Received: 4 December 2020 | Accepted: 15 April 2021

DOI: 10.1002/pits.22542

RESEARCH ARTICLE

WILEY

Procrastination, perceived maternal psychological control, and structure in math class: The intervening role of academic self-concept

Şule Selçuk[1] | Aylin Koçak[2] | Athanasios Mouratidis[3] | Aikaterini Michou[4] | Melike Sayıl[5]

[1]Department of Psychology, Faculty of Arts and Sciences, Kastamonu University, Kastamonu, Turkey

[2]Department of Psychology, Izmir University of Economics, Izmir, Turkey

[3]Department of Psychology, Bilkent University, Ankara, Turkey

[4]Department of Educational Sciences, Graduate School of Education, Bilkent University, Ankara, Turkey

[5]Department of Psychology, TED University, Ankara, Turkey

Correspondence

Şule Selçuk, Department of Psychology, Faculty of Arts and Sciences, Kastamonu University, Kuzeykent Campus, 37150 Kastamonu, Turkey.
Email: sselcuk@kastamonu.edu.tr

Funding information

The Scientific and Technological Research Council of Turkey, Grant/Award Number: 114K815

Abstract

Do students procrastinate less when their parents psychologically press them to study? Or do they show procrastination when classroom environment lacks structure? In this study, we aimed to investigate to what extent perceived maternal psychological control and perceived classroom structure in math class relate to adolescents' academic procrastination in math via adolescents' academic self-concept in math. Three hundred fifty-three adolescents (M_{age} = 16.86 years, SD = 1.35) rated maternal psychological control, structure provided by their math teachers, their own academic self-concept in math, and academic procrastination in math. Results from structural equation model indicated that procrastination in math was positively predicted by achievement-oriented psychological control and negatively by perceived provision of structure by means of academic self-concept in math. Based on the current findings, we provided some suggestions for school counselors and other specialists.

KEYWORDS

academic procrastination, academic self-concept, achievement-oriented psychological control, dependency-oriented psychological control, perceived structure

1 | INTRODUCTION

Academic procrastination, which refers to students' tendency to delay homework assignments or putting off school-related activities that may invoke feelings of discomfort (Solomon & Rothblum, 1984), is highly common and prevalent among students (Özer et al., 2009; Solomon & Rothblum, 1984; Steel, 2007; Zakeri et al., 2013). Among others, it has been found to associate with poor academic performance (Kim & Seo, 2015), higher depression, and lowered self-esteem (Steel, 2007). As procrastination is generally conceived as a personality trait, many studies regarding correlates or antecedents of procrastination have focused on the relations between procrastination and personality characteristics, such as conscientiousness and neuroticism (Sirois et al., 2019; see also Steel, 2007 for a review). Indeed, preceding research has revealed that people with certain characteristics are more likely to engage in procrastination (e.g., Schutte & del Pozo de Bolger, 2020; Ziegler & Opdenakker, 2018). For instance, first-year secondary education students exhibiting low levels of metacognitive self-regulation, self-efficacy, and effort regulation (Ziegler & Opdenakker, 2018), and undergraduate students with lower conscientiousness (Steel & Klingsieck, 2016), mindfulness (Cheung & Ng, 2019), and self-control (Xu et al., 2021) were found to have a higher tendency to procrastinate.

Some researchers (e.g., Klingsieck, 2013b) have suggested, however, that procrastination may be domain-specific, a view which implies that situational factors and the context may explain as well when procrastination takes place (see Mann, 2016). In line with this perspective, some of the previous research has also focused on situational factors that may alter the conditions for which procrastination may manifest—factors such as perceived difficulty and interest of the task and likability of the teacher (Klingsieck, 2013a), or peer norms and unorganized and lax teachers (Nordby et al., 2017). For instance, teachers' flexibility in grading and low levels of instructor organization and support have been found to associate with higher academic procrastination (Corkin et al., 2014; Schraw et al., 2007). In addition, some research has shown that parenting is also linked with academic procrastination (e.g., Batool, 2020; Sedláková et al., 2014). For example, compassionate and supportive parenting seems to associate negatively with academic procrastination (Batool, 2020) whereas psychologically controlling parenting relates positively with it (Shih, 2019). Taken together, the few studies that have focused on contextual factors suggest that procrastination may occur also for reason that may lie beyond students' control. Therefore, focusing only on person-related correlates of procrastination such as low self-esteem and neglecting contextual ones, such as teachers' and parenting practices may provide an incomplete picture of the factors that are associated with procrastination. Therefore, it is important to examine contextual correlates of procrastination before suggesting effective measures to decrease it.

To better understand the social context in which adolescents' academic procrastination can be developed, we focused in the present study on both perceived family and classroom environment. Regarding the family environment, we considered perceived maternal psychological control (which refers to intrusive and manipulative maternal behaviors) as a correlate of adolescents' academic procrastination in mathematics as previous research has highlighted the important role of it in the development of dysfunctional academic attitudes such as academic incompetence (see Soenens & Vansteenkiste, 2010), misappropriate time use (Won & Yu, 2018), disengagement coping (Shih, 2019) as well as procrastination (Shih, 2019; Won & Yu, 2018). Regarding the classroom environment, we considered that perceived structure in high school class (as the flip side of unorganized and lax teaching; Nordby et al., 2017) would relate to adolescents' procrastination in mathematics. Furthermore, because procrastination has been closely linked with core aspects of the self (Steel, 2007), we investigated whether academic self-concept in math intervenes the relation of perceived maternal psychological control and perceived teacher provision of structure to procrastination. Equally important, given that the majority of research on procrastination has been conducted with university students and mostly in Western context (Klassen & Kuzucu, 2009), the present study would contribute to the literature by shedding further light on adolescents' academic procrastination in a non-Western setting, that is Turkish high schools.

1.1 | Academic procrastination

Procrastination can be seen as a form of dysfunctional motivation (Klassen & Kuzucu, 2009) and a self-regulatory failure (Steel, 2007). It is a prevalent phenomenon across cultures (see Hussain & Sultan, 2010; Jadidi et al., 2011; Klassen & Kuzucu, 2009; Solomon & Rothblum, 1984) and has been found to relate to poor academic performance and commitment (Balkış, 2013; Balkış & Erdinç, 2017; van Eerde, 2003; Hussain & Sultan, 2010; Kim & Seo, 2015; Klassen et al., 2008; Steel et al., 2001) and lower psychological well-being (van Eerde, 2003).

As briefly mentioned earlier, most studies on procrastination investigated the personality characteristics of people who tend to procrastinate. Low conscientiousness and high neuroticism as well as perfectionism have been found to be important positive predictors of academic procrastination (Jadidi et al., 2011; Johnson & Bloom, 1995; Schouwenburg & Lay, 1995; Watson, 2001). Moreover, other between-person characteristics such as academic self-efficacy, self-concept, and self-esteem have been also considered as predictors of academic procrastination (see, van Eerde, 2003; Farran, 2004; Klassen & Kuzucu, 2009). This line of research has found that procrastination related positively to less adaptive achievement goals (such as mastery-avoidance goals), self-handicapping, and disorganization, and negatively to more adaptive achievement goals (such as mastery-approach goals), cognitive and metacognitive strategies, and self-regulation ability beliefs (van Eerde, 2003; Howell & Watson, 2007; Klassen & Kuzucu, 2009; Klassen et al., 2008).

There is a limited body of research that has explored how perceived social context might be associated with academic procrastination, though the latter cannot but manifest within certain contexts (Nordby et al., 2017). The relation between procrastination and perceptions of social context seems plausible, because research has pointed out that several correlates of procrastination such as self-esteem or self-worth can be largely determined by parenting practices (e.g., Curran, 2018; Faherty et al., 2020; Garber et al., 1997; Wouters et al., 2018) or by classroom's learning environment (e.g., Roeser & Eccles, 1998).

1.2 | Maternal psychological control and academic procrastination

Psychological control is defined as parents' covert, intrusive, restrictive, and manipulative behaviors damaging children's psychological world via guilt induction, love withdrawal, and expression restriction (Barber & Harmon, 2002; Barber, 1996). According to Barber and Harmon (2002), a wide spectrum of psychologically controlling parenting behaviors undermine—sometimes intentionally, sometimes unintentionally—child's core self-worth. Accordingly, it was consistently demonstrated that psychological control relates to lower self-esteem (Bean et al., 2003), poor self-regulation (Rogers et al., 2019), and diminished self-efficacy (Xu et al., 2017).

In their attempt to further differentiate parental psychological control, Soenens and Vansteenkiste (2010) distinguished psychological control, as dependency-oriented and achievement-oriented. Whereas dependency-oriented psychological control refers to parents' psychologically controlling practices aiming to keep children physically and emotionally dependent to parents, achievement-oriented psychological control reflects psychologically controlling behaviors aiming to make children meet their parents' strict and high demands for achievement striving (Soenens et al., 2010). Soenens and Vansteenkiste (2010) demonstrated that dependency-oriented psychological control and achievement-oriented psychological control are distinct forms of psychological control, with each of them being uniquely linked with certain outcomes (e.g., dependency or self-criticism), parental characteristics (e.g., parents with separation anxiety or maladaptive perfectionism), or family-related variables (e.g., enmeshed or perfectionistic family climate).

Aside this differentiation in psychological control, only few studies have examined the association between parenting practices and academic procrastination. For instance, Pychyl et al. (2002) revealed that authoritative parenting positively and authoritarian parenting negatively predicted procrastination among adolescent students with self-esteem mediating this association (though only for females). In addition, another study conducted with

Taiwanese high school students indicated that parental criticism is negatively associated with procrastination on homework and preparing for the examination (Shih, 2017). Partly in line with these findings, Zakeri et al. (2013) showed that university students whose parents are high on the dimensions of acceptance-involvement and psychological autonomy-granting are less likely to procrastinate, whereas those whose parents are high on behavioral strictness-supervision have higher academic procrastination tendencies. Given that authoritarian parenting includes psychologically controlling practices (Barber et al., 2002) and autonomy granting is inversely related to psychological control (Silk et al., 2003), these studies suggest that maternal psychological control may be an important predictor of academic procrastination. Indeed, Mih (2013) showed that higher perceived parental psychological control is related to more procrastination among adolescent students by means of controlled motivation for learning (i.e., learning motivation instigated by external forces). Similarly, Shih (2019) revealed that perceived parental psychological control is positively linked with adolescents' academic procrastination.

Not surprisingly, parenting practices are also associated with self-related variables. For instance, it has been shown that perceived maternal psychological control is inversely associated with academic self-efficacy (Xu et al., 2017) and self-concept via satisfaction of basic psychological needs (Lu et al., 2017). In contrast, parental warmth, involvement, and interest in children's schooling along with healthy parent–child communication were linked with higher academic competence beliefs among adolescents (Juang & Silbereisen, 2002). Based on these findings and given that parenting styles and behaviors relate to children's academic procrastination (Pychyl et al., 2002; Zakeri et al., 2013), we expected that the two dimensions of psychological control would be related to higher academic procrastination through lower self-concept in math. If students perceive their parents as less controlling (and therefore more autonomy supportive), they are more likely to feel responsible for their actions and academically competent (Soenens & Vansteenkiste, 2005), and eventually less likely to procrastinate (Won & Yu, 2018). On the other hand, if students perceive their parents as more controlling, they will feel less agentic and experience less competency and mastery (Soenens & Vansteenkiste, 2010) which eventually will lead them to procrastinate more (Won & Yu, 2018). Nevertheless, given that procrastination directly refers to school-related activities, another factor that may explain why some students procrastinate more than some others may lie to the way the learning environment is well structured.

1.3 | Perceived structure in class and academic procrastination

Structure in class can be defined as teachers' providing help, support, and clear expectations, being responsive in a consistent manner, and acting accordingly to students' learning situations (Skinner & Belmont, 1993). Well-structured learning environments provided by teachers have been found to be associated with optimal school-related outcomes such as higher competence need satisfaction and higher engagement in classroom (Jang et al., 2010; Skinner & Belmont, 1993). These studies indicated that students belonging to well-structured learning environment tend to report higher levels of competence, effort, and persistence. Hence, the more students are involved and engaged in their class-related duties, the less likely they procrastinate.

Indeed, a recent study with middle and high school students indicated that perceived structure in the fall semester was negatively associated with academic procrastination in the spring semester (Mouratidis et al., 2018). In addition, Schraw et al. (2007) revealed that students who believed that their teachers held low expectations for them and who were more flexible regarding grading criteria and deadlines (both of which can be considered as indices of lack of structure), were more likely to procrastinate. In contrast, students whose teachers had high expectations were less likely to procrastinate. Taken together, these findings demonstrate that teachers' structure-related behaviors relate to students' academic procrastination tendency.

With regard to the role of teachers in adolescents' self-related beliefs, it was found that teachers' provision of well-structured environment relates positively to adolescents' engagement (Jang et al., 2010), and less procrastination (Mouratidis et al., 2018), most likely because structure renders the environment predictable where

students can exercise their skills, and therefore develop not only their sense of competence (Mouratidis et al., 2013) but also satisfy their basic psychological needs (Aelterman et al., 2019). Presumably, in such well-structured learning environment students are more likely to develop their academic self-concept and to hold positive views of themselves which in turn may decrease the chances to procrastinate. Parallel to this line of thought, a previous study revealed that higher instructor organization and support is associated with higher self-efficacy regarding course work, which in turn is linked with lower procrastination among college students (Corkin et al., 2014).

1.4 | The present study

Classroom environment and parents have been suggested to play an important role in adolescents' self-efficacy beliefs and school achievement (see Schunk & Meece, 2006). However, as indicated by Soenens and Vansteenkiste (2005), there is little interplay between educational psychology and developmental psychology which attend to the role of classroom environment and parenting, respectively. In an attempt to extent previous research which has focused on either the role of classroom environment (e.g., instructional practices of teachers) or parenting on academic procrastination (e.g., Batool, 2020; Corkin et al., 2014; Pychyl et al., 2002), we aimed to investigate their joint roles. We focused on specific parenting practices (i.e., maternal psychological control) instead of unstructured or chaotic home environment to avoid overlapping with perceived structure that we assessed for the classroom environment. In addition, most of the studies examining the relation between parenting and academic procrastination generally attended to parenting styles such as authoritative and authoritarian parenting (see a review for Woo & Yeo, 2019). However, as stated previously (e.g., Barber et al., 2005) unless examining the distinct parental practices, it will not be possible to see the effects of certain parental practices that lead to procrastination. Therefore, instead of focusing on parenting typologies, we preferred to study specific parenting practices (i.e., psychological control)—especially the one which refer to achievement-oriented psychological control as it directly refers to the educational settings. Finally, we should note that as Turkish mothers have greater childcare roles compared to fathers (Ataca, 2009) and Turkish adolescents tend to perceive higher psychological control from their mothers than their fathers (Sayıl & Kındap, 2010), we attended to maternal rather than paternal psychological control.

In sum, we aimed to examine to what extent perceived social context in two distinct socialization settings (in family and at school) relate to adolescents' procrastination. Regarding the family context, two domain-specific expressions of maternal psychological control were investigated. The first domain refers to child's achievement-oriented psychological control, which we consider especially relevant to academic domains such as in mathematics which is considered a valued, challenging subject (Blackwell et al., 2007) and therefore a heavily investigated topic (e.g., Stoet & Geary, 2018). The second domain refers to the psychological control that emanates due to excessive physical and emotional proximity between the mother and the child. As for the school context, we focused on perceived structure in math class because we considered it an important facet of classroom environment that enhance engagement (Stroet et al., 2013) as opposite to procrastination.

As maternal psychological control has been found to be associated with self-related constructs such as self-esteem, perceived competence, and self-concept, we hypothesized that adolescents who perceived their mothers to exhibit higher achievement-oriented and dependency-oriented psychological control to hold lower levels of academic self-concept in math and, in turn, to procrastinate more (Hypothesis 1). Likewise, as provision of structure has been found to positively relate to high perceived competence, we also expected that students who perceived the learning environment of their classroom to be well-structured to report higher levels of academic self-concept in math and, in turn, to procrastinate less (Hypothesis 2) (see Figure 1).

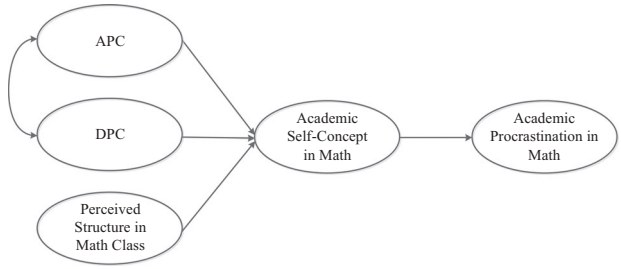

FIGURE 1 The Hypothesized Model. *Note*: APC, achievement-oriented psychological control; DPC, dependency-oriented psychological control

2 | METHODS

2.1 | Participants

The data were collected during the spring semester of 2014–2015 academic year. Participants were 353 Turkish adolescents (174 males, 171 females, and 8 omitting reporting their gender; M_{age} = 16.86 years, *SD* = 1.35) attending different public high schools in the district of Ankara and were coming from families with different socioeconomic background. The socioeconomic status of participants assessed with family income was determined as low (13.9%), lower-middle (22.1%), middle (32.3%), upper-middle (20.7%), and high (8.5%) (2.5% missing cases). The majority of the participants had biological mothers (97.2%) and biological fathers (94.9%). Mothers' level of educational attainment was primary school (15.6%), middle school (11.9%), high school (33.4%), college, university, master, or PhD (37.1%) (1.4% missing cases). Fathers' level of educational attainment was primary school (8.2%), middle school (8.2%), high school (23.5%), and college, university, master, or PhD (57.2%) (2.8% missing cases).

2.2 | Procedure

Before data collection, an ethical permission was obtained from the ethical committee of the host University, as well as from the Turkish Ministry of Education. The schools were randomly selected from the list including all public schools located in Ankara city center. Upon permission being taken from the school principals, we gathered informed consents from adolescents' parents. The students who participated in the study replied to the questionnaires during a regular class hour. Students replied anonymously and they were free to withdraw their participation at any time during the study. All questionnaires were administered in Turkish. The questionnaires were translated from English to Turkish by members of the project team who were native Turkish speakers and translated back into English by a native English speaker fluent in Turkish. Final decisions for the translated form of each item were attained based on agreement among the translators.

2.3 | Measures

2.3.1 | Achievement- and dependency-oriented psychological control

We used Dependency-Oriented and Achievement-Oriented Psychological Control Scale (DAPCS; Soenens et al., 2010) to assess adolescents' perceptions of their mothers' psychological control practices. Nine items were used to measure perceived achievement-oriented psychological control (e.g., "My mother is less friendly with me if

I perform less than perfectly") and eight items to measure perceived dependency-oriented psychological control (e.g., "My mother will make me feel guilty when I will leave home permanently"). Two items ("My mother shows that she is disappointed with me if I do not rely on her for a problem" and "My mother is only happy with me if I rely exclusively on her for advice") were dropped from the dependency-oriented psychological control because of the poor fit. Student answered the items over a five-point Likert type scale (1 = *totally disagree*, 5 = *totally agree*). The Cronbach's alphas of the subscales for the present study were .90 for the achievement-oriented psychological control and .68 for the dependency-oriented psychological control.

2.3.2 | Perceived structure in math class

Adolescents' perceived structure in class as provided by their math teachers was measured by the Teacher Provision of Structure subscale of the Teacher as Social Context Scale (Belmont et al., 1988). The subscale consists of four sub-factors: *Monitoring* with five items (e.g., "My teacher checks to see if I'm ready before he/she starts a new topic."), *contingency* with six items (e.g., "When I do something right, my teacher always lets me know."), *expectancy* with five items (e.g., "My teacher makes it clear what he/she expects of me in school."), and *help and support* with five items (e.g., "If I can't solve a problem, my teacher shows me different way to try to."). A five-point Likert type scale (1 = *strongly disagree*; 5 = *strongly agree*) was used to assess each item. The Cronbach's alpha of the provision of structure as a composite score was .88 (α = .76 for monitoring, α = .66 for contingency, α = .66 for expectancy, and α = .69 for help and support, each of which could be considered marginally acceptable given their length—see Cortina, 1993).

2.3.3 | Academic self-concept in math

Adolescents' academic self-concept in math was measured with the Academic Self-Concept Scale (Marsh, 1990). The 6-item scale (e.g., "Compared to others of my age, I am good at math" and "Compared to others of my age, work in math classes is easy for me.") was rated over a five-point Likert type scale (1 = *strongly disagree*, 5 = *strongly agree*). In the current study, the Cronbach's alpha was .92.

2.3.4 | Academic procrastination in math

Academic procrastination in mathematics was measured with the scale adapted from General Procrastination Scale (Lay, 1986). The scale originally consists of 11 items (e.g., "I often find myself doing my math homework and assignments that I had intended to do days before." and "I generally delay before starting on work doing my math homework and assignments I have to do.") but given that two items ("I usually start doing my math assignments shortly after it is assigned" and "I usually accomplish all my math homework and assignments I plan to do in a day") yielded a poor fit, we dropped them from the final scale. The items were rated on a five-point Likert-type scale (1 = *strongly disagree*, 5 = *strongly agree*). In the current study, the Cronbach's alpha was .92.

3 | RESULTS

3.1 | Preliminary analyses

First, descriptive statistics and zero-order bivariate correlations were calculated as preliminary analyses (see Table 1). As can be noticed in Table 1, achievement-oriented psychological control was correlated positively with

TABLE 1 Descriptive statistics and zero-order bivariate correlations of the study variables

	1	2	3	4	*M*	*SD*
1. APC	–				1.94	0.84
2. DPC	.55**	–			2.64	0.81
3. Perceived structure in math class	−.07	−.04	–		3.27	0.59
4. Academic self-concept in math	−.19**	−.09	.23**	–	2.48	0.79
5. Academic procrastination in math	.03	−.01	−.17**	−.31**	3.24	0.94

Abbreviations: APC, achievement-oriented psychological control; DPC, dependency-oriented psychological control; *SD*, standard deviation.

**$p < .01$.

dependency-oriented psychological control and negatively with academic self-concept in math. Neither achievement-oriented, nor dependency-oriented psychological control was related to academic procrastination in math. Perceived structure in math class was correlated positively with academic self-concept in math with both of them being related negatively to academic procrastination in math.

In addition, we conducted a multivariate analysis of variance (MANOVA) to examine whether study variables differed as a function of adolescent gender. Results indicated that the multivariate effect of gender was significant, Wilks' $\lambda = 0.91$, $F(5, 323) = 5.87$, $p < .001$, partial $\eta^2 = .08$. Follow-up univariate analyses showed that girls, compared to boys, reported higher dependency-oriented psychological control and perceived structure in math class, and lower achievement-oriented psychological control (see Table 2). Therefore, we included gender as a covariate in our hypothesized model.

3.2 | Main analyses

To investigate the intervening role of academic self-concept in math in the relations of achievement-oriented psychological control, dependency-oriented psychological control, and perceived structure in math class to academic procrastination in math, we used structural equation modeling (SEM) with latent variables. The analysis was conducted with the lavaan package (Rosseel, 2012) and R software (R Core Team, 2016). Full information maximum likelihood estimation (FIML) and maximum likelihood estimation with robust standard errors (MLR) were used to estimate missing values and to calculate parameter estimates, respectively. Specifically, we modeled five latent constructs (i.e., achievement-oriented psychological control, dependency-oriented psychological control,

TABLE 2 Gender differences on study variables

	Girls *M* (*SD*)	Boys *M* (*SD*)	*F*	Partial η^2
APC	1.83 (0.82)	2.05 (0.84)	5.77*	.02
DPC	3.05 (0.65)	2.88 (0.70)	5.23**	.02
Perceived structure in math class	3.38 (0.62)	3.18 (0.56)	9.15**	.03
Academic self-concept in math	2.55 (0.79)	2.41 (0.78)	2.56	.01
Academic procrastination in math	3.11 (0.93)	3.28 (0.86)	2.78	.01

Abbreviations: APC, achievement-oriented psychological control; DPC, dependency-oriented psychological control; *SD*, standard deviation.

*$p < .05$; **$p < .01$.

perceived structure in math class, academic self-concept in math, and academic procrastination in math). The latent variables of achievement-oriented and dependency-oriented psychological control were defined by nine and six items, respectively. Moreover, monitoring, contingency, expectations, help and support sub-scales of teacher as social context scale served as indicators of the latent variable of perceived structure in math class. In addition, the latent variable of academic self-concept in math was defined by six items. Lastly, academic procrastination latent factor was defined by nine items.

As a first step, we tested the five-factor measurement model. This model yielded an acceptable fit to the data: S-Bχ^2 (517; N = 353) = 967.97, p < .001, Comparative Fit Index [CFI] = 0.914, Standardized Root Mean Square Residual [SRMR] = 0.058, Root Mean Square Error of Approximation [RMSEA] = 0.050 (90-CI: 0.045–0.054). Next, we performed SEM analysis with latent variables defined by their corresponding items to test the hypotheses. Adolescent gender, coded as a dichotomous variable (0 = male, 1 = female), was included as a covariate in the structural model to control its possible effects on the relations. Results showed that the model provided an acceptable fit to the data, S-Bχ^2 (551; N = 345) = 1012.81, p < .001, CFI = 0.912, SRMR = 0.061, RMSEA = 0.049 (90-CI: 0.045–0.054). As expected, academic procrastination in math was negatively predicted by academic self-concept in math (β = −.30, p < .001) which was positively predicted by perceived structure in math class (β = .24, p < .001) and negatively by achievement-oriented psychological control (β = −.21, p < .05) (see Figure 2). Contrary to our hypothesis, dependency-oriented psychological control was not associated with academic self-concept in math (β = .03, *ns*). (see Figure 2). Finally, gender was negatively related to achievement-oriented psychological control (β = −.21, p < .05) and positively associated with perceived structure in math class (β = .24, p < .01), indicating that girls, compared to boys, reported lower achievement-oriented psychological control and higher perceived structure in math class.

We also conducted tests of indirect effects with delta method (Sobel, 1982) via lavaan package to explore whether the indirect relations were statistically significant. Results revealed that achievement-oriented psychological control (β = .06, p = .07) and perceived structure in math class (β = −.07, p < .01) were indirectly related to academic procrastination in math via academic self-concept in math. These findings provided partial support to Hypothesis 1 and full support to Hypothesis 2. Taken together, it was revealed that higher achievement-oriented psychological control and lower perceived structure in math class were related to lower academic self-concept in math, which in turn, was associated with higher levels of academic procrastination in math.

3.3 | Supplementary analyses

For exploratory purposes, we conducted a multigroup SEM analysis to examine whether the reported relations differ across girls and boys. Satorra-Bentler χ^2 difference tests revealed no significant difference (a) between the

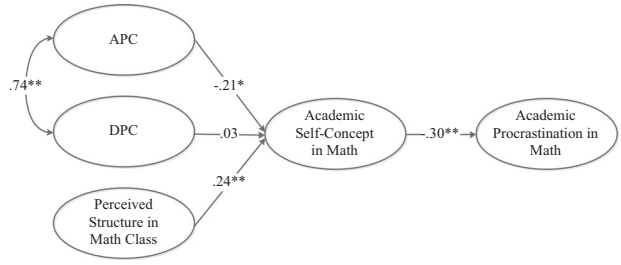

FIGURE 2 The structural model showing the intervening role of academic self-concept in math in the link between maternal psychological control, perceived structure in math class, and academic procrastination in math. *Note*: Model adjusted for adolescent gender (not presented). APC, achievement-oriented psychological control; DPC, dependency-oriented psychological control. *p < .05. **p < .01

baseline (i.e., model without equality constraints) and the metric invariance models (i.e., factor loadings constrained to be equal), $\Delta S - B\chi^2$ (29) = 42.67 and (b) between the metric invariance and the structural invariance models (i.e., factor loadings and regression paths constrained to be equal), $\Delta S - B\chi^2$ (4) = 3.08, *ps* > .05. Thus, it was shown that factor loadings were invariant across girls and boys, and suggested relationships did not differ based on adolescent gender. In addition, we examined the two-way interactions among composite scores of achievement-oriented psychological control, dependency-oriented psychological control, and perceived structure in math class. It was revealed that none of the interactions were significant, *ps* > .10.

Although our hypothesized model was based on theory and previous research findings, as our study was cross-sectional, we also tested three alternative models (Kline, 2011). We explored whether the hypothesized model provides a better account for the relationships between study variables compared with other models predicting alternative pattern of relationships. In the first alternative model, we allowed academic procrastination in math to predict academic self-concept in math which, in turn to predict achievement-oriented psychological control, dependency-oriented psychological control, and perceived structure in math class. In the second alternative model, we allowed achievement-oriented psychological control, dependency-oriented psychological control, perceived structure in math class, and academic self-concept in math all together to predict academic procrastination in math. In the third alternative model, we allowed academic procrastination in math to predict achievement-oriented psychological control, dependency-oriented psychological control, and perceived structure in math class, which in turn to predict academic self-concept in math. In all these alternative models, achievement-oriented psychological control and dependency-oriented psychological control were allowed to covary and gender was included as a covariate, as in the hypothesized model. Comparison of Akaike information criterion (AIC) values revealed that the first alternative model (AIC = 28767.58) yielded a slightly better fit to the data compared with the hypothesized model (AIC = 28769.67) (i.e., ΔAIC = 2.1). The hypothesized model provided a better fit compared to the second (AIC = 28793.74) and third alternative models (AIC = 28790.69) (ΔAIC = 24.1 and 21, respectively).

4 | DISCUSSION

In this study, we examined the relations of maternal achievement-oriented and dependency-oriented psychological control and perceived structure in math class to academic procrastination in math with the intervening role of academic self-concept in math. It was revealed that mothers' achievement-oriented, but not dependency-oriented psychological control, was associated with academic procrastination in math via adolescents' academic self-concept in math. Therefore, we partially confirmed our first hypothesis. In addition, and in line with the expectations of our second hypothesis, we found that adolescents' academic self-concept in math intervenes the relation between perceived structure in math class and academic procrastination in math.

These findings suggest that academic self-concept might be one of the underlying mechanisms through which perceived achievement-oriented psychological control and perceived structure in class may coincide with academic procrastination. Our results suggest that adolescents who perceive their mother to show love and care only when they achieve academically are likely to hold lower perceptions about their learning ability and performance in achievement contexts. In addition, when adolescents doubt of their academic ability and performance, they seem more likely to delay starting and/or completing their academic tasks. Previous research has shown that perfectionist parents tend to use achievement-oriented psychological control (Soenens et al., 2010), that children of these parents may develop perfectionism (Soenens et al., 2005) by criticizing themselves (Soenens et al., 2010), and that self-critical perfectionism is strongly associated with academic procrastination (Flett et al., 1992). This sequence of relations is reproduced in our study as our findings suggest that children of perfectionist parents who over criticizing or manipulating through love withdrawal their children's performance may start question their capabilities, thereby undermining their academic self-concept. Once their self-concept declines, they may tend to postpone completing their assigned schoolwork as they are afraid of making failure.

But why perceived maternal dependency-oriented psychological control failed to relate to academic self-concept in math or academic procrastination in math? A possible explanation is that dependency-oriented psychological control is more likely to evoke dependency-oriented characteristics (Soenens et al., 2010) such as fear of separation, dependency to others to take approval from them, and feelings of insecurity (Soenens et al., 2012). Therefore, it may not have a direct relation to self-concept in the academic domain. Won and Yu (2018) revealed that parental control including practices that denote dependency-oriented and achievement-oriented psychological control (such as inducing guilty feeling, threatening, and fostering performance goals) are positively related to academic procrastination among sixth to twelveth graders. However, in that study the authors provided no information regarding which specific aspects of parental psychological control drove the relation between procrastination and parental control, as the latter was assessed as a composite construct. Certainly, our findings indicate the importance of examining domain-specific types of psychological control simultaneously as, even though they are highly related, their relations to other constructs may differ (see Soenens et al., 2010). In this way, we would be able to gain knowledge about which specific type of psychologically controlling behaviors is particularly associated with adolescent outcomes under investigation.

The link between perceived structure in math class and academic procrastination in math via self-concept indicates that well-structured learning environment may improve adolescents' academic self-concept, and in turn curtail procrastination. This finding is supported by a longitudinal study which showed that students who belonged to a well-structured learning environment held higher academic self-concept (Leflot et al., 2010). Along similar lines, another study found that indicators of poor structure in class, such as low teacher expectations and flexible class management (in terms of grading and keeping deadlines), related to higher academic procrastination (Schraw et al., 2007). Therefore, it seems that teachers who are perceived to communicate their expectations, to behave in consistent way, to help and support their students, and to monitor their progress may enhance students' confidence in their own learning abilities, contain their fear of possible failure and thus decrease their tendency to procrastinate. Thus, it may be argued that supportive teacher behaviors in a well-structured classroom context may help students to gain a good habit (via a positive self-concept) that is very crucial not only for school life but also for worklife in the future.

Our study also suggests that boys perceive more academic-achievement oriented psychological control and less dependency-oriented psychological control, compared to girls. This finding is consistent with previous findings indicating similar differences based on adolescent gender (e.g., Cacioppo et al., 2013; Pace et al., 2018; Soenens et al., 2010). It seems that there are gender differences in socialization across various cultures such that girls are socialized to be compliant, relationship-oriented, dependent, and nurturant whereas boys are expected to be competitive, achievement-oriented, self-reliant, and assertive (see Harper & Marshall, 1991; Shaffer, 2009). In addition, and in accordance to the previous research (e.g., Lietaert et al., 2015; Vansteenkiste et al., 2012), girls perceived higher structure in class from their teachers than boys. This finding may imply that teachers treat girls and boys differentially. Alternatively, it may also denote that girls tend to evaluate their teachers more positively than boys, irrespective of teachers' actual behaviors. In addition, compared with boys, girls may perceive their teachers' behaviors as more structured than boys, as they appear to have better self-regulation and metacognitive awareness in math (Alcı & Altun, 2007).

4.1 | Limitations and future directions

The present research carries several limitations that should be underscored. First, this study was cross-sectional, so the findings are open to alternative interpretations. For instance, it may be that adolescents who tend to procrastinate are more likely to experience achievement-oriented psychological control by their mothers. Accordingly, procrastinators may be more willing to put the blame on lack of structure in class to maintain a positive self-image. Indeed, lack of significant difference between the fit of the hypothesized model and that of the

first alternative model suggests that most likely a reciprocal association exists such that perceptions of more control in the academic domain and less structure in math class lower one's academic self-concept in math, which in turn, predict higher academic procrastination in math, which in turn lowers one's academic self-concept in math. Therefore, cross-lag longitudinal associations should be explored in future studies. In addition, it should be acknowledged that adolescents were the only informants, so shared method variance may have inflated the present relations. Therefore, further studies should replicate the findings with a multi-informant study design. Moreover, internal consistency values of some subscales (i.e., dependency-oriented psychological control and three subscales of perceived structure) were below the generally accepted cut-off point 0.70 (see Field, 2009). Furthermore, we assessed certain aspects of the family environment (i.e., mothers' psychological control practices) and not others such as chaotic home environment (for a review, see Marsh et al., 2020) or lack of parental behavioral control (Pinquart, 2016) which seem highly relevant to adverse academic outcomes. Therefore, future research should attend to other family-related correlates of academic procrastination.

4.2 | Conclusions and implications

To sum up, although the findings are based on correlational analyses, the present study suggests that adolescents' self-concept may suffer when they perceive their mothers being more psychologically controlling because of their low academic performance and when they simultaneously experience an ill-structured learning environment. Moreover, the study showed that adolescents with a low academic self-concept tend to procrastinate their homework. Our findings seem to extend our understanding regarding the role of perceived classroom and family environment in adolescent's academic procrastination and the intervening role that academic self-concept can have in this relation.

These findings are informative for teachers, parents, and school counselors as they show a mechanism through which adolescents could become less functional at school. It seems that counselors need to work with parents to increase their awareness of the possible negative consequences that psychological pressure can have on their children when they demand higher and higher academic achievement. Such pressure is likely to lower their children's academic self-concept and increase in turn their procrastination, something which results in poor school performance which could further undermine self-concept. Encouraging parents to use more effective practices towards their children's achievement can make a difference. For instance, given that past research has shown that supportive or autonomy-supportive parenting is associated with better academic self-concept and self-efficacy (Graziano et al., 2009; Hung, 2007), lower procrastination (Zakeri et al., 2013), and higher academic achievement (Bindman et al., 2015; Hung, 2007), schools need to encourage parents to be supportive towards their children, take their perspectives and support their volitional and self-initiating behaviors, and foster autonomous decision-making and problem-solving.

In a similar vein, given that academic procrastination is related to academic performance (Balkış, 2013; van Eerde, 2003; Steel et al., 2001), academic support programs or interventions aimed to address academic procrastination may require to include components designed to improve adolescents' academic self-concepts by encouraging teachers to provide a structured learning environment together with a supportive teacher–student relationship in their classes. Relatedly, school counselors and other specialists need to increase teachers' awareness of the relations that their instructional practices could have with their students' academic self-concept and procrastination behaviors. As structured learning environment seems to foster students' academic self-concept and to prevent the tendency to procrastinate, teachers need to be encouraged to make clear their expectations from students, to provide the necessary support and help, to be consistently responsive to their students, and to monitor their students' learning situations and act accordingly.

ACKNOWLEDGMENTS

This study was supported by The Scientific and Technological Research Council of Turkey (Project No: 114K815).

CONFLICT OF INTERESTS

The authors declare that there are no conflict of interests.

AUTHOR CONTRIBUTIONS

We certify that the manuscript has been seen and reviewed by all authors, and all authors contributed to it in a meaningful way and agree to be listed in the order shown.

ETHICS STATEMENT

Ethical approval for this study was obtained from the ethical committee of Hacettepe University (Ethics approval number: 76000869/431-3093).

INFORMED CONSENT

Informed consent was obtained from all adolescents and their mothers included in the study.

DATA AVAILABILITY STATEMENT

The data sets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

ORCID

Şule Selçuk http://orcid.org/0000-0003-0933-8174

REFERENCES

Aelterman, N., Vansteenkiste, M., Haerens, L., Soenens, B., Fontaine, J. R. J., & Reeve, J. (2019). Toward an integrative and fine-grained insight in motivating and demotivating teaching styles: The merits of a circumplex approach. *Journal of Educational Psychology*, *111*, 497–521. https://doi.org/10.1037/edu0000293

Alcı, B., & Altun, S. (2007). Lise öğrencilerinin matematik dersine yönelik özdüzenleme ve bilişüstü becerileri, cinsiyete, sınıfa ve alanlara göre farklılaşmakta mıdır? *Çukurova Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, *16*, 33–44.

Ataca, B. (2009). Turkish family structure and functioning. In S. Bekman, & A. Aksu-Koc (Eds.), *Perspectives on human development, family and culture* (pp. 108–125). Cambridge University Press.

Balkış, M. (2013). Academic procrastination, academic life satisfaction and academic achievement: The mediation role of rational beliefs about studying. *Journal of Cognitive and Behavioral Psychotherapies*, *13*, 57–74.

Balkış, M., & Erdinç, D. (2017). Gender differences in the relationship between academic procrastination, satisfaction with academic life and academic performance. *Electronic Journal of Research in Educational Psychology*, *15*, 105–125. https://doi.org/10.14204/ejrep.41.16042

Barber, B. K. (1996). Parental psychological control: Revisiting a neglected construct. *Child Development*, *67*, 3296–3319. https://doi.org/10.1111/j.1467-8624.1996.tb01915.x

Barber, B. K., Bean, R. L., & Erickson, L. D. (2002). Expanding the study and understanding of parental psychological control. In B. K. Barber (Ed.), *Intrusive parenting: How psychological control affects children and adolescents* (pp. 262–289). American Psychological Association.

Barber, B. K., & Harmon, E. L. (2002). Violating the self: Parental psychological control of children and adolescents. In B. K. Barber (Ed.), *Intrusive parenting: How psychological control affects children and adolescents* (pp. 15–52). American Psychological Association.

Barber, B. K., Stolz, H. E., Olsen, J. A., Collins, W., & Burchinal, M. (2005). Parental support, psychological control, and behavioral control: Assessing relevance across time, culture, and method. *Monographs of the Society for Research in Child Development*, *70*, I–147. http://www.jstor.org/stable/3701442

Batool, S. S. (2020). Academic achievement: Interplay of positive parenting, self-esteem, and academic procrastination. *Australian Journal of Psychology*, *72*, 174–187. https://doi.org/10.1111/ajpy.12280

Bean, R. A., Bush, K. R., McKenry, P. C., & Wilson, S. M. (2003). The impact of parental support, behavioral control, and psychological control on the academic achievement and self-esteem of African American and European American adolescents. *Journal of Adolescent Research*, *18*, 523–541. https://doi.org/10.1177/0743558403255070

Belmont, M., Skinner, E., Wellborn, J., & Connell, J. (1988). Teacher as social context: A measure of student perceptions of teacher provision of involvement, structure, and autonomy support (Tech. Rep. No. 102). University of Rochester.

Bindman, S. W., Pomerantz, E. M., & Roisman, G. I. (2015). Do children's executive functions account for associations between early autonomy-supportive parenting and achievement through high school? *Journal of Educational Psychology*, *107*, 756–770. https://doi.org/10.1037/edu0000017

Blackwell, L. S., Trzesniewski, K. H., & Dweck, C. S. (2007). Implicit theories of intelligence predict achievement across an adolescent transition: A longitudinal study and an intervention. *Child Development*, *78*, 246–263. https://doi.org/10.1111/j.1467-8624.2007.00995.x

Cacioppo, M., Pace, U., & Zappulla, C. (2013). Parental psychological control, quality of family context and life satisfaction among Italian adolescents. *Child Indicators Research*, *6*, 179–191. https://doi.org/10.1007/s12187-012-9164-4

Cheung, R. Y., & Ng, M. C. (2019). Being in the moment later? Testing the inverse relation between mindfulness and procrastination. *Personality and Individual Differences*, *141*, 123–126. https://doi.org/10.1016/j.paid.2018.12.015

Corkin, D. M., Shirley, L. Y., Wolters, C. A., & Wiesner, M. (2014). The role of the college classroom climate on academic procrastination. *Learning and Individual Differences*, *32*, 294–303. https://doi.org/10.1016/j.lindif.2014.04.001

Cortina, J. M. (1993). What is coefficient alpha? An examination of theory and applications. *Journal of Applied Psychology*, *78*, 98–104. https://doi.org/10.1037/0021-9010.78.1.98

Curran, T. (2018). Parental conditional regard and the development of perfectionism in adolescent athletes: The mediating role of competence contingent self-worth. *Sport, Exercise, and Performance Psychology*, *7*, 284–296. https://doi.org/10.1037/spy0000126

Faherty, A. N., Lowe, K., & Arnett, J. J. (2020). Mind games: Parental psychological control and emerging adults' adjustment. *Journal of Social and Personal Relationships*, *37*, 695–794. https://doi.org/10.1177/0265407519877240

Farran, B. (2004). Predictors of academic procrastination in college students (Publication No. 3125010; ProQuest Dissertations and Theses Global Doctoral dissertation). Fordham University.

Field, A. P. (2009). *Discovering statistics using SPSS* (3rd ed.). Sage.

Flett, G. L., Blankstein, K. R., Hewitt, P. L., & Koledin, S. (1992). Components of perfectionism and procrastination in college students. *Social Behavior and Personality: An International Journal*, *20*, 85–94. https://doi.org/10.2224/sbp.1992.20.2.85

Garber, J., Robinson, N. S., & Valentiner, D. (1997). The relation between parenting and adolescent depression: Self-worth as a mediator. *Journal of Adolescent Research*, *12*, 12–33. https://doi.org/10.1177/0743554897121003

Graziano, F., Bonino, S., & Cattelino, E. (2009). Links between maternal and paternal support, depressive feelings and social and academic self-efficacy in adolescence. *European Journal of Developmental Psychology*, *6*, 241–257. https://doi.org/10.1080/17405620701252066

Harper, J. F., & Marshall, E. (1991). Adolescents' problems and their relationship to self-esteem. *Adolescence*, *26*, 799–808.

Howell, A. J., & Watson, D. C. (2007). Procrastination: Associations with achievement goal orientation and learning strategies. *Personality and Individual Differences*, *43*, 167–178. https://doi.org/10.1016/j.paid.2006.11.017

Hung, C. L. (2007). Family, schools and Taiwanese children's outcomes. *Educational Research*, *49*, 115–125. https://doi.org/10.1080/00131880701369644

Hussain, I., & Sultan, S. (2010). Analysis of procrastination among university students. *Procedia-Social and Behavioral Sciences*, *5*, 1897–1904. https://doi.org/10.1016/j.sbspro.2010.07.385

Jadidi, F., Mohammadkhani, S., & Tajrishi, K. Z. (2011). Perfectionism and academic procrastination. *Procedia-Social and Behavioral Sciences*, *30*, 534–537. https://doi.org/10.1016/j.sbspro.2011.10.104

Jang, H., Reeve, J., & Deci, E. L. (2010). Engaging students in learning activities: It is not autonomy support or structure but autonomy support and structure. *Journal of Educational Psychology*, *102*, 588–600. https://doi.org/10.1037/a0019682

Johnson, J. L., & Bloom, A. M. (1995). An analysis of the contribution of the five factors of personality to variance in academic procrastination. *Personality and Individual Differences*, *18*, 127–133. https://doi.org/10.1016/0191-8869(94)00109-6

Juang, L. P., & Silbereisen, R. K. (2002). The relationship between adolescent academic capability beliefs, parenting and school grades. *Journal of Adolescence*, *25*, 3–18. https://doi.org/10.1006/jado.2001.0445

Kim, K. R., & Seo, E. H. (2015). The relationship between procrastination and academic performance: A meta-analysis. *Personality and Individual Differences*, *82*, 26–33. https://doi.org/10.1016/j.paid.2015.02.038

Klassen, R. M., Krawchuk, L. L., & Rajani, S. (2008). Academic procrastination of undergraduates: Low self-efficacy to self-regulate predicts higher levels procrastination. *Contemporary Educational Psychology*, *33*, 915–931. https://doi.org/10.1016/j.cedpsych.2007.07.001

Klassen, R. M., & Kuzucu, E. (2009). Academic procrastination and motivation of adolescents in Turkey. *Educational Psychology*, *29*, 69–81. https://doi.org/10.1080/01443410802478622

Kline, R. B. (2011). *Principles and practice of structural equation modeling* (3rd ed.). Guilford.

Klingsieck, K. B. (2013a). Procrastination: When good things don't come to those who wait. *European Psychologist*, *18*, 24–34. https://doi.org/10.1027/1016-9040/a000138

Klingsieck, K. B. (2013b). Procrastination in different life-domains. Is procrastination domain specific? *Current Psychology*, *32*, 175–185. https://doi.org/10.1080/00050068808255605

Lay, C. H. (1986). At last, my research article on procrastination. *Journal of Research in Personality*, *20*, 474–495. https://doi.org/10.1016/0092-6566(86)90127-3

Leflot, G., Onghena, P., & Colpin, H. (2010). Teacher–child interactions: Relations with children's self-concept in second grade. *Infant and child development*, *19*, 385–405. https://doi.org/10.1002/icd.672

Lietaert, S., Roorda, D., Laevers, F., Verschueren, K., & De Fraine, B. (2015). The gender gap in student engagement: The role of teachers' autonomy support, structure, and involvement. *British Journal of Educational Psychology*, *85*, 498–518 . https://doi.org/10.1111/bjep.12095

Lu, M., Walsh, K., White, S., & Shield, P. (2017). The associations between perceived maternal psychological control and academic performance and academic self-concept in Chinese adolescents: The mediating role of basic psychological needs. *Journal of Child and Family Studies*, *26*, 1285–1297. https://doi.org/10.1007/s10826-016-0651-y

Mann, L. (2016). Procrastination revisited: A commentary. *Australian Psychologist*, *51*, 47–51. https://doi.org/10.1111/ap.12208

Marsh, H. W. (1990). The structure of academic self-concept: The Marsh/Shavelson model. *Journal of Educational Psychology*, *82*, 623–636. https://doi.org/10.1037/0022-0663.82.4.623

Marsh, S., Dobson, R., & Maddison, R. (2020). The relationship between household chaos and child, parent, and family outcomes: A systematic scoping review. *BMC Public Health*, *20*, 1–27. https://doi.org/10.1186/s12889-020-08587-8

Mih, V. (2013). Role of parental support for learning, autonomous/control motivation, and forms of self-regulation on academic attainment in high school students: A path analysis. *Cognition, Brain, Behavior. An Interdisciplinary Journal*, *17*, 35–59.

Mouratidis, A., Michou, A., Aelterman, N., Haerens, L., & Vansteenkiste, M. (2018). Begin-of-school-year perceived autonomy-support and structure as predictors of end-of-school-year study efforts and procrastination: The mediating role of autonomous and controlled motivation. *Educational Psychology*, *38*, 435–450. https://doi.org/10.1080/01443410.2017.1402863

Mouratidis, A., Vansteenkiste, M., Michou, A., & Lens, W. (2013). Perceived structure and achievement goals as predictors of students' self-regulated learning and affect and the mediating role of competence need satisfaction. *Learning and Individual Differences*, *23*, 179–186. https://doi.org/10.1016/j.lindif.2012.09.001

Nordby, K., Klingsieck, K. B., & Svartdal, F. (2017). Do procrastination-friendly environments make students delay unnecessarily? *Social Psychology of Education*, *20*, 491–512. https://doi.org/10.1007/s11218-017-9386-x

Özer, B. U., Demir, A., & Ferrari, J. R. (2009). Exploring academic procrastination among Turkish students: Possible gender differences in prevalence and reasons. *The Journal of Social Psychology*, *149*, 241–257. https://doi.org/10.3200/SOCP.149.2.241-257

Pace, U., D'Urso, G., & Zappulla, C. (2018). Negative eating attitudes and behaviors among adolescents: The role of parental control and perceived peer support. *Appetite*, *121*, 77–82. https://doi.org/10.1016/j.appet.2017.11.001

Pinquart, M. (2016). Associations of parenting styles and dimensions with academic achievement in children and adolescents: A meta-analysis. *Educational Psychology Review*, *28*, 475–493. https://doi.org/10.1007/s10648-015-9338-y

Pychyl, T. A., Coplan, R. J., & Reid, P. A. (2002). Parenting and procrastination: Gender differences in the relations between procrastination, parenting style and self-worth in early adolescence. *Personality and Individual Differences*, *33*, 271–285. https://doi.org/10.1016/S0191-8869(01)00151-9

R Core Team. (2016). *R: A language and environment for statistical computing [Computer software manual]*. R Foundadion for Statistical Computing. http://www.R-project.org/

Roeser, R. W., & Eccles, J. S. (1998). Adolescents' perceptions of middle school: Relation to longitudinal changes in academic and psychological adjustment. *Journal of Research on Adolescence*, *8*, 123–158. https://doi.org/10.1207/s15327795jra0801_6

Rogers, A. A., Memmott-Elison, M. K., Padilla-Walker, L. M., & Byon, J. (2019). Perceived parental psychological control predicts intraindividual decrements in self-regulation throughout adolescence. *Developmental Psychology*, *55*, 2352–2364. https://doi.org/10.1037/dev0000818

Rosseel, Y. (2012). *lavaan: Latent variable analysis (R package version 3.3–1) [Computer software manual]*. http://CRAN.R-project.org/package=lavaan

Sayıl, M., & Kındap, Y. (2010). Ergenin anne-babadan algıladığı psikolojik kontrol: Psikolojik kontrol ölçeğinin geçerlik ve güvenirliği. *Türk Psikoloji Yazıları [Turkish Psychological Articles]*, *13*, 62–75.

Schouwenburg, H. C., & Lay, C. H. (1995). Trait procrastination and the big-five factors of personality. *Personality and Individual Differences*, *18*, 481–490. https://doi.org/10.1016/0191-8869(94)00176-S

Schraw, G., Wadkins, T., & Olafson, L. (2007). Doing the things we do: A grounded theory of academic procrastination. *Journal of Educational Psychology*, *99*, 12–25. https://doi.org/10.1037/0022-0663.99.1.12

Schunk, D. H., & Meece, J. L. (2006). Self-efficacy development in adolescence. In F. Pajares, & T. Urdan (Eds.), *Self-efficacy beliefs of adolescents* (pp. 71–96). Information Age.

Schutte, N. S., & del Pozo de Bolger, A. (2020). Greater mindfulness is linked to less procrastination. *International Journal of Applied Positive Psychology*, *5*, 1–12. https://doi.org/10.1007/s41042-019-00025-4

Sedláková, J., Mýlek, V., Čapková, K., Procházka, J., Vaculík, M., & Ježek, S. (2014). Parental control of child as a predictor of academic procrastination. In M. Houška, I. Krejčí, & M. Flégl (Eds.), *Proceedings of the 11th International Conference on Efficiency and Responsibility in Education* (Vol. 2014, pp. 694–702). Czech University of Life Sciences Prague.

Shaffer, D. R. (2009). Sex differences, gender-role development, and sexuality, *Social and personality development* (6th ed., pp. 231–259). Wadsworth.

Shih, S. (2017). Factors related to Taiwanese adolescents' academic procrastination, time management, and perfectionism. *The Journal of Educational Research*, *110*, 415–424. https://doi.org/10.1080/00220671.2015.1108278

Shih, S. (2019). An examination of academic coping and procrastination from the self-determination theory perspective. *Journal of Education and Human Development*, *8*, 57–68. https://doi.org/10.15640/jehd.v8n1a8

Silk, J. S., Morris, A. S., Kanaya, T., & Steinberg, L. (2003). Psychological control and autonomy granting: Opposite ends of a continuum or distinct constructs? *Journal of Research on Adolescence*, *13*, 113–128. https://doi.org/10.1111/1532-7795.1301004

Sirois, F. M., Yang, S., & van Eerde, W. (2019). Development and validation of the general procrastination scale (GPS-9): A short and reliable measure of trait procrastination. *Personality and Individual Differences*, *146*, 26–33. https://doi.org/10.1016/j.paid.2019.03.039

Skinner, E. A., & Belmont, M. J. (1993). Motivation in the classroom: Reciprocal effects of teacher behavior and student engagement across the school year. *Journal of Educational Psychology*, *85*, 571–581. https://doi.org/10.1037/0022-0663.85.4.571

Sobel, M. E. (1982). Asymptotic confidence intervals for indirect effects in structural equation models. *Sociological Methodology*, *13*, 290–312. https://doi.org/10.2307/270723

Soenens, B., Elliot, A. J., Goossens, L., Vansteenkiste, M., Luyten, P., & Duriez, B. (2005). The intergenerational transmission of perfectionism: Parents' psychological control as an intervening variable. *Journal of Family Psychology*, *19*, 358–366. https://doi.org/10.1037/0893-3200.19.3.358

Soenens, B., Park, S. Y., Vansteenkiste, M., & Mouratidis, A. (2012). Perceived parental psychological control and adolescent depressive experiences: A cross-cultural study with Belgian and South-Korean adolescents. *Journal of Adolescence*, *35*, 261–272. https://doi.org/10.1016/j.adolescence.2011.05.001

Soenens, B., & Vansteenkiste, M. (2005). Antecedents and outcomes of self-determination in 3 life domains: The role of parents' and teachers' autonomy support. *Journal of Youth and Adolescence*, *34*, 589–604. https://doi.org/10.1007/s10964-005-8948-y

Soenens, B., & Vansteenkiste, M. (2010). A theoretical upgrade of the concept of parental psychological control: Proposing new insights on the basis of self-determination theory. *Developmental Review*, *30*, 74–99. https://doi.org/10.1016/j.dr.2009.11.001

Soenens, B., Vansteenkiste, M., & Luyten, P. (2010). Toward a domain-specific approach to the study of parental psychological control: Distinguishing between dependency-oriented and achievement-oriented psychological control. *Journal of Personality*, *78*, 217–256. https://doi.org/10.1111/j.1467-6494.2009.00614.x

Solomon, L. J., & Rothblum, E. D. (1984). Academic procrastination: Frequency and cognitive-behavioral correlates. *Journal of Counseling Psychology*, *31*, 503–509. https://doi.org/10.1037/0022-0167.31.4.503

Steel, P. (2007). The nature of procrastination: A meta-analytic and theoretical review of quintessential self-regulatory failure. *Psychological Bulletin*, *133*, 65–94. https://doi.org/10.1037/0033-2909.133.1.65

Steel, P., Brothen, T., & Wambach, C. (2001). Procrastination and personality, performance, and mood. *Personality and Individual Differences*, *30*, 95–106. https://doi.org/10.1016/S0191-8869(00)00013-1

Steel, P., & Klingsieck, K. B. (2016). Academic procrastination: Psychological antecedents revisited. *Australian Psychologist*, *51*, 36–46. https://doi.org/10.1111/ap.12173

Stoet, G., & Geary, D. C. (2018). The gender-equality paradox in science, technology, engineering, and mathematics education. *Psychological Science*, *29*, 581–593. https://doi.org/10.1177/0956797617741719

Stroet, K., Obdenakker, M.-C., & Minnaert, A. (2013). Effects of need supportive teaching on early adolescents' motivation and engagement: A review of the literature. *Educational Research Review*, *9*, 65–87. https://doi.org/10.1016/j.edurev.2012.11.003

van Eerde, W. (2003). A meta-analytically derived nomological network of procrastination. *Personality and Individual Differences*, *35*, 1401–1418. https://doi.org/10.1016/S0191-8869(02)00358-6

Vansteenkiste, M., Sierens, E., Soenens, B., Goossens, L., Dochy, F., Aelterman, N., & Beyers, W. (2012). Identifying configurations of perceived autonomy support and structure: Associations with self- regulated learning, motivation and problem behavior. *Learning and Instruction*, *22*, 431–439. https://doi.org/10.1016/j.learninstruc.2012.04.002

Watson, D. C. (2001). Procrastination and the five-factor model: A facet level analysis. *Personality and Individual Differences*, *30*, 149–158. https://doi.org/10.1016/S0191-8869(00)00019-2

Won, S., & Yu, S. L. (2018). Relations of perceived parental autonomy support and control with adolescents' academic time management and procrastination. *Learning and Individual Differences*, *61*, 205–215. https://doi.org/10.1016/j.lindif.2017.12.001

Woo, V. M.-W., & Yeo, K. J. (2019). The relationship between parenting styles and procrastination behaviours: A systematic review. *Asia Proceedings of Social Sciences*, *3*, 6–9. https://readersinsight.net/APSS/article/view/472

Wouters, S., Colpin, H., Luyckx, K., & Verschueren, K. (2018). Explaining the relationship between parenting and internalizing symptoms: The role of self-esteem level and contingency. *Journal of Child & Family Studies*, *27*, 3402–3412. https://doi.org/10.1007/s10826-018-1167-4

Xu, T., Sirois, F. M., Zhang, L., Yu, Z., & Feng, T. (2021). Neural basis responsible for self-control association with procrastination: Right MFC and bilateral OFC functional connectivity with left dlPFC. *Journal of Research in Personality*, *91*, 104064. https://doi.org/10.1016/j.jrp.2021.104064

Xu, X., Lou, L., Wang, L., & Pang, W. (2017). Adolescents' perceived parental psychological control and test anxiety: Mediating role of academic self-efficacy. *Social Behavior and Personality: An International Journal*, *45*, 1573–1583. https://doi.org/10.2224/sbp.6754

Zakeri, H., Esfahani, B. N., & Razmjoee, M. (2013). Parenting styles and academic procrastination. *Procedia-Social and Behavioral Sciences*, *84*, 57–60. https://doi.org/10.1016/j.sbspro.2013.06.509

Ziegler, N., & Opdenakker, M. C. (2018). The development of academic procrastination in first-year secondary education students: The link with metacognitive self-regulation, self-efficacy, and effort regulation. *Learning and Individual Differences*, *64*, 71-82. https://doi.org/10.1016/j.lindif.2018.04.009

How to cite this article: Selçuk, Ş., Koçak, A., Mouratidis, A., Michou, A., & Sayıl, M. (2021). Procrastination, perceived maternal psychological control, and structure in math class: The intervening role of academic self-concept. *Psychol Schs*, 58, 1782–1798. https://doi.org/10.1002/pits.22542