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► **To cite this version:**

Martinie Marie-Amélie, Rebecca Shankland. Poor learning-related resource management and psychological inflexibility as predictors of procrastination in first-year university students. *Cogent Education*, 2023, 10 (2), 10.1080/2331186X.2023.2287907 . hal-04389096

HAL Id: hal-04389096

<https://hal.science/hal-04389096>

Submitted on 11 Jan 2024

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**Poor Learning-Related Resource Management and Psychological Inflexibility as Predictors of
Procrastination in First-Year University Students**

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Martinie, M.-A., & Shankland, R. (In press). Poor Learning-Related Resource Management and Psychological Inflexibility as Predictors of Procrastination in First-Year University Students. *Cogent Education*. <http://doi.org/10.1080/2331186X.2023.2287907>

Abstract (136 words)

Poor academic performance is known to be linked to the tendency to procrastinate. The latter is thought to reflect deficits in effort regulation and study time management (i.e., learning-related resources), but some recent results have suggested that it could stem from psychological inflexibility. The main objective of the present study was thus to ascertain whether effort regulation, study time management, and psychological (in)flexibility predict variations in French students' academic procrastination. The results of an online survey among 259 first-year humanities and social sciences students revealed that 42.4% of the variance in procrastination was predicted by effort regulation and study time management, and 4% by psychological inflexibility. There was also a negative relationship between academic performance and procrastination. These results are discussed in terms of the usefulness of implementing interventions at the start of university to promote academic success and student wellbeing.

Keywords: procrastination, effort regulation, study time, psychological (in)flexibility, higher education

Declarations

Conflict of interest: The authors declare that they have no conflict of interest in relation to this article.

Poor Learning-Related Resource Management and Psychological Inflexibility as Predictors of Procrastination in First-Year University Students

In modern society, the life domains of work and studies are characterized by a tendency to procrastinate. *Procrastination* refers to the unnecessary and intentional postponing of activities, even though it may have negative consequences for the individual (Steel, 2007). It is linked to poor mental health (Stead et al., 2010), high levels of stress (Shaked & Altarac, 2022), feelings of shame (Fee & Tangney, 2000), guilt (Blunt & Pychyl, 2005), depression and anxiety (Ferrari, 1991), poor quality of life and low satisfaction with life (Rozenal et al., 2014). In academic settings, procrastination has negative effects on academic performances (Martinie et al., 2022), including lower assignment grades, course grades and grade point averages (Corkin et al. 2021), and a higher course dropout rate (Balkis, 2013). It is also positively correlated with academic burnout (Abdi Zarrin et al., 2019; Hall et al. 2019). In sum, academic procrastination is problematic for both the academic performance and wellbeing of students. It is important to identify its predictors, in order to design interventions that can effectively reduce it.

University teachers and administrators can limit but not eliminate procrastination among students by acting on situational factors. For instance, changes in examination rules have been shown to reduce study delay (Schmidt et al. 2022). The present study therefore investigated how far academic procrastination among French first-year university students is predicted by effort regulation and study time management, as well as by students' internal state. We focused specifically on this population because for multiple reasons (e.g., change in personal interests, wrong academic choice, health crisis, etc.) including procrastination, more than half of all French students fail to complete their first year (Ministère de l'Enseignement Supérieur et de la Recherche, 2020). This population therefore appears to be particularly at risk and to have fewer resources to cope with academic situations. The purpose of the present

study was to inform educators about educational practices that can reduce academic procrastination.

Learning-Related Resource Management and Procrastination

In academic settings, students need to have knowledge and skills, but they also need to use personal resources such as effort regulation. The latter refers to persistence in the face of difficulty or tedium, and relates to the ability to control one's attention and effort in situations where distractions may be welcome. In other words, it reflects a commitment to pursue goals even when the individual is distracted and the task is difficult. This resource is key to learning, in that it determines the continued use of learning strategies. Authors have observed that the less students regulate their effort, the more they procrastinate (Hailikari et al., 2021; Martinie et al., 2022; Rakes & Dunn, 2010; Wolters & Hussain, 2015; Ziegler & Opdenakker, 2018). This negative relationship therefore suggests that procrastination is linked to a deficit of effort regulation.

Procrastinators are characterized by poor effort self-regulation, but also by poor study time management. As time is a resource that cannot be changed, individuals must choose how to use it. Compared with nonprocrastinators, chronic procrastinators spend less time preparing for activities that may lead to success and more time on projects that may lead to failure, and underestimate the time needed to perform a task (Lay, 1992; McCown et al., 1987). Moreover, many students find themselves with insufficient time to prepare for their exams because they have not planned their working time in advance, and therefore fail to achieve the grade needed to pass (Asikainen et al., 2013). Authors have observed that the less students regulate their study time, the more they procrastinate (Aribas, 2021; Hailikari et al., 2021; Martín-Antón et al., 2022; Zhao et al., 2021). This negative relationship suggests that procrastination is related to poor study time management skills. However, not all studies have observed a significant relationship (Ackerman & Gross, 2005; Pychyl et al., 2000). For

example, Pychyl et al. (2000) found that individuals with high versus low procrastination scores did not differ on the number of errors in study time estimates. This result does not support idea that procrastination is a study time management problem and that procrastinators therefore have problems with their study time estimations. The relationship between study time management and procrastination therefore requires further clarification.

Experiential Avoidance and Procrastination

Procrastination should not be regarded solely as the outcome of deficits in effort regulation and study time management, as it may also be a strategy for avoiding negative affect (Sirois & Pychyl, 2013; 2016; Tice et al., 2001). Procrastination most often occurs when the task to be performed is viewed as aversive (e.g., Blunt & Pychyl, 2000; Martín-Antón et al., 2022; Shaked & Altarac, 2022; Steel, 2007) or lacking an immediate reward (Schouwenburg & Groenewoud, 2001). Students often have a negative perception of academic work, viewing it as boring, unpleasant and anxiety-provoking (Kaftan & Freund, 2019). Aversive tasks generate negative affect (anxiety and worry), so one way of avoiding further negative affect associated with an aversive task is to not perform that task and to engage in another more pleasant one instead. The results of three studies are consistent with this view. First, in a daily diary study, Pollack and Herres (2020) observed that negative affect predicted next-day procrastination, whereas procrastination did not predict next-day negative affect. Results therefore showed that negative affect precedes procrastination. Second, Forstervold et al. (2022) reported that students' perceived stress increased procrastination. Third, Tice et al. (2001) found that if participants with induced bad mood believed they could change their mood by engaging in a pleasant distractor task instead of practicing for a multiplication test (i.e., aversive task), they procrastinated. This effect was not observed if participants were given to believe that their bad mood could not be changed. Results therefore

suggested that participants procrastinated in order to go from a bad mood to a good mood, and their procrastination served an emotion regulation purpose.

When they choose a distractor activity, procrastinators may not realize that their task avoidance will subsequently increase their negative affect (Tice & Baumeister, 1997). And yet procrastination has been shown to be linked to negative emotions such as despair, anxiety, guilt, shame, regret, and stress (Blunt & Pychyl, 2005; Zeenath & Orcullo, 2012).

Furthermore, procrastination is correlated with negative self-assessment (Flett et al., 1995; Flett et al. 2012), in the form of self-deprecating thoughts after delaying tasks (McCown et al., 2012), and self-blame related to past procrastination (Stainton et al., 2000). These negative self-assessments fuel procrastinators' stress (Flett et al., 2012, Sirois, 2014). A meta-analysis carried out by Sirois and Kitner (2015) showed that procrastination is linked to greater use of maladaptive coping strategies (i.e., immediately relieving negative emotions related to a stressor without addressing the source of the stress), and less use of adaptive coping strategies (i.e., addressing the cause of a problem or learning to deal with the negative emotions associated with that problem).

Procrastinating to avoid aversive feelings is consistent with experiential avoidance, but also with the notion of psychological (in)flexibility that subtends acceptance and commitment therapy (Hayes et al., 2012). *Psychological flexibility* is defined as the "ability to contact the present moment more fully as a conscious human being, and to either change or persist when doing so serves valued ends" (Hayes et al., 2006, p. 5). It is characterized by six key psychological processes: (a) acceptance (i.e., ability to face situations rather than trying to avoid them), (b) cognitive defusion (i.e., ability to consider thoughts as mental events rather than reality), (c) self as context (i.e., ability to stand back from one's internal experience and observe it from another perspective: the person does not identify with the content of an internal experience, but with the context in which this experience emerges), (d) committed

action (i.e., engagement in actions that are coherent with the person's values), (e) clear values (i.e., identification of own meaningful values), and (f) present moment awareness (i.e., ability to focus attention on the present moment, with openness and curiosity rather than being constantly distracted or oriented by one's thoughts or judgments).

In contrast to psychological flexibility, *psychological inflexibility* is defined as the "rigid dominance of psychological reactions, over chosen values and contingencies, in guiding action" (Bond et al., 2011, p. 678). It too is characterized by six key psychological processes: (a) experiential avoidance (i.e., avoiding potentially meaningful situations because of the fear of experiencing negative emotions), (b) cognitive fusion (i.e., identifying with one's thoughts), (c) self-as-content (i.e., identifying with the content of one's internal experiences), (d) inaction (i.e., lack of engagement with activities related to one's values), (e) lack of contact with values (i.e., lack of clarity of one's values), and (f) lack of contact with the present moment (Hayes et al., 2012).

Previous research has highlighted positive correlations between inflexibility and depression, anxiety, stress, and psychological distress (Bond et al., 2011), while some studies (Eisenbeck et al., 2019; Gagnon et al., 2016; Glick et al., 2014; Hailikari et al., 2021) have highlighted a negative link between experiential avoidance and procrastination, suggesting that procrastination results from psychological inflexibility. More specifically, Eisenbeck et al. (2019) showed that experiential avoidance mediates the relationship between general psychological distress and academic procrastination. For their part, Hailikari et al. (2021) found that the variance in procrastination in Finnish students was predicted positively by experiential avoidance, and negatively by time and effort management. To our knowledge, however, their study had at least two limitations. First, participants were preselected, insofar as they had to have problems with their studies and were therefore probably more motivated

to improve their learning-related resource management. Second, only one of the 12 (in)flexibility processes was measured.

Purpose of the Present Study

The present study explored whether the tendency to procrastinate is predicted by psychological (in)flexibility processes, effort regulation, and study time management in an unselected French student population. Given that procrastination is considered to be a deficit in learning-related resource management, and may also result from psychological inflexibility, we expected it to be predicted negatively by effort regulation, study time management and psychological flexibility, and positively by psychological inflexibility. We also expected procrastination to be negatively correlated with academic performance. This study was not preregistered, but our data are publicly available on the Open Science Framework and can be access at:

https://osf.io/cb8r9/?view_only=b9dd4f139033460ca2de4db50cf5b1a0

Method

The study was preregistered on the institution's register of data processing activities. It was carried out in accordance with the Declaration of Helsinki, and complied with the General Data Protection Regulation and the French Data Protection Act. All participants gave their written informed consent.

Sample and Procedure

During the seventh week of the first semester of the 2021-2022 academic year, French students ($N = 580$), enrolled in a humanities and social sciences bachelor program were invited by the authors to complete an online survey comprising scales measuring academic procrastination, effort regulation, study time management, and psychological (in)flexibility.

The order of the scales was randomized across participants. A total of 276 students completed the survey. Of these, four outliers were identified (z score > 3), and their data were excluded from the analyses. We had to exclude the data of a further 13 students, as they did not sit the university's exams. The final sample was therefore composed of 259 students (239 female and 20 male) ($M_{\text{age}} = 18.64$ years, $SD_{\text{age}} = 1.312$).

Measures

Academic procrastination.

We used an 11-item validated French version (Osiurak et al., 2015) of Solomon and Rothblum (1984)'s Academic Procrastination Scale. The internal consistency of this scale was satisfactory ($\alpha = .73$). All items were rated on a 7-point Likert scale ranging from 1 (*not at all true for me*) to 7 (*totally true for me*). A mean procrastination score was calculated.

Resource management.

In the absence of a validated tool in French, 12 items (time and study environment: eight items; effort regulation: four items) from the Motivated Strategies for Learning Questionnaire (Duncan et al., 2015) were translated by the authors. An English-French bilingual then translated the French version back into English. Any discrepancies between the original items and the back-translation were discussed by the authors and the back-translator until a satisfactory solution was found. The internal consistency of the two subscales was satisfactory ($\alpha = .67$ for study time management; $\alpha = .64$ for effort regulation). A mean score was calculated for each type of resource management.

Psychological (in)flexibility

Psychological (in)flexibility was measured with the French version of the Multidimensional Psychological Flexibility Inventory short form (Grégoire et al., 2020). Internal consistency was satisfactory for both the flexibility ($\alpha = .85$) and the inflexibility ($\alpha = .83$) subscales. We calculated mean scores for flexibility and inflexibility.

Academic performance

Participants' mean grade for the first semester of the first year of the bachelor's degree program in psychology was used as an indicator of their academic performance. This mean grade was calculated from the grades for five teaching units. Each teaching unit was assessed by a written exam. Grades range from 0 to 20 in the French system.

Results

Data Processing

We conducted two types of analyses. First, correlation analyses were performed between factors (Bravais-Pearson r). Second, we conducted two-step hierarchical regression analyses in which procrastination scores were regressed on the two types of resource management in the first step. Psychological flexibility and inflexibility were added in the follow-up step. Analyses were performed using jamovi software version 2.2.5 (The jamovi Project, 2021).

Descriptive Statistics

The variables in the study are described in Table 1. All variables had a satisfactory level of normality, with skewness values below two and kurtosis values below four (Kline, 1998, reported by Kane et al., 2004).

Insert Table 1 about here

Correlations Between Procrastination, Psychological Flexibility and Inflexibility, Learning-Related Resource Management, and Performance

The results of correlation analyses are set out in Table 2. They revealed clear relations between factors. Procrastination was negatively correlated with study time management, effort regulation, psychological flexibility, and performance (all $ps < .001$). It was also positively correlated with psychological inflexibility ($p < .001$). Effort regulation was linked positively with study time management, flexibility, and performance (all $ps < .001$), and negatively with inflexibility ($p < .01$). Study time management was correlated positively with psychological flexibility and performance (both $ps < .001$), and negatively with psychological inflexibility ($p < .01$). Finally, psychological inflexibility was negatively correlated with psychological flexibility ($p < .001$).

Insert Table 2 about here

Predictors of Procrastination

We checked the multicollinearity between our variables. The variance inflation factor, an index of statistical multicollinearity between factors, was below five, suggesting an absence of multicollinearity between our variables (see Table 1). Results of the first step of the regression analyses revealed that resource management accounted for 42.4% (adjusted R^2) of the variance in procrastination, $F(2, 256) = 95.9, p < .001$. Procrastination was significantly and negatively predicted by study time management, $t(256) = -6.39, p < .001$, and effort regulation, $t(256) = -6.55, p < .001$. The results of the second step revealed that 46.7% of the variance was accounted for when flexibility and inflexibility variables were added, $\Delta F(2, 254)$

= 11.3, $p < .001$. In this model, only inflexibility significantly and positively predicted procrastination, $t(254) = 4.26, p < .001$.

Discussion

The present study investigated whether learning-related resource management and psychological (in)flexibility predict procrastination in French first-year university students, with a view to using these factors as levers for improving student learning. Drawing on previous studies, we expected the two types of resource management (effort regulation and study time management) to negatively predict procrastination, and psychological inflexibility to positively predict it. Finally, we expected procrastination to be negatively correlated with academic performance.

Correlation analyses revealed that study time management, effort regulation, psychological flexibility, and performance were negatively correlated with procrastination, while the latter was positively correlated with psychological inflexibility. These results are consistent with those reported in the literature (e.g., Aribas, 2021; Eisenbeck et al., 2019; Hailikari et al., 2021; Martinie et al., 2022). Effort regulation and study time management were positively correlated with academic performance, again consistent with literature findings (Baker, 1989; Haarala-Muhonen et al., 2011; Häfner et al., 2015). Finally, effort regulation and study time management were correlated positively with flexibility, and negatively with inflexibility. Concerning our model, 42% of the variance in procrastination was negatively predicted by effort regulation and study time management, and 4% was positively predicted by inflexibility. Taken together, these results reinforce the idea that procrastination reflects impaired study time management (Burka & Yuen, 1982; Glick & Orsillo, 2015) and effort regulation (Rakes & Dunn, 2010; Wolters & Hussain, 2015), as well as psychological inflexibility. A recent study in a similar population found that 24% of the variance in procrastination was negatively predicted by effort regulation (Martinie et al.,

2022). By adding study time management and psychological inflexibility, our model had greater power to predict procrastination variance.

The idea that procrastination is a deficit of flexibility has only recently emerged in the literature. The results of several studies (Eisenbeck et al., 2019; Gagnon et al., 2016; Hailikari et al., 2021) point to a negative link between psychological flexibility and procrastination. Nevertheless, these studies had various methodological limitations. Psychological (in)flexibility was measured by means of the Acceptance and Action Questionnaire-II (Bond et al., 2011), which was developed to measure experiential avoidance. This tool has been criticized (see Grégoire et al., 2020) because it has too few items to capture all the dimensions of psychological (in)flexibility (Gámez et al., 2011). Furthermore, given that it taps into experiential avoidance, it should be regarded as a measure of psychological inflexibility rather than psychological flexibility. Other authors have also pointed out that this questionnaire does not distinguish between the tendency to use experiential avoidance strategies and the consequences of such strategies, such as more negative emotions (Wolgast, 2014). This is problematic, as it may lead researchers to overestimate the strength of the relationship between experiential avoidance and mental health problems. One added value of our study was the use of the Multidimensional Psychological Flexibility Inventory to probe the 12 dimensions of psychological flexibility and inflexibility, with no other items measuring other constructs or experiences (Rolffs et al., 2016).

The strong contributions of effort regulation and study time management to the prediction of procrastination are hardly surprising. Today's students grew up in the age of computers, and these have become an integral part of their lifestyle (Haverila, 2013). Smartphones and computers can create any number of distractions, and encourage students to focus their attention on short-term distractions (e.g., surfing on the Internet) rather than on academic work, thereby impairing effort regulation and reducing the amount of time spent

learning. Moreover, procrastination can be conceptualized as a form of disconnect between the individual's present and future selves. More specifically, procrastinators try to regulate their present mood by avoiding unpleasant, challenging or boring tasks that generate negative emotions (for a review, see Sirois & Pychyl, 2013). They prefer immediacy, which prevents them from giving priority to the future. Hence, Sirois (2014)'s meta-analysis showed that procrastination is negatively and moderately associated with the future time perspective, and positively related to the present time perspective.

Our results converge with those reported by Hailikari et al. (2021). These authors found that the tendency to procrastinate among students with study problems was predicted negatively by time and effort management, and positively by experiential avoidance. One added value of our study is that by capturing all the psychological (in)flexibility processes, we were able to show that effort regulation, study time management, and psychological inflexibility are all predictors of academic procrastination in an unselected sample of students. Our study was therefore not just a simple replication of Hailikari et al. (2021)'s study, but an important extension, as it is vital to take all the psychological (in)flexibility processes in account when designing interventions to combat procrastination by helping students deal constructively with their internal states.

Limitations and Future Directions

The present study had four main limitations. First, the correlation analyses did not allow us to reach any conclusions about the causal nature of the relationships we observed. Second, the internal consistency of the resource management scales was below the satisfactory level of .70, reducing the reliability of our results. Third, our results specifically concerned French humanities and social sciences students, who tend to procrastinate more than students in other subject areas (Nordby et al., 2017). It is worth mentioning that in this subject area, students

are mainly female, and 92% of our sample was female. Given that gender-related differences have been observed (Ozer & Ferrari, 2011), our results cannot be generalized to male students. Ozer and Ferrari (2011) observed that among Turkish students, male students reported more frequent academic procrastination than female students. Furthermore, female and male students gave different reasons for their procrastination. Female students cited fear of failure and laziness, while male students cited risk taking and rejection of control. Moreover, we only included first-year students, meaning that different conclusions might be reached for students in other years. Fourth, our model did not take self-efficacy into consideration. This personal resource refers to individuals' ability to act in a way that enables them to achieve their goals (Bandura, 1997; Heo et al., 2022; Üner et al., 2020). Self-efficacy can play an important role in dealing with stress and increasing mental wellbeing (e.g., Llorens et al., 2007; Salanova et al., 2002), and has been found to be linked to procrastination (Liu et al., 2020; Svartdal et al., 2022), effort regulation and study time management (Rakes & Dunn, 2010; Wolters & Hussain, 2015), and psychological flexibility (Hailikari et al., 2021). In future research, it would be useful to bring these factors together to explain procrastination by taking each psychological (in)flexibility process into account.

Practical Implications and Conclusions

Taken together, our results suggest that in order to overcome procrastination, students must at the very least manage their effort, study time, and internal state. To facilitate effort regulation, it is important for students to avoid ego depletion, by alternating tasks of varying levels of difficulty, taking breaks during learning sessions, and reducing the number of short-term distractions available on their phones and computers. Moreover, given that effort regulation is correlated with self-efficacy (Heo et al., 2022; Üner et al., 2020), one way of promoting effort regulation would be to enhance students' self-efficacy through, say, positive feedback from family, peers, and teachers (Schunk, 1985; Usher, 2009). Furthermore, given

that procrastination is negatively associated with the future time perspective (Sirois, 2014), it would be interesting to raise students' awareness of the importance of planning their study time and organizing their study environment to avoid procrastination. This would enable them to be more active in their learning, by reducing the strategy of working at the last minute under time pressure. The objective here would be to facilitate the conditions for continuous work, which is a source of academic success and wellbeing. Finally, regarding psychological (in)flexibility, interventions specifically designed to develop greater psychological flexibility among students have been tested in acceptance and commitment therapy workshops. The Korsa program was devised to prevent and reduce mental health problems in the student population (Grégoire et al., 2017). Although the original aim was not to reduce procrastination, given that the latter is known to be related to mental health issues (e.g., Haycock et al., 1998), this type of program might also be useful for reducing procrastination in students. One of the studies on the impact of the Korsa program highlighted the relationship between psychological flexibility, stress and wellbeing, and results showed that the association between psychological flexibility and wellbeing became stronger over time (Grégoire et al., 2019). Future studies involving the Korsa program could therefore measure its potential benefits in terms of reducing procrastination.

In conclusion, helping first-year students to improve their effort regulation and study time management, and to cope constructively with their internal states seems a relevant means of reducing their procrastination. These three factors alone accounted for 46.4% of the variance in procrastination, underlining their influence and the need for targeted interventions in this area.

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Table 1
Descriptive Statistics for Measurement Scales

	ProCra	Effort-reg	Time	Flexi	Inflexi	Perf
<i>n</i>	259	259	259	259	259	259
<i>M</i>	3.98	4.75	4.92	4.58	4.18	10.9
<i>SD</i>	0.99	1.12	0.84	0.95	1.11	2.52
<i>Skewness</i>	-0.01	-0.32	-0.07	-0.11	-0.00	-0.01
<i>Kurtosis</i>	-0.80	-0.31	-0.02	-0.19	-0.56	-0.57
<i>VIF</i>		1.58	1.47	1.22	1.11	

Note. Likert scale ranging from 1 (*not at all true for me*) to 7 (*totally true for me*). ProCra: procrastination; Effort-reg: effort regulation; Time: study time management; Flexi: psychological flexibility; Inflexi: psychological inflexibility; Perf: performance; Skewness: perfect symmetry or asymmetry equal to 0; Kurtosis: normal kurtosis equal to 0; VIF: variance inflation factor.

Table 2
Correlations for Study Variables

	1	2	3	4	5	6
1. ProCra	—					
2. Effort-reg	-0.581 ***	—				
3. Time	-0.577 ***	0.563 ***	—			
4. Flexi.	-0.293 ***	0.346 ***	0.246 ***	—		
5. Inflexi	0.335 ***	-0.189 **	-0.146 *	-0.304 ***	—	
6. Perf	-0.209 ***	0.331 ***	0.242 ***	0.041	-0.042	—

Note. ProCra: procrastination; Effort-reg: effort regulation; Time: study time management; Flexi: psychological flexibility; Inflexi: psychological inflexibility; Perf: performance. * $p < .05$. ** $p < .01$. *** $p < .001$.

Table 3*Model Coefficients - Procrastination*

Predictor	<i>B</i>	<i>B SE</i>	<i>t</i>	<i>p</i>	β
<i>Step 1</i>					
Effort-reg	-0.33	0.05	-6.55	< .001	-0.37
Time	-0.42	0.06	-6.39	< .001	-0.36
<i>Step 2.</i>					
Effort-reg	-0.29	0.05	-5.83	< .001	-0.33
Time	-0.41	0.06	-6.36	< .001	-0.35
Inflexi	0.19	0.04	4.26	< .001	0.21
Flexi	-0.02	0.05	-0.54	0.58	-0.02

Note. Effort-reg: effort regulation; Time: study time management; Flexi: psychological flexibility; Inflexi: psychological inflexibility. $R^2 = .42$ ($p < .001$) for Step 1; $\Delta R^2 = .04$ ($p < .001$) for Step 2.

