



The Correlation between Procrastination and Perceived Stress & Parenting Styles of Chinese Medical Students

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Abstract

To explore the correlations between procrastination, perceived stress and parenting style of Chinese medical students. One hundred and forty students of bachelor of medicine (MBBS) (62 males and 78 females) aged from 18 to 22 years enrolled in the study. Procrastination assessment scale-students (PASS), the Chinese version of the perceived stress scale (PSS) and the Chinese version of Egma minnen av Barndoms uppfostran (EMBU) were assessed at the beginning of the semester. Meanwhile, PSS were retested two times at 2 weeks (PSS2) and 4 weeks (PSS3) after the first testing (PSS1). Students with higher procrastination frequency had higher scores of PSS2, PSS3 and total PSS than the students with lower procrastination frequency. Boys reported a significantly higher level of father punishment and mother rejection and mother over-intervention than girls. Procrastination, mother warmth & affection and over-intervention had positive and significant main effects on stress. Procrastination induced delayed stress of MBBS. Male MBBS reported more negative relationships with their parents than female MBBS. Positive parenting style had a positive correlation with stress and negative parenting style had a negative correlation with stress. Procrastination, mother warmth & affection and over-intervention predicted higher stress.

Disciplinary: Health Sciences and Management, Psychological Sciences.

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1 Introduction

Procrastination is a common behavior in societies. Procrastination refers to putting off, prolonging, postponing, suspending, or delaying performing a particular task (Solomon and Rothblum, 1984). The act of unnecessarily delaying tasks to the point of experiencing subjective discomfort. A lot of people become victims of procrastination, but students are the target most of the time (Loa, 2012). Procrastination is prolonging a particular task that a person intends to complete, especially when he is in a situation of emotional discomfort (Ferrari, 1991). (Ferrari, 1992) described that academic procrastinators remain unsuccessful in achieving their educational goals because of fear of failure and task evasion. (Schraw et al., 2007) described it as, postponing or deferring any task intentionally that must be accomplished.

Academic procrastination appears as a major problem among graduate students (Cao, 2012; Nordby et al 2017) which is considered damaging to students' academic development and success (Zakeri et al., 2013). Identified that graduate students tend to have higher procrastination than undergraduate students. In postgraduate students, academic procrastination is linked with fear of failure, task evasion, reading skills and different kinds of academic stress (Collins et al., 2008). Procrastination put an adverse effect on graduate students' academic development (Onwuegbuzie, 2000). Previous studies found that around 70 percent of university students are facing procrastination in their academic tasks (Mahasneh et al., 2016). In contrast, more than 50 percent of students face procrastination constantly and problematically. (Shah et al., 2017; Hans et al., 2015) investigated in their study that approximately 58 percent of undergraduate students procrastinated three hours or more in a day. Solomon and Rothblum (1984) reported that 27.6 percent of their undergraduate students face procrastination while studying for their exams, 46 percent face it when writing a term paper and 30.1% when they intend to complete an assignment. In the same way, (Mahasneh et al., 2016) highlighted procrastination among graduate students with the same three tasks as 39.3%, 41.7% and 60% respectively.

Several studies showed detrimental consequences of academic procrastination comprising psychological, personal, emotional and health issues (Johnson and Bloom, 1995). Procrastination induced stress in students, providing further evidence that procrastination enhances stress in young adulthood (Arslan et al., 2019). It is essential to identify the reasons that enhance undergraduate students' chances of procrastination on academic tasks. (Scher and Ferrari, 2000) described that family dynamics are considered a significant and key factor in academic procrastination. Academic procrastination can be linked to family issues, environmental issues and personal issues, with parenting style, being a basic factor among all.

Parenting style is regarded as one of the primary family factors linked to academic procrastination (Zakeri et al., 2013). Several studies stated that children prey to academic procrastination by association with their parents, who act as mentors and advisors for certain actions (Chen, 2017). Results from empirical studies identified the role of the parent in breeding procrastination among children (Ferrari. and Olivette, 1994). Academic procrastination breeds

among university students because they have a higher level of criticism and expectations from their parents (Frost et al., 1993). Parental behavior leads to academic procrastination among university students, as higher parental expectations and criticism have been associated with the system of socially-prescribed perfectionism that is directly and positively linked to procrastination (Frost et al., 1991). Parenting can play positive or negative behavior (Kochanska et al., 2007). The child's capabilities and personality grow in a safe, stable atmosphere that will ultimately develop his educational and socio-economic progress in the case of positive parenting, whereas negative parenting behavior weakens the child's personality, confidence and character, thus leading to lower academic progress (Hardy et al., 2008).

Several physical, psychological and emotional issues seem to be linked with procrastination. Academic procrastination acts like a distressing phenomenon, and researchers identified it positively related to stress (Sunitha and Musthafa 2013). Stress is a detrimental emotional reaction that arises when a person cannot compete with his competencies, desires, and capabilities (Maxwell, 2004). Literature suggested a positive linkage between academic procrastination and stress. Academic procrastination put an adverse impact on students' academic progress and thus leads to stress (Ekundayo et al., 2010). Tice and Baumeister (1997) identified those university students with higher procrastination experience higher stress. Pychyl (1995) found academic procrastination among doctoral students produces stress, depression and guilt. However, the relationship between procrastination perceived stress and parenting styles had not been fully understood by Chinese medical students.

The purpose of this study was to explore the correlation between procrastination, perceived stress and the parenting style of Chinese medical students. The study also examined which one of the parenting styles envisages academic procrastination? Also, the effect of the gender difference in this relationship was identified. The present study first hypothesized that parenting styles are linked with procrastination and negative parenting style correlated with a higher frequency of procrastination, as well as procrastination induced higher level of stress in college students. (Gallagher et al., 2008) suggested that parenting styles categorized by severe punishing or changeable discipline are associated with increased anxiety. The study further hypothesized that parenting styles might regulate the process during which procrastination induces the stress on Chinese MBBS students

2 Method

2.1 Participants and Procedure

Participants of this study were 140 Bachelor of Medicine (MBBS) students (male 62 and female 78, with the age of 18-22 years) from Shandong University. All subjects who completed the questionnaire package contained demographic information, parenting style (EMBU), procrastination assessment scale-students and perceived stress scale questionnaire at the beginning of the semester. The perceived stress questionnaire was followed up two weeks and 4 weeks after the first test. Approval for the study was obtained from the Institutional Ethics

Committee of the Medical College of Shandong University. Written consent was obtained from each subject. The purpose of the study, voluntary participation, confidentiality and freedom to discontinue at any time without being left untreated were understood by participants.

2.2 Measures

2.2.1 Procrastination Assessment Scale-Students (PASS)

Procrastination assessment scale-students (PASS) is extensively used to measure academic procrastination among students (Solomon and Rothblum, 1984). Procrastination assessment scale-students (PASS) has two parts, first part has six academic tasks: writing a term paper, studying for exams, weekly assignments, performing administrative tasks, taking part in meetings and performing academic tasks in general. In six tasks, the participants have to accomplish three rating scales which indicate the frequency with which they procrastinate on that task (1 = Never procrastinate, 5 = Always procrastinate) whether their procrastination on the task is a problem (1 = Not at all a problem, 5 = Always a problem) and in case of to decrease their procrastination on the task (1 = Do not want to decrease 5 = Definitely want to decrease) (Solomon and Rothblum, 1984). The sum of PASS items delivers an overall academic procrastination measure with total scores ranging from 12-60. Higher scores demonstrate a higher level of academic procrastination. The second part of the PASS asks respondents to think about when last time they felt procrastination during writing a term paper and have to identify the reason for procrastination. Self-reported procrastination comprises both frequent delay and stress and it takes time to accomplish a task in this situation. Previous studies describe that higher procrastinators lessen delay only when a person's stress reaches a peak (Solomon et al., 1983).

2.2.2 Chinese Version Perceived Stress Scale (PSS)

Perceived stress scale-10 (PSS-10) measures the aspects of one's life that are uncontrollable, unpredictable, and overloading. Respondents were asked to respond to each question on a 5-point Likert scale that range from 0 to 4, where 0 means (never) while 4 shows (very often). The scores range from 0 to 40, where a higher score indicates a higher level of perceived stress. PSS-10 is more reliable and valid with Cronbach's alphas ranging from 0.78-0.91 and the test-retest reliability coefficients, which range from 0.55-0.85 (Wang et al., 2011).

2.2.3 Chinese Version of EMBU

Engma minnen av Bardndosnauppfostran (EMBU) is an 81-item self-report inventory (Perris et al., 1980). The Chinese version of EMBU (EMBU-CV) revised by (Dongmei, 1993), consists of 6 kinds of father parenting styles (warmth & affection, punishment & severity, favoring subject, rejection, over-intervention and over-protection) and 5 kinds of mother parenting styles (warmth affection, punishment & severity, favoring subject, rejection and over-intervention & protection). The Cronbach's alphas of EMBU-CV ranged from 0.46-0.85, the test-retest reliability coefficients of EMBU-CV ranged from 0.58-0.82. In this study, father over-intervention and over-protection took

as one kind, 5 kinds of father parenting styles and 5 kinds of mother parenting styles were analyzed.

2.3 Data Analysis

The collected data was analyzed through a quantitative technique using SPSS®23. An independent t-test was used to compare the differences in procrastination, PSS and parenting style between genders and differences in parenting style and PSS between high and low procrastination of students. Pearson’s correlation was conducted to examine the correlation between procrastination, stress and parenting styles. Regression analysis was used to analyze parenting styles' prediction or regulation effect on stress induced by procrastination. Differences were considered statistically significant if the p-value was less than 0.05.

3 Result and Discussion

3.1 The Comparison of Procrastination, Perceived Stress and Parent Styles between High and Low Procrastination Groups

To explore the differences in parenting style and perceived stress between students with higher and lower procrastination. The frequency distribution of PASS was generated and divided into two groups. 47 students with a PASS score of 30 or below were labeled “low procrastinators” and 52 students scoring 37 or higher were labeled “high procrastinators”. The results indicate that there is significant difference in procrastination ($t=-9.237$, $p<0.01$), PSS2 ($t= -1.98$, $p=0.05$) and PSS3 ($t= -2.88$, $p<0.01$) and total PSS ($t= -2.16$, $p=0.03$) between two groups while there exist no significant differences in parenting styles between two groups (Table 2). The results also indicate that students with high procrastination have a higher level of stress and time going.

Table 1: The comparison of parent style and perceived stress between high and low procrastination groups (M±SD)

| Variables | | Higher Procrastination group (n=52) | Lower Procrastination group (n=47) | t | P |
|-------------------------------------|-----------------------|-------------------------------------|------------------------------------|--------|-------|
| Procrastination | | 61.63 ±7.66 | 43.93± 7.16 | -9.237 | <0.01 |
| Stress | PSS1 | 9.34±1.23 | 9.29±1.38 | -0.18 | 0.85 |
| | PSS2 | 9.32±1.00 | 8.89±1.16 | -1.98 | 0.05 |
| | PSS3 | 8.94±1.10 | 8.21±1.36 | -2.88 | <0.01 |
| | Total PSS | 27.58±2.36 | 26.43±2.87 | -2.16 | 0.03 |
| Father | Warmth & affection | 56.01±8.22 | 58.38±9.07 | 1.35 | 0.17 |
| | Punishment & severity | 14.96±4.23 | 15.04 ±5.26 | 0.08 | 0.93 |
| | Favoring Subject | 10.51 ±4.15 | 9.97±4.14 | -0.64 | 0.51 |
| | Rejection | 8.17±2.28 | 7.80±2.39 | -0.77 | 0.44 |
| Over-intervention & Over-protection | | 15.09±3.35 | 15.20±2.67 | 0.17 | 0.86 |
| Mother | Warmth & affection | 62.78±6.96 | 63.57±8.78 | 0.49 | 0.62 |
| | Over-intervention | 34.36±6.73 | 34.34 ±4.76 | -0.02 | 0.98 |
| | Rejection | 10.94±2.88 | 10.55±3.42 | -0.61 | 0.54 |
| | Punishment & severity | 10.53±2.50 | 11.06±4.04 | 0.78 | 0.43 |
| | Favoring subject | 10.59±4.21 | 10.14±4.30 | -0.52 | 0.60 |

3.2 The Comparison of Procrastination, Perceived Stress and EMBU between Male and Female Students

The comparison of differences in procrastination, perceived stress and EMBU between males and females is shown in Table 1. The results state no significant difference in procrastination and perceived stress between male and female groups. Boys scored higher level of father punishment ($t = -2.05, p < 0.01$) and mother rejection ($t = -1.97, p < 0.01$) than girls. The results indicate that male students have more negative relationships with their parents than female students in the Chinese sample.

Table 2: The comparison of procrastination, perceived stress and EMBU between male and female students (M±SD)

| Variables | | Male group (n=62) | Female group (n=78) | t | P |
|-----------------|-------------------------------------|----------------------|------------------------|-------|------|
| Procrastination | | 31.04±5.24 | 32.37±5.53 | 1.43 | 0.15 |
| PSS1 | | 9.19±1.51 | 9.15±1.22 | -0.17 | 0.86 |
| PSS2 | | 9.03±1.21 | 9.11±1.00 | 0.44 | 0.65 |
| PSS3 | | 8.63±1.72 | 8.49±1.15 | -0.59 | 0.55 |
| Father | Warmth & affection | 55.51±9.00 | 57.97±8.67 | 1.63 | 0.10 |
| | Punishment & severity | 16.01±5.46 | 14.46±3.44 | -2.05 | 0.04 |
| | Favoring Subject | 10.61±4.42 | 10.07±3.69 | -0.78 | 0.43 |
| | Rejection | 8.20±2.59 | 7.85±2.02 | -0.89 | 0.37 |
| | Over-intervention & Over-protection | 15.40±3.04 | 14.85±2.75 | -1.12 | 0.26 |
| Mother | Warmth & affection | 61.29±8.29 | 63.60±7.54 | 1.70 | 0.09 |
| | Over-intervention | 35.20±6.13 | 33.39±5.24 | -1.88 | 0.06 |
| | Rejection | 11.32±3.37 | 10.30±2.71 | -1.97 | 0.05 |
| | Punishment & severity | 11.19±3.95 | 10.41±2.18 | -1.48 | 0.13 |
| | Favoring subject | 11.01±4.45 | 10.07±3.75 | -1.35 | 0.17 |

3.3 The Correlation between Procrastination and EMBU and Perceived Stress

The correlations among procrastination, EMBU and perceived stress are presented in Table 3. Both father's and mother's parenting style does not correlate with procrastination. Procrastination has positive correlation with PSS2 ($r = 0.195, p < 0.05$). Father punishment & severity has negatively correlation with PSS2 ($r = -0.171, p < 0.01$); father favoring subject shows positive significant correlation with PSS2 ($r = 0.173, p < 0.05$) and PSS3 ($r = 0.179, p < 0.05$). Mother warmth & affection has positively significant correlation with PSS2 ($r = 0.171, p < 0.05$); mother over-intervention shows positively significant correlation with PSS3 ($r = 0.355, p < 0.01$) and total PSS ($r = 0.227, p < 0.01$); mother rejection and punishment & severity has negative correlation with PSS2 ($r = -0.170, p < 0.05$; $r = -0.171, p < 0.05$); mother favoring subject has positive correlation with PSS3 ($r = 0.187, p < 0.05$). There exists a significant correlation between PSS1, PSS2, PSS3 and total PSS. The results indicate that the negative parenting style of both father and mother negatively correlates with developmental stress, while the positive parenting style of both father and mother has a positive correlation with developmental stress. Interestingly, the mother's over-intervention

has a positive correlation with PSS3 and total PSS, which might imply that children experienced positively when the mother has over-intervention behaviors in Chinese culture.

Table 3: Two-tailed Correlations between EMBU and Procrastination and Stress

| | Procrastination | PSS1 | PSS2 | PSS3 | Total PSS |
|--------------------------------|-----------------|----------|----------|----------|-----------|
| Father | | | | | |
| Warmth & affection | -0.151† | 0.134 | 0.155† | 0.030 | 0.138 |
| Favoring subject | 0.068 | -0.019 | 0.173* | 0.179* | 0.150† |
| Over-intervention & protection | -0.002 | 0.129 | -0.037 | 0.161† | 0.132 |
| Punishment & severity | 0.043 | -0.018 | -0.171* | 0.099 | -0.023 |
| Rejection | 0.062 | -0.121 | -0.140† | 0.115 | -0.052 |
| Mother | | | | | |
| Warmth & affection | -0.098 | 0.122 | 0.171* | 0.078 | 0.162† |
| Favoring subject | 0.031 | -0.058 | 0.163† | 0.187* | 0.134 |
| Over-intervention & protection | 0.030 | 0.090 | 0.001 | 0.355*** | 0.227** |
| Punishment & severity | -0.004 | -0.099 | -0.171* | 0.129 | -0.048 |
| Rejection | 0.077 | -0.141† | -0.170* | 0.122 | -0.067 |
| PSS1 | 0.051 | 1 | - | | |
| PSS2 | 0.113 | 0.280*** | 1 | | |
| PSS3 | 0.195* | 0.189* | 0.384*** | 1 | |
| Total PSS | 0.163 | 0.691*** | 0.728*** | 0.751*** | 1 |

*** p < 0.001, ** p < 0.01, * p < 0.05, † p < 0.10

3.4 Regression Analysis between Parenting Styles, Perceived Stress and Procrastination

3.4.1 Overview of Predictive Analyses

Series of hierarchical regression analyses were conducted, each series included one kind of parenting style as a predictor. Within each set of analyses, separate regression analyses were performed to predict stress from procrastination and one kind of parenting style of father and mother. Each set of analyses included gender, procrastination, one kind of parenting style of father or mother and the interactions of procrastination with parenting style as predictors. All predictor variables (including interaction terms) were entered as separate steps to identify each main effect's independent contributions and the interaction effects' independent contributions after controlling for the main effects. The results of regression analyses revealed several significant main effects of procrastination and parenting style.

3.4.2 Warmth & Affection of Father and Mother

The overall regressions predicting the perceived stress from gender, mother warmth & affection and procrastination were significant, $F(4, 135)=2.815$, $p < 0.05$, while the overall regression from gender, father warmth & affection and procrastination was not significant. As noted in Table 4, Procrastination and mother warmth & affection were significant predictors of perceived stress, father warmth & affection approached but did not reach statistical significance. In both analyses, the interaction of procrastination and parenting styles did not reach statistical significance.

Table 4: Hierarchical Regression Analyses Predicting Stress from Procrastination and Warmth & Affection of Father and Mother ($N=140$)

| Predictors | B | SE | β | ΔR^2 | T |
|--|--------|-------|---------|--------------|--------------------|
| Father's warmth & affection | | | | | |
| Gender | 0.029 | 0.171 | 0.014 | 0.000 | 0.169 |
| Father's warmth & affection | 0.144 | 0.085 | 0.144 | 0.020 | 1.685 [†] |
| Procrastination | 0.203 | 0.085 | 0.203 | 0.040 | 2.393* |
| Procrastination* Father's warmth & affection | -0.061 | 0.086 | -0.062 | 0.004 | -0.712 |
| Mother's warmth & affection | | | | | |
| Gender | 0.029 | 0.171 | 0.014 | 0.000 | 0.169 |
| Mother's warmth & affection | 0.172 | 0.085 | 0.172 | 0.029 | 2.022* |
| Procrastination | 0.196 | 0.084 | 0.196 | 0.037 | 2.330* |
| Procrastination* Mother's warmth & affection | -0.111 | 0.090 | -0.107 | 0.011 | -1.241 |

* $p < 0.05$, [†] $p < 0.10$

Note: Each predictor was entered as a separate step

3.4.3 Punishment & Severity of Father and Mother

In terms of predicting stress from procrastination and punishment & severity of father and mother, both sets of analyses revealed positive and significant main effects of procrastination. Table 5 revealed that the interaction of procrastination and punishment and severity of father and mother approached but did not reach statistical significance.

Table 5: Hierarchical Regression Analyses Predicting Stress from Procrastination and Punishment & Severity of Father and Mother ($N=140$)

| Predictors | B | SE | β | ΔR^2 | T |
|---|--------|-------|---------|--------------|--------------------|
| Father punishment & severity | | | | | |
| Gender | 0.029 | 0.171 | 0.014 | 0.000 | 0.169 |
| Father punishment & severity | -0.032 | 0.087 | -0.032 | 0.001 | -0.369 |
| Procrastination | 0.176 | 0.085 | 0.176 | 0.030 | 2.064* |
| Procrastination* Father punishment & severity | 0.158 | 0.092 | 0.149 | 0.021 | 1.716 [†] |
| Mother punishment & severity | | | | | |
| Gender | 0.029 | 0.171 | 0.014 | 0.000 | 0.169 |
| Mother punishment & severity | -0.055 | 0.086 | -0.055 | 0.003 | -0.637 |
| Procrastination | 0.174 | 0.085 | 0.174 | 0.030 | 2.044* |
| Procrastination* Mother punishment & severity | 0.175 | 0.095 | 0.166 | 0.024 | 1.842 [†] |

* $p < 0.05$, [†] $p < 0.10$

Note: Each predictor was entered as a separate step

3.4.4 Favoring Subject of Father and Mother

The overall regressions predicting the perceived stress from gender, father favoring subject and procrastination were not significant, as was the overall regression from gender, mother favoring subject and procrastination. As indicated in Table 6, both sets of analyses revealed positive and significant main effects of procrastination.

Table 6: Hierarchical Regression Analyses Predicting Stress from Procrastination and Favoring subject of Father and Mother ($N=140$)

| Predictors | B | SE | β | ΔR^2 | T |
|--|-------|-------|---------|--------------|--------------------|
| Father favoring subject | | | | | |
| Gender | 0.029 | 0.171 | 0.014 | 0.000 | 0.169 |
| Father favoring subject | 0.149 | 0.085 | 0.149 | 0.022 | 1.758 [†] |
| Procrastination | 0.162 | 0.085 | 0.162 | 0.026 | 1.922* |
| Procrastination* Father favoring subject | 0.088 | 0.079 | 0.094 | 0.009 | 1.111 |
| Mother favoring subject | | | | | |
| Gender | 0.029 | 0.171 | 0.014 | 0.000 | 0.169 |
| Mother favoring subject | 0.130 | 0.085 | 0.130 | 0.017 | 1.524 |
| Procrastination | 0.168 | 0.085 | 0.168 | 0.028 | 1.981* |
| Procrastination* Mother favoring subject | 0.127 | 0.081 | 0.132 | 0.017 | 1.565 |

* $p < 0.05$, [†] $p < 0.10$

Note: Each predictor was entered as a separate step

3.4.5 Rejection of Father and Mother

The overall regression predicting the perceived stress from gender, father rejection and procrastination is not significant, as was the overall regression from gender, mother rejection and procrastination. As noted in Table 7, Procrastination is a significant predictor of perceived stress. In both analyses, the interaction of procrastination and parenting styles approached but did not reach statistical significance.

Table 7: Hierarchical Regression Analyses Predicting Stress from Procrastination and Rejection of Father and Mother

| Predictors | B | SE | B | ΔR^2 | T |
|-----------------------------------|--------|-------|--------|--------------|--------|
| Father rejection | | | | | |
| Gender | 0.029 | 0.171 | 0.014 | 0.000 | 0.169 |
| Father rejection | -0.060 | 0.086 | -0.060 | 0.004 | -0.706 |
| Procrastination | 0.178 | 0.085 | 0.178 | 0.031 | 2.096* |
| Procrastination* Father rejection | 0.172 | 0.102 | 0.147 | 0.020 | 1.688† |
| Mother rejection | | | | | |
| Gender | 0.029 | 0.171 | 0.014 | 0.000 | 0.169 |
| Mother rejection | -0.082 | 0.086 | -0.082 | 0.006 | -0.944 |
| Procrastination | 0.183 | 0.085 | 0.183 | 0.033 | 2.149* |
| Procrastination* Mother rejection | 0.157 | 0.088 | 0.151 | 0.022 | 1.795† |

* $p < 0.05$, † $p < 0.10$

Note: Each predictor was entered as a separate step

3.4.6 Over-Intervention & Protection of Father and Mother

The overall regressions predicting the perceived stress from gender, over-intervention & protection of father and mother and procrastination are not significant. As indicated in Table 8, the analyses reveal positive and significant main effects of procrastination and mother's over-intervention & protection.

Table 8: Hierarchical Regression Analyses Predicting Stress from Procrastination and over-intervention & protection of Father and Mother (N=140)

| Predictors | B | SE | β | ΔR^2 | T |
|--|-------|-------|---------|--------------|---------|
| Father over-intervention & protection | | | | | |
| Gender | 0.029 | 0.171 | 0.014 | 0.000 | 0.169 |
| Father over-intervention & protection | 0.124 | 0.085 | 0.124 | 0.015 | 1.461 |
| Procrastination | 0.172 | 0.084 | 0.172 | 0.029 | 2.036* |
| Procrastination* Father over-intervention & protection | 0.030 | 0.090 | 0.029 | 0.001 | 0.335 |
| Mother over-intervention & protection | | | | | |
| Gender | 0.029 | 0.171 | 0.014 | 0.000 | 0.169 |
| Mother over-intervention & protection | 0.225 | 0.084 | 0.225 | 0.017 | 2.671** |
| Procrastination | 0.162 | 0.083 | 0.162 | 0.028 | 1.949* |
| Procrastination* Mother over-intervention & protection | 0.065 | 0.084 | 0.067 | 0.017 | 0.777 |

** $p < 0.01$, * $p < 0.05$, † $p < 0.10$

Note: Each predictor was entered as a separate step

This study revealed that students with a higher frequency of procrastination had a higher level of stress in the second and fourth weeks after the new semester, indicating that procrastination induced developmental stress. Boys reported significantly higher levels of father punishment and mother rejection than girls. Procrastination was positively correlated with stress. Both father's and mother's negative parenting styles were negatively correlated with stress levels

while positive parenting style was positively correlated with stress levels. Parenting styles did not correlate with procrastination. Consistent with previous conclusions (Steel, 2007; Ozer et al., 2009), and our hypothesis, the present study found that a higher frequency of procrastination, among students led to a higher level of stress.

Previous studies had confirmed that parenting style is the key factor that affects the development of children. Researchers concluded that authoritarian parents tend to have a greater impact on females' personalities than males (Fischer et al., 1992), which suggested that boys and girls had different interactions between their parents and themselves. Our findings resembled the previous study (Someya et al., 1999) by showing that boys reported a significantly higher level of father punishment and severity, mother rejection than girls. The results indicated that there exists a special relationship among boys, girls and parents under cultural backgrounds in China

In correlation results, a positive correlation between procrastination and stress was found, a negative correlation between negative parenting style of both father and mother and stress and a positive correlation between positively parenting style of both father and mother and stress were also found which indicated that students who experienced the positive attitude of the father (father's favoring) and mother (warmth and affection) had a higher level of stress under procrastination. However, no correlation between parenting style and procrastination was found in the study. Combine with the results that there were no differences in parenting styles between higher and lower procrastination groups, present results suggested that parenting style is unlinked directly with procrastination but might mediate or regulate procrastination-induced developmental stress (Putwain et al., 2010; Visser et al., 2018).

To clarify our hypotheses, a series of hierarchical regression analyses were conducted. The results showed that there were not only major effects of parenting styles and procrastination on stress, but the interaction effect between punishment & severity and procrastination, and the interaction effect between rejection and procrastination on stress were marginally significant. Briefly, students with higher punishment & severity and rejection of both father and mother had lower levels of stress under procrastination than students with low punishment & severity and rejection of both father and mother. The findings expanded the conclusion that some measures exist, such as decreasing negative parenting behaviors and increasing positive parenting behaviors to improve the relationship between adolescents and their parents to overcome procrastination (Munyi et al., 2013).

4 Conclusion

The current study links procrastination, stress reaction and parenting style. Considering we collected the data at the beginning of the semester, the results suggested that procrastination induced perceived stress along with the time moving and academic tasks increasing. Our results expanded the conclusions that procrastination enhanced stress in adolescence and punishment and rejection of parents' behaviors down-regulated the process in which procrastination-induced developmental perceived stress.

The current study has some limitations. First, the sample size only included Chinese MBBS and was relatively small. Secondly, although the present study establishes a linkage between parenting style and procrastination, particularly as it relates to stress and self-reports have been used to collect data in the study. Furthermore, the study requires enlarging sample size and using objective markers such as saliva cortisol level to indicate stress response and explore the mediate effect of self-concept in the relationship between parenting style, procrastination, and stress.

5 Availability of Data and Material

Information can be made available by contacting the corresponding author

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