 10 [96,99]. VIF and Tolerance values of the independent variables are presented in Table 3.

Table 3. VIF and Tolerance values of the arguments.

Scale	VIF	Tolerance
CMC	1.527	1.396
ASE	1.536	1.394

Table 3 shows that there is no multicollinearity problem among the variables evaluated in the study. In addition, skewness and kurtosis values were evaluated to determine whether the research data exhibited a normal distribution. Skewness and kurtosis values are expected to be between -2 and $+2$ to confirm the normal distribution of the data [97,98]. The mean, standard deviation, skewness and kurtosis values of the variables in the measurement model are presented in Table 4.

Table 4. Mean, standard deviation, skewness, and kurtosis values of the scales (N = 578).

Scale	Min	Max	$\bar{X}$	SD	Skewness	Kurtosis
AA	1.00	5.56	2.41	1.17	0.698	-0.565
ASE	1.71	4.14	2.99	0.497	-0.027	0.120
ATTP	2.00	5.00	4.14	0.557	-0.634	0.398
CMC	2.14	5.00	3.96	0.660	-0.523	-0.192

Table 4 shows that the skewness and kurtosis values for each variable in the study are within acceptable limits and the data exhibits a normal distribution. Moreover, academic amotivation scores range from 1 to 5.56, and the opinions of the participants have an average point value of 2.41 (SD = 1.17). The academic self-efficacy scores are between 1.71 and 4.14, and the arithmetic mean score for academic self-efficacy is $\bar{X} = 2.99$, with a standard deviation value of 0.497. Scores on the scale of attitude toward the teaching profession vary between 2.0 and 5.0, and the arithmetic mean value is $\bar{X} = 4.14$, with a standard deviation score of 0.557. The results indicate that participants have a positive attitude toward the teaching profession. Scores on classroom management anxiety vary

between 2.14 and 5.00, and have an arithmetic mean score of 3.96, with a standard deviation score of 0.660. It is noteworthy that the participants' views on classroom management anxiety is quite high.

The scores for the attitude toward the teaching profession and for classroom management anxiety are very close. The high scores on the attitude toward the teaching profession are pleasing with regard to its potential positive contribution to the education system. The higher scores for classroom management anxiety, on the other hand, might indicate that classroom management courses could not be sufficient for them to build confidence in these skills or they may have experienced classroom management anxiety after they engaged in practice teaching in a real classroom setting during their internship. In fact, classroom context is often defined with a living organism metaphor to indicate its ever-changing and unique nature, and in these circumstances, offering a standardized prospectus for classroom management is almost impossible. As a result, higher levels of classroom management anxiety could be understood during the initial contact of prospective mathematics teachers with real classroom context. The arithmetic mean score of the academic self-efficacy scale calculated as $\bar{X} = 2.99$ is another significant finding, which might indicate that courses offered in these education faculties were not sufficient to support the academic self-efficacy of prospective mathematics teachers.

4.1. Assessment of Measurement Model

The confirmatory factor analysis (CFA) of the measurement tools used in SEM research need to be repeated with the existing data set. Construct validity was evaluated using mean variance (AVE) and composite reliability (CR). The composite reliability (CR) score should be greater than the acceptable value of 0.7 for all factors and the mean variance (AVE) extracted for all variables should be greater than 0.5 [100,101]. AVE and CR values are presented in Table 5, and fit indices are presented in Table 6.

Table 5. Cronbach's Alpha, CR, and AVE scores of the scales.

Constructs	Cronbach's Alpha	CR	AVE
AA	0.936	0.940	0.510
ASE	0.873	0.902	0.571
ATTP	0.859	0.920	0.512
CMC	0.953	0.973	0.533

Table 6. Confirmatory factor analysis results of the scales.

Scale	χ^2/df	GFI	AGFI	IFI	TLI	CFI	RMSEA
AA	2.126	0.904	0.902	0.948	0.937	0.947	0.077
ASE	2.102	0.960	0.914	0.963	0.938	0.962	0.076
ATTP	3.337	0.899	0.898	0.923	0.907	0.926	0.078
CMC	2.971	0.906	0.902	0.916	0.904	0.916	0.079

Table 5 shows that Cronbach's Alpha scores range from 0.859 to 0.953. AVE scores are above 0.50, and CR scores are above 0.70 for each construct. These results indicate the consistency of the constructs, and show that the scales used in the research have convergent validity.

The academic amotivation scale (AA) consists of 16 items and four dimensions: "Task Value", "Talent beliefs", "Task characteristics" and "Effort beliefs". The measurement model of the academic amotivation scale (AA), which includes 4 items in each dimension, was tested with the second level CFA. All the paths related to the items and dimensions in the scale were found to be statistically significant at the 0.01 level. The fit index values are as follows: $\chi^2/df = 2.126$, GFI = 0.904 AGFI = 0.902, IFI = 0.948, TLI = 0.937, CFI = 0.947,

and RMSEA = 0.077. The CFA results show that the χ^2/sd value is in the perfect fit range, and the GFI, IFI, TLI, CFI, RMSEA values are in the acceptable range.

The academic self-efficacy scale (ASE) consists of 7 items. With the first level CFA, all the paths except the 7th item in the scale were found to be statistically significant at the 0.01 level. The fit index values for the scale were calculated as $\chi^2/\text{df} = 2.102$, GFI = 0.960, IFI = 0.963, CFI = 0.962, all values are in perfect agreement, and AGFI = 0.914, TLI = 0.938, and RMSEA = 0.076 are in the acceptable range.

Attitude toward the teaching profession scale (ATTP) is unidimensional with 12 items. With the first level CFA, all the paths related to the 12 items in the scale are statistically significant at the 0.01 level. The fit index values for the attitude toward the teaching profession scale were calculated as $\chi^2/\text{df} = 3.337$, GFI = 0.899, AGFI = 0.898, IFI = 0.923, TLI = 0.907, CFI = 0.926, and RMSEA = 0.078. These results indicate that the values of fit indices are in the acceptable range.

The classroom management anxiety scale (CMC) is a 23-item and three-dimensional scale, and the measurement model was tested with the second-level CFA. All the paths related to 23 items and three factors in the scale are significant at the 0.01 level. The CFA results indicate a perfect fit with fit index values of $\chi^2/\text{df} = 2.971$, GFI = 0.906, AGFI = 0.902, IFI = 0.916, TLI = 0.904, CFI = 0.916, and RMSEA = 0.079. As can be seen, the χ^2/df value shows a perfect fit, and the GFI, AGFI, IFI, TLI, CFI, and RMSEA values are within the acceptable range.

4.2. Assessment of the Structural Model

In line with the purpose of the research, the hypothetical model shown in Figure 1 was tested by SEM. In other words, the relationships between academic motivation (AA), academic self-efficacy (ASE), attitude toward the teaching profession (ATTP) and classroom management anxiety (CMC) were analyzed using SEM. Before the model was tested, the modifications made in the measurement models to increase the fit indices of the scales were included in the model. Apart from these modifications, no other modifications were deemed necessary in the model. As a result of the analysis, the standardized path coefficient between the academic self-efficacy scale (ASE) and the academic amotivation scale (AA) was found to be -0.40 , and the standardized path coefficient with the attitude toward the teaching profession scale (ATTP) was 0.19 . The standardized path coefficient between the attitude toward the teaching profession scale (ATTP) and the academic amotivation scale (AA) was -0.37 , and the standardized path coefficient with the classroom management anxiety scale (CMC) was 0.31 . All the other paths were found to be statistically significant at the 0.01 level.

The fit indices for the hypothetical model were calculated as $\chi^2/\text{df} = 1.961$, GFI = 0.898, AGFI = 0.897, IFI = 0.927, TLI (NNFI) = 0.938, CFI = 0.949, and RMSEA = 0.071. The calculated values indicate that the fit indices for the model are in the acceptable range. As a result, it can be said that the proposed hypothetical model is confirmed. Structural equation modelling tested in the study is shown in Figure 2.

As it can be seen on Table 7 that the standardized regression coefficient between academic self-efficacy and attitude toward the teaching profession is 0.19 , which indicates that the increase in the academic self-efficacy scores of prospective mathematics teachers will also increase the scores of their attitude toward the teaching profession. In other words, there is a positive and statistically significant relationship between these two variables. Prospective mathematics teachers' academic self-efficacy explains 14.50% of the total variance of their attitudes toward the teaching profession. Kline [90] stated that an effect size of around 0.10 is considered small, around 0.30 moderate, and around 0.50 large. Accordingly, the standardized regression coefficient between both variables indicates a small effect size. However, the results confirm that the academic self-efficacy of prospective mathematics teachers positively and significantly predicts their attitude toward the teaching profession.

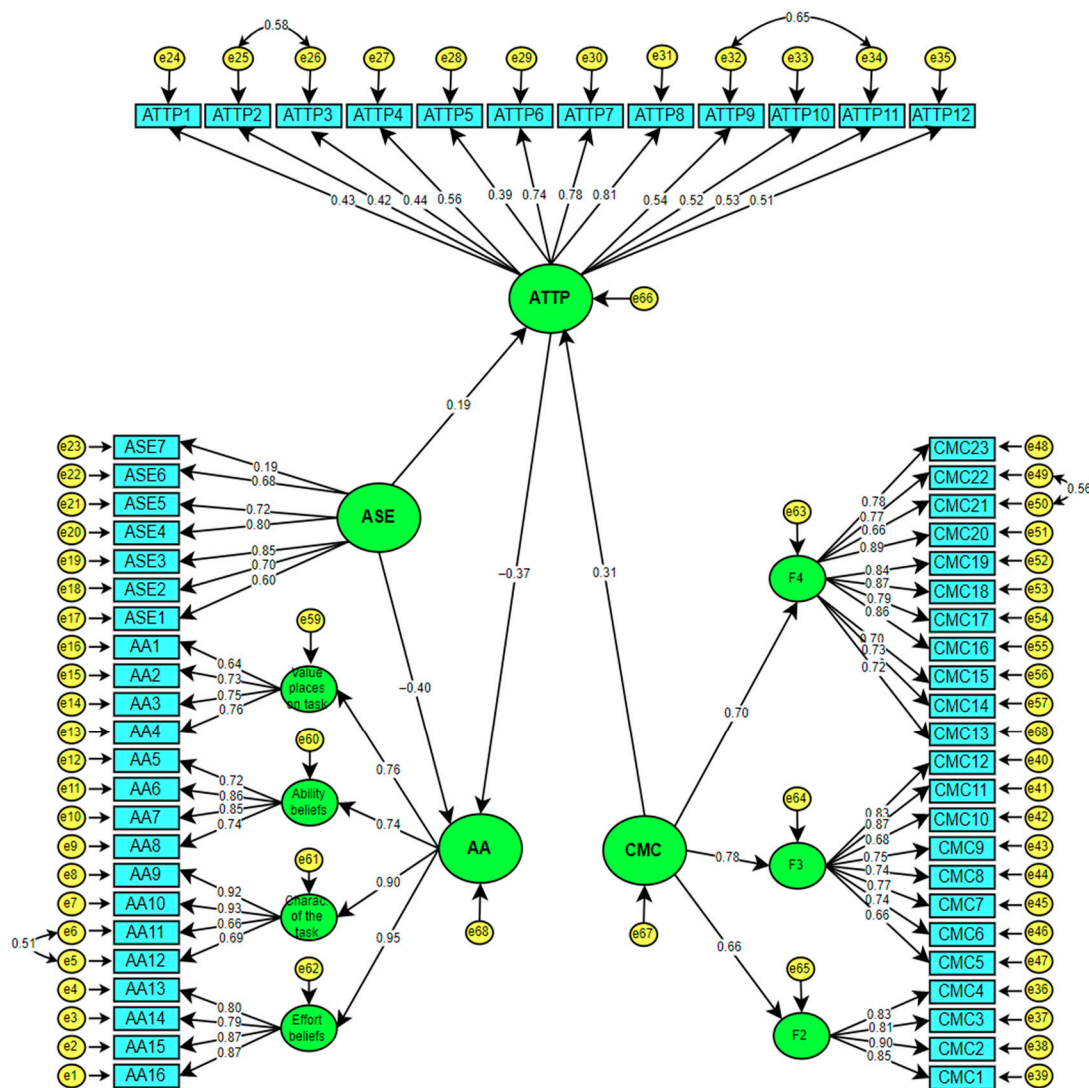


Figure 2. Final hypothesized model used in the research scenario.

Table 7. Values of variance explained, standard error, t , p , and standardized regression coefficients.

			Estimate	SE	<i>t</i>	<i>p</i>	β
ATTP	←	ASE	0.133	0.061	0.328	***	0.191
AA	←	ASE	−0.772	0.171	5.355	***	0.404

*** $p < 0.01$.

The standardized regression coefficient between the academic self-efficacy levels of prospective mathematics teachers and their academic amotivation levels is -0.40 , which indicates that there is a negative correlation between academic self-efficacy and academic amotivation. These results show that the decrease in the academic amotivation of prospective mathematics teachers causes an increase in their academic self-efficacy. Prospective mathematics teachers' academic self-efficacy explains the 33.90% of total variance in their academic amotivation. The standardized regression coefficient between both variables indicates the presence of a moderate effect size. This result shows that prospective mathematics teachers' academic self-efficacy predicts their academic amotivation negatively and significantly.

In Figure 2, the standardized regression coefficient between attitude toward the teaching profession and academic amotivation is shown as -0.37 , which shows that there is

a negative correlation between these two variables. In other words, the increase in the scores of the prospective mathematics teachers' attitude toward the teaching profession causes a decrease in the scores of their academic amotivation. A standardized regression coefficient of -0.37 means that the effect size is moderate in the relationship between both variables. Prospective mathematics teachers' scores on the attitude toward the teaching profession explain the 33.90% of total variance in their academic amotivation. In light of these results, it can be said that prospective mathematics teachers' attitude toward the teaching profession predicts their academic amotivation negatively and significantly.

Figure 2 also shows that the standardized regression coefficient between prospective mathematics teachers' classroom management anxiety and their attitude toward the teaching profession is 0.31. Classroom management anxiety explains 32.8% of the total variance of their attitude toward the teaching profession. These results indicate that there is a positive and moderate relationship between prospective mathematics teachers' classroom management anxiety and their attitude toward the teaching profession. The result might imply that despite their classroom management anxiety, prospective mathematics teachers put effort in overcoming their anxiety and maintain their positive attitude toward the teaching profession. In addition, prospective mathematics teachers begin to observe or practice in-class teaching during the third and fourth years of teaching, and their first encounter with the real classroom settings could have increased their classroom management anxiety.

As presented in Table 8, there is a direct correlation between prospective mathematics teachers' academic self-efficacy (ASE) levels and their academic amotivation (AA) levels, and between their academic self-efficacy (ASE) levels and their attitude toward the teaching profession (ATTP). However, when the mediating effect of the attitude toward the teaching profession (ATTP) in the relationship between academic self-efficacy (ASE) and academic amotivation (AA) was analyzed, it was found that the attitude toward the teaching profession (ATTP) did not have a direct effect on these variables ($\beta = 0.071$; $t = -0.538$; $p = 0.031 > 0.01$).

Table 8. Findings on direct and indirect relationships between variables.

	Result Variables					
	ATTP			AA		
	β	SE	p	β	SE	p
ASE	0.191	0.061	***			
R ²		0.437				
ASE				0.404	0.171	***
R ²					0.610	
ASE	0.106	0.060	$p = 0.031$			
AA	-0.135	0.169				
R ²		0.101				
Indirect effect		-0.071				

*** $p < 0.01$.

5. Discussion

The current study evaluated the relationships between prospective mathematics teachers' academic amotivation, academic self-efficacy, attitude toward the teaching profession, and classroom management anxiety. The structural equation model (SEM) was used to determine the hypothetical relationships between the variables and the conceptual model was tested using the path analysis.

The findings showed that prospective mathematics teachers' attitude toward the teaching profession was considerably positive, which indicated that these prospective mathematics teachers had a significant intention to practice teaching profession. Eroglu and Unlu [102] also observed eagerness to perform teaching profession in their study on

a similar group of prospective teachers. These findings are significant considering that positive attitude toward the teaching profession or the willingness to do this profession is key to effective classroom management [103]. Yet, the current study revealed that prospective mathematics teachers experienced a high level of classroom management anxiety. In fact, past research supports this finding indicating that classroom management was a major concern for both prospective and novice teachers. Novice teachers often reported that classroom management issues led to poorer teaching performance, and thus they needed more support to employ better classroom management [82]. On the other hand, classroom management is considered to be a core competence in teaching profession [67,104] since achievement of instructional goals depends heavily on a teachers' capability to perform effective classroom management and to take best care of students in the classroom [84,105,106]. Effective classroom management is key to creating the positive learning environment necessary for the cognitive and affective development of students [83,107,108]. For this reason, it would be beneficial to develop prospective mathematics teachers' classroom management skills starting from the early phases of teacher training so that they are better equipped to cope with their classroom management anxiety [67]. As emphasized by Eranil et al. [109], revising the teacher education curricula in education faculties in order to better develop the classroom management competencies of prospective teachers, and preparing more realistic guidelines for the enhancement and evaluation of prospective mathematics teachers' school practice experiences could help achieve better results in this regard.

The current study also revealed a statistically significant relationship between prospective mathematics teachers' academic self-efficacy and their attitude toward the teaching profession. The academic self-efficacy of these prospective mathematics teachers was found to positively and significantly predict their attitude toward the teaching profession. There are other studies in the literature that support our findings. For instance, in the study conducted by Üstüner [110], the self-efficacy beliefs of prospective teachers were determined to have a positive effect on their attitude toward the teaching profession. In the same study, it was stated that implementation of a teacher training curriculum that would enhance prospective mathematics teachers' self-efficacy would also help develop a more positive attitude toward the teaching profession. In the same vein, a significant relationship between prospective mathematics teachers' self-efficacy beliefs and their attitude toward the teaching profession was determined by several studies [42,54,56,111]. Based on their findings, these researchers also emphasized that improving students' self-efficacy would help improve their attitude toward the teaching profession. In another study, Özgenel and Deniz [112] concluded that the attitudes of education faculty students toward the teaching profession significantly predicted their academic self-efficacy levels, and the positive attitude of these students was associated with their willingness and commitment to practicing the profession in the future. The researchers underlined that teachers with a positive attitude toward the teaching profession and a high level of academic self-efficacy can maximize the quality of their instruction.

With regard to academic self-efficacy and academic amotivation, the current analysis revealed a negative relationship. In other words, as the academic amotivation of prospective mathematics teachers decreased, their academic self-efficacy increased. The relevant literature provides several findings regarding the relationship between academic self-efficacy and academic (a)motivation [113]. For instance, in the early literature, Pajares [8] stated that there was a strong relationship between students' self-efficacy, motivation and academic achievement. In a recent study conducted by Sivacı and Coplu [114], the academic self-efficacy of university students was found to have a significant effect on their academic motivation. Fulgencio et al. [115] stated that lack of academic motivation resulted in academic failure, and emphasized that lack of motivation negatively affected productivity, caused feelings of disappointment and frustration, and worsened students' general well-being. In fact, motivation is considered one of the fundamental requirements for learning. Cognitive and affective learning as the ultimate goal of education depends much heavily

on students' motivation or lack of motivation [116], and prospective teachers with a high sense of motivation and self-efficacy would be more likely to better support their students' learning process when they start working. Çağırhan and Poyraz [117] support this view, arguing that students perform better when they have teachers with high self-efficacy beliefs based on their research findings. For this reason, particular attention should be given to developing both the motivation and self-efficacy of prospective teachers, and teacher education programs should be carefully designed in this regard.

Another finding of the current study was that there was a negative relationship between prospective mathematics teachers' attitude toward the teaching profession and their academic amotivation. In other words, as prospective mathematics teachers attitude scores toward the teaching profession increased, their academic amotivation scores decreased. Similar findings were also presented by some previous research. For instance, Zembat et al. [118] concluded that prospective teachers with a positive attitude toward the teaching profession had higher motivation scores, and determined that a positive attitude toward the teaching profession was particularly related to intrinsic motivation. They also emphasized that love of teaching predicted prospective mathematics teachers' positive attitude toward the teaching profession [118]. Similarly, the findings of Alkhateeb's [119] research revealed that university students' positive attitude toward the teaching profession was closely related to their liking of children. From the perspective of self-determination theory, these findings support the assumption that the value placed on a task or to the intrinsic/extrinsic rewards provided by its enactment would decrease amotivation and related task-avoidance [18,20]. When this is combined with ability beliefs (i.e., self-efficacy), individuals are considered to become more motivated to perform a certain act. Accordingly, prospective teachers displaying more positive attitudes toward their profession are more likely to value their professional roles and their outcomes, and therefore, to feel more motivated to both develop their professional knowledge and skills, and also to practice the profession in the future. The study by Saks et al. [120] supports the same argument from a different perspective. These researchers found that love of children could not suffice in supporting prospective students' positive attitude toward the profession in the Estonian sample. Their research revealed that education faculty students did not find the teaching profession attractive enough as they perceived it as a difficult and low-paid job, so they displayed lower motivation. These findings, considered altogether, indicate that developing prospective mathematics teachers' attitudes toward teaching as their future job not only depends on their interest and love of children but also the perceived positive image and value of the job. In addition, although early motivation does not guarantee career long motivation, it is still noteworthy that the development of teacher motivation begins during initial teacher education [54,121].

With regard to prospective mathematics teachers' attitude toward the teaching profession, the current study also found that their attitude was positively related to their classroom management anxiety. The finding indicates that prospective mathematics teachers with a positive attitude toward teaching experience higher levels of classroom management anxiety. In fact, this could be a surprising but also an expectable result as anxiety does not always produce negative results, contrary to popular belief; mild or even moderate anxiety can be a driving force that motivates students to do new things and to achieve success [122]. For students, a moderate level of anxiety can motivate them to study and improve their performance. Keskin [123], who determined in his study that prospective teachers had a moderate level of anxiety toward the teaching profession, also supported this argument. Prospective teachers with a moderate level of anxiety could be more likely to make much effort to employ better teaching performance. In addition, it is often stated that classroom management is significantly related to the psychological and attitudinal aspects of teaching profession. For instance, Atici [124] reported that prospective mathematics teachers' felt confident about starting their teaching career and had a positive attitude toward the profession in this regard, but still they had significant concerns about their classroom management capabilities such as understanding children, coping with undesirable behaviors,

and using modern teaching methods effectively. Classroom management courses in teacher training programs aim to develop prospective mathematics teachers' capabilities to employ proactive management practices in the classroom as well as preparing them to handle sudden and unexpected situations [125]. However, it is stated that when effective classroom management education cannot be fully integrated into teacher training programs [126], prospective teachers might not develop classroom management self-efficacy, and may eventually tend to dislike or even quit the profession after a while [127]. Therefore, classroom management anxiety combined with a negative attitude toward teaching could result in a negative classroom climate that would harm the well-being and motivation of both teachers and students [128]. However, as emphasized earlier by Brouwers and Tomic [105], teacher education programs are often not sufficient to eliminate classroom management anxiety of teachers despite offering several courses and professional development activities. As supported by the findings of a recent study by Adams et al. [67], the development of classroom management skills is not only knowledge-driven but also feedback, inspiration and practice-driven, and teacher education programs should address all these aspects.

Limitations and Implications

Although the current study yielded significant results that would contribute both to the theory and practice of teaching and teacher education, it also bears some limitations. One limitation is that the participants of the current study are all from primary education mathematics teaching departments, so the results could be generalized to the prospective teachers in this field. The participants were all selected from the third and fourth grade students because in Turkey, prospective teachers begin visiting schools during the 3rd grade, and they only observe lessons. During the fourth grade they start teaching with the guidance of a mentor teacher. These should be taken into consideration as they might have affected the results. A similar study conducted with only prospective teachers on internship could yield different results. Another limitation of the current study is that it conducted an overall analysis of data collected from the seven universities to achieve the required sample size. Hence, the analysis did not yield results pertinent to the cohort of prospective teachers from each university; yet slight differences might be observed in the enactment of teacher training courses in these universities. The same holds true for the demographics of the participants.

The findings of the current study have implications for the future investigations on the psychological states of prospective mathematics teachers. For one thing, despite supporting previous arguments that prospective teachers experience classroom management anxiety, the current study found that this anxiety could be related to prospective mathematics teachers' attachment to the teaching profession, suggesting that the valence of teaching could elevate their concerns whether they will be able to employ the necessary strategies to enact the profession in the best way possible. These postulations warrant additional research to be able to make more assertive generalizations. Furthermore, the current study suggested that developing prospective mathematics teachers' academic self-efficacy and motivation during their initial education could help develop a positive attitude toward the profession, which is also significant for their adherence to the code of professional conduct [56]. Future studies could address this relationship with the integration of other related variables such as factors effecting intrinsic/extrinsic motivation or other factors influencing attitudes toward teaching such as the perceived image or value of teaching profession, and focus on their moderating/mediating effects. Similarly, the findings of the current study could be supported through qualitative studies, which could yield in-depth understanding into these relationships, and could contribute to building newer theories.

The current study also suggests implications for the development of teacher education programs. The findings showed that prospective mathematics teachers' motivation and their academic self-efficacy during the preparation stage could also have significant implications for their future practice of the profession because their beliefs and motivation in teaching are formed to a greater extent during these initial stages of teacher education, and

determines the quality of their future performance [60]. Considering the fast-changing and ever-demanding nature of current educational environments, teaching education programs should be periodically evaluated and updated to support the holistic development of prospective mathematics teachers behaviorally, attitudinally, and psychologically. From the perspective of the social cognitive theory, academics teaching in the faculties of education should provide prospective teachers with moderately challenging but achievable tasks (enacted mastery experience), create opportunities for them to observe successful role models (vicarious experience), provide constructive and encouraging feedback on their in-class practices (social persuasion), and create a supportive environment to reduce their tension and stress (addressing affective and physiological states). Thus, they could support the self-efficacy of their students as prospective teachers, increase their motivation and engagement with professional development courses, and help them overcome their classroom management anxiety [129]. In addition, satisfying students' autonomy needs and giving them responsibility over the outcomes of their acts would also support their belief in their capability to perform better and reach desired outcomes, which eventually enhance their academic self-efficacy, and motivation [20,46].

6. Conclusions

The current study addressed the relationships between prospective mathematics teachers' academic amotivation, academic self-efficacy, their attitude toward the teaching profession, and their classroom management anxiety. These variables were investigated in previous research either separately or in relation to other variables, but the current study tested the hypothetical relationships between these psychological variables using the path analysis (i.e., SEM). The combined analysis of these variables both offered a new approach to their relationships, and supported most of the assertions in the literature in a different context of prospective teachers. The study revealed that prospective mathematics teachers had a positive attitude toward the teaching profession, and indicated their eagerness in performing this profession in the future. In addition, the results showed that their self-efficacy predicted their attitude toward the profession, that's, the higher their academic self-efficacy, the more positive their attitude toward the profession. The prospective mathematics teachers' attitude toward the teaching profession also had a negative relationship with their academic amotivation, which implied that prospective mathematics teachers with higher levels of motivation developed a more positive attitude toward the profession. On the other hand, the classroom management anxiety of prospective mathematics teachers was found to be quite high, and those with a more positive attitude toward the profession had higher levels of classroom management anxiety. These results suggest significant implications both for the theory and practice, particularly with regard to teacher training.

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