





Positive delay? The influence of perceived stress on active procrastination



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Purpose: Although it is widely accepted that procrastination is counterproductive, active procrastination may be considered a constructive coping strategy in situations where work-related stress is high. Drawing upon the conservation of resource theory and the ego depletion theory, the article suggests that active procrastination can be influenced by perceived stress, mediated by ego depletion, and potentially moderated by the Big Five personality traits.

Design/methodology/approach: Using hierarchical regression analysis, Hayes Process Macros, and the general path analytic framework, our hypotheses were investigated. The sample was made up of 651 Chinese civil servants.

Findings/results: According to the results, ego depletion fully mediated the positive connection between perceived stress and active procrastination. Furthermore, extroversion, conscientiousness, and openness negatively moderate the link between perceived stress and ego depletion as well as mediating effect. While neuroticism exhibited a positive moderating effect.

Practical implications: The findings can serve as references for civil servants and public organisations to address stress and create a more relaxed work environment. Recognising active procrastination as a potential coping strategy can help to reframe the perception of procrastination and guide organisations in supporting their employees' wellbeing.

Originality/value: This study extends comprehension of active procrastination in stressful situations and highlights the potential positive coping consequences of stress attributes. By exploring the mechanisms involved, the study sheds light on how perceived stress can influence active procrastination, with ego depletion serving as a mediating factor, which helps to explain how individuals may experience reduced self-control and subsequently engage in active procrastination as a coping strategy.

Keywords: perceived stress; active procrastination; ego depletion; Big Five personality traits; the conservation of resource theory; the ego depletion theory.

Introduction

People frequently put off tasks or decisions in life and at work, although they are aware that doing so could lead to inefficiency, poor performance, or increased stress (Choi & Maron, 2009; Chu & Choi, 2005; Steel, 2007). Previous research has generally associated procrastination with negative consequences such as impaired mental health (Stead et al., 2010), lower subjective well-being (Balkis & Duru, 2016), increased anxiety (Tian et al., 2012), lower job performance, and professional advancement (Beswick et al., 1988; Steel et al., 2001). These studies have portrayed procrastination as an *irrational behavioural delay* and highlighted its detrimental effects on individuals functioning and outcomes (Akerlof, 1991; Steel, 2007). However, it is important to notice that procrastination's impacts are complex, and recent researches have begun to look at its potential benefits or adaptive aspects, particularly in terms of efficiency and creativity (Chu & Choi, 2005; Shin & Grant, 2021). For example, Chu and Choi (2005) discovered that, although sharing a comparable degree of delay with passive and active procrastinators, procrastinators exhibit distinct traits and consequences that resemble non-procrastinators more in various aspects, including productive scheduling, self-efficacy beliefs, strategies for coping, and academic performance. Shin and Grant (2021) discovered that moderate procrastination was connected with better creativity, particularly when individuals had internal willingness and the capacity to come up with new concepts. This perspective suggests that delaying tasks can provide individuals with additional time for reflection, exploration, and the incubation of ideas, leading to more creative outcomes.

Procrastination can be classified into passive procrastination (PP) and active procrastination (AP) (Chu & Choi, 2005; Ni et al., 2012). The conventional definition of procrastination is known as PP, where individuals delay or postpone task progress or completion without engaging in productive activities during the delay (Ni et al., 2012). People who exhibit PP often struggle to start tasks, experience difficulty in maintaining focus, and tend to feel overwhelmed by the demands of their responsibilities. Such a type of delay is frequently linked to detrimental effects such as increased stress, decreased productivity, and lower academic or work performance. Active procrastination, on the other hand, is the act of purposefully postponing tasks but engaging in constructive or productive activities during the delay, such as taking time pressure as a challenge stressor before deadlines (Chu & Choi, 2005). Active procrastinators may experience fewer negative emotions directly resulting from time pressure, such as anxiety and tension (Choi & Moran, 2009), and are able to transform stress into motivation and achieve better performance (Beswick et al., 1988; Seo, 2013).

It is possible for grassroots level civil servants who are exposed to high stress to actively put off doing something to deal with their work demands and perceived pressure. Grassroots level civil servants often work in challenging environments with high job requirements, significant responsibilities, a high workload, strict external supervision, low self-autonomy, and insufficient staffing. A change in work practices within the public sector signifies a move away from a more relaxed and leisurely work culture where activities such as enjoying a cup of tea and reading a newspaper are common throughout the day. Instead, the 'no tasks left for the next day; no documents left on the table' rule is being encouraged as a way to increase productivity and effectiveness to ensure that tasks are completed in a timely manner. This increasing work stress results in severe job burnout, mental indifference, and poor work passion (Li et al., 2012). However, by delaying tasks until the last minute, civil servants may perceive a sense of urgency, leading to increased focus and productivity. This can be particularly relevant in situations where there are strict deadlines or time-sensitive tasks that require immediate attention. Developing the habit of actively and purposefully delaying tasks as a positive coping strategy may help civil servants to manage work stress and achieve better performance.

Theoretical support for examining the mechanisms of perceived stress on the AP of civil servants is provided by the Conservation of Resource (COR) Theory and Ego Depletion Theory (Huang et al., 2022; Xia et al., 2020). According to the COR theory, individuals struggle hard to get, keep, and guard their resources because losing them might cause stress and exhaustion (Hobfoll, 1989). In the context of work pressure, employees may utilise their limited control resources to accomplish the needs they must satisfy. However, if the decline of control resources exceeds the available stock, it can lead to exhaustion and negative outcomes. The ego depletion theory contends that self-control is a finite resource that can eventually run out. Individuals may engage in

avoidance or adjustment techniques as a way to conserve and reclaim those resources after their resources of control are exhausted. Purposely delaying tasks can be one such technique used to curtail further out-of-control behaviour. Self-control resources can become depleted, which may impact individuals' ability to engage in self-regulatory behaviours effectively. Therefore, investigating how ego depletion induced by perceived stress could potentially lead to engaging in AP can provide valuable insights into the underlying mechanisms of these phenomena.

When investigating factors that can reduce the negative effects of felt stress on ego-depletion in civil servants, it is important to take differences in perceived pressure into account. Individuals with distinct personality traits may perceive and react to pressure in unique ways. In certain cases, the Big Five personality traits (extroversion, agreeableness, conscientiousness, openness, and neuroticism) are a helpful place to start for researchers to investigate how perceived pressure affects ego depletion (Yu et al., 2017).

Previous studies (e.g. He et al., 2021; Liu et al., 2020) have primarily concentrated on the causes and processes of PP, while certain studies about AP have been conducted on campus or in enterprises (Habelrih & Hicks, 2015; Hicks & Storey, 2015; Zhou, 2020), and little research has been carried out on civil servants, regardless of whether one tends to procrastinate actively or passively. Given the unique challenges Chinese civil servants face, such as the requirement to perform both physical and mental work (Lv et al., 2012), maintain emotional communication with the public, and the limited opportunities for career development (Guo & Chen, 2023; Wang et al., 2015), understanding how they can effectively cope with stress is crucial. Accordingly, this study responds to the calls of previous research (Bui, 2007; Liao, 2019) by examining how civil servants utilise AP to cope with work stress through ego depletion. In addition, personality traits could potentially influence the extent to which perceived stress leads to engaging in AP.

Theoretical background and hypotheses development

Conservation of resource theory

The COR theory contends that people actively avoid the potential or actual loss of their own resources and work to accumulate and defend them (Hobfoll, 1989). Pressures related to career development and workplace ostracism may result in the depletion of an employee's own resources (Mitchell et al., 2019), stimulate negative behaviours such as PP, and prevent constructive actions such as innovation (Chen et al., 2020; Zhang et al., 2021). The COR theory points out that when people are threatened or have lost resources because of pressure, they will take countermeasures (Crant, 2000; Hobfoll, 1989), like adopting organisational citizenship behaviours to help avoid further loss of resources (Halbesleben & Bowler, 2007). Personality can also help individuals seek resources to make up for the excessive loss of resources, so it can alleviate

ego depletion (Yu et al., 2022a). By describing the stress-coping process from the standpoint of personal resources, the theory offers a theoretical explanation of perceived stress and AP, as well as the moderating role of personality on ego depletion.

Ego depletion theory

According to the ego depletion theory, a person's ability to practice self-control may decline as a result of using up all of their available resources (Baumeister et al., 1998). Workplace stresses brought on by unjustified workloads and abusive leadership may cause employees' resources to be exhausted and further lead to negative feelings and actions, like emotion exhaustion and aggressive behaviours (Barlett et al., 2016; Hagger et al., 2010; Wang et al., 2022). People with depleted egos will make an effort to replenish their own resources and adapt themselves (Tice et al., 2007; Webb & Sheeran, 2003). This theoretically supports the interpretation that ego depletion and AP are associated (Zhang et al., 2022).

Perceived stress and active procrastination

According to Chu and Choi (2005), AP is the behaviour of purposefully making delayed decisions to complete the task before the deadline to produce desirable outcomes. Active procrastinators view pressure as a motivator and an incentive, and they feel good while under pressure (Choi & Maron, 2009).

The degree to which a person senses unpredictable, uncontrollable, and overloaded situations or events occurring in life is known as perceived stress (Cohen et al., 1983). When people see stressful situations as dangerous and believe they lack resources to handle them, it might have a negative effect. The difficulty and urgency of job responsibilities place high stress on employees (Chen, 2020), which leads to burnout and health issues (Hao et al., 2015; Tatsuse et al., 2019). According to the COR theory, there are two ways to respond to the loss of resources: to acquire new resources or to suspend existing resource consumption (Hobfoll, 1989). The former response is to actively seek and acquire new resources to compensate for the loss. This can involve identifying alternative sources of resources or finding ways to replenish or replace the depleted resources. The latter response is to suspend or reduce the consumption of existing resources. This means individuals may prioritise and conserve their remaining resources rather than using them up quickly. Examples of such actions include minimising threats, using the adaptive targeting process, rearranging priorities (Folkman, 2008; Folkman & Lazarus, 1985), and adjusting needs (e.g. control, tolerate) that go beyond their own personal resources (Kaiseler et al., 2014).

Active procrastination can be viewed as a reorganisation of cumulative work ordering the more important tasks back on. In the context of civil servants with high stress, AP can be seen as a strategic approach to task management. By purposefully postponing important tasks, civil servants create a temporary reprieve from immediate demands,

allowing them to focus attention and limited resources on critical duties. This can serve as a means of conserving resources and regaining focus. By creating a sense of time pressure, civil servants may be more motivated and focused when approaching the postponed tasks. The impending deadline can act as an incentive to work efficiently, utilising their limited resources in a concentrated manner. It is critical to understand that AP differs from PP, which involves unproductive delays and avoidance of responsibilities. Active procrastination involves a purposeful decision to delay tasks and leverage time pressure as a motivational tool for more focused and efficient completion. By engaging in AP, civil servants with high stress may strategically reorganise their workload, enabling them to recover energy, prioritise critical duties, and accomplish tasks within the given constraints. This approach acknowledges the need to manage limited resources effectively and optimise performance under challenging circumstances. Therefore, we suggest the following hypothesis:

H1: Perceived stress has a positive effect on civil servants' active procrastination.

The mediating role of ego depletion

Ego depletion refers to a process of temporary decline in one's capability and willingness to control himself and/or herself, which can damage personal resources (Baumeister et al., 1998; Hagger et al., 2010). The COR theory states that people use their limited resources to fulfil different work requirements (Hobfoll, 1989; Westman et al., 2004). This study suggests that perceived stress can influence the ego depletion of civil servants. Perceived stress in the workplace can lead to more frequent dynamic resource consumption for self-control to cope with work demands and situations (Schmidt & Neubach, 2007). In addition, dealing with stressful situations requires civil servants to expend a significant amount of energy to adjust their emotions and cognitions, which could exhaust their resources (Diestel & Schmidt, 2011). Furthermore, prior studies have shown that individual ego depletion increases when higher stress is perceived (Diestel & Schmidt, 2011). We propose the following hypothesis in accordance with the aforementioned discussion:

H2: Perceived stress has a positive effect on civil servants' ego depletion.

The ego depletion theory suggests that people can replenish their exhausted resources (Baumeister et al., 1998). People who suffer from excessive ego depletion, for example, may exhibit cognitive bias because of a lack of resources and control, which could then lead to behaviours that undermine self-regulation, such as lower work engagement and increased procrastination (Fischer et al., 2007). People can also take steps to stop additional resource loss and work towards the goal by systematically controlling various tasks in a planned way (Hobfoll, 1989). Engaging in midday relaxation activities or planned task control can help restore resources. Active procrastination can be seen

as one such strategy for resource recovery. When civil servants experience significant ego depletion, they may feel a lack of competence or ability to complete tasks. By deliberately and actively procrastinating, they aim to restore their resources, regain control, and avoid further chaos. We suggest the following hypothesis in light of the given discussion:

H3: Ego depletion has a positive effect on civil servants' active procrastination.

Civil servants who experience stress at work will use their limited resources of self-control to handle the emotional disorders caused by stress and pressure. If they are unable to stop resource loss or supplement resources, the speed of resource loss will be further accelerated, resulting in ego depletion (Hobfoll, 1989; Schmidt & Neubach, 2007). Ego depletion can have detrimental effects on job performance and organisational outcomes. Without proper prevention and management of resource loss, civil servants may struggle to stay organised and maintain productivity. In such situations, intentional procrastination can serve as a strategy to prevent and repair resource loss. By putting work off and engaging in brief relaxation or other activities immediately that provide a temporary break from work demands, civil servants may be able to restore their depleted resources and enhance their self-management abilities. This can help them to regain a sense of control, improve focus and concentration, and ultimately improve their job performance. In the light of this, we suggest the following hypothesis:

H4: Ego depletion plays a mediating role in how perceived stress influences active procrastination.

The moderating role of the Big Five personality traits (extroversion, agreeableness, conscientiousness, openness, and neuroticism)

The Big Five personality model is widely accepted and includes five broad domains (i.e. extroversion, agreeableness, conscientiousness, openness, and neuroticism) (McCrae & Costa, 1997). Extroversion (E) reflects how talkative, forceful, and gregarious a person is (Barrick & Mount, 1991). Those high in extroversion enjoy adventure, social, and other enthusiastic activities (McCrae & Costa, 1997), show more positive emotions (Costa & McCrae, 1980), and focus more on the positive aspects of events. Positive emotions can offset ego depletion (Tice et al., 2007), which helps people feel less emotional exhaustion. Individuals with high extroversion tend to retain a pleasant psychological state under pressure because of their high mood, and stress has less impact on their psychological resource consumption. Therefore, we infer that perceived stress has different impact on ego depletion depending on extroversion and propose the following hypothesis:

H5a: Extroversion negatively moderates the relationship between perceived stress and ego depletion, such that the relationship is weaker when extroversion is higher.

Conscientiousness (C) reflects dependability; people with high conscientiousness are more accountable, conscientious,

and possess considerable willpower (Barrick & Mount, 1991). According to Ching et al. (2014), conscientiousness can make people act seriously, feel optimistic, and not get fatigued easily. Furthermore, highly conscientious people have strong self-control and self-restraint, and are able to manage stress in an orderly fashion (Qi et al., 2013). Individuals who are more conscientious are less sensitive to perceived stressful events and have higher self-control. They can better exercise self-control and reduce the loss of psychological resources. As a result, we propose the following hypothesis:

H5b: Conscientiousness negatively moderates the relationship between perceived stress and ego depletion, such that the relationship is weaker when conscientiousness is higher.

Openness (O) refers to a person's level of imagination, culture, curiosity, originality, broad-mindedness, intelligence, and artistic sensitivity (Barrick & Mount, 1991). People with a high level of openness are more creative, curious, and have greater pressure elasticity (Williams et al., 2009). They are more inclusive and more ready to accept the status quo when under stress (Chen et al., 2015). According to studies, people with high openness personality traits can reassess stressors, adjust themselves to generate positive emotions, and replenish consumed resources (Qi et al., 2013; Williams et al., 2009). It is speculated that people who have greater openness will be more adept at adjusting their own state and mobilising positive emotions when facing stress, resulting in lower levels of ego depletion and psychological energy consumption. Therefore, we propose the following hypothesis:

H5c: Openness negatively moderates the relationship between perceived stress and ego depletion, such that the relationship is weaker when openness is higher.

According to Barrick and Mount (1991), agreeableness (A) means being polite, adaptable, reliable, friendly, cooperative, forgiving, soft-hearted, and patient. Studies show that agreeableness is associated with positive psychological factors such as trust and resilience (Deng et al., 2021). Those with high agreeableness experience higher levels of adaptation, lower levels of perceived stress, and less mental resource depletion, such as energy depletion (Wang et al., 2015). They have the potential for interpersonal intimacy (Graziano et al., 1996), and are adversely correlated with colleagues' lack of reciprocity (Petrou et al., 2011). They can adapt quickly (Han & Zhou, 2020) and thus use fewer psychological resources to resist stress, thus reducing ego depletion. Therefore, we propose the following hypothesis:

H5d: Agreeableness negatively moderates the relationship between perceived stress and ego depletion, such that the relationship is weaker when agreeableness is higher.

Neuroticism (N) means feeling nervous, anxious, furious, humiliated, sentimental, and insecure (Barrick & Mount, 1991). Individuals with high neuroticism are prone to experiencing higher psychological stress and anxiety (McCrae & Costa, 1997). High neuroticism tends to result in negative feelings such as worry and sadness (Yu et al., 2021), which is

known as 'distress proneness' (Wilson et al., 2005, p. 12) or 'psychological stress' (Qi et al., 2013, p. 102), and is easy to cause ego depletion. Therefore, individuals with high neuroticism may perceive a high level of pressure and find it difficult to self-control the negative emotions caused by stress, making ego depletion more severe. Therefore, we propose the following hypothesis:

H5e: Neuroticism positively moderates the relationship between perceived stress and ego depletion, such that the relationship is stronger when neuroticism is higher.

Hypothesis 4 proposes that ego depletion mediates the link between perceived stress and AP, while in hypotheses 5a–5e, individuals also differ in the ego depletion brought on by stress depending on their different personalities and different personality levels. Therefore, this study further proposes a moderated mediation model to examine how perceived stress affects AP.

When faced with difficult situations, individuals with high extroversion are optimistic and confident (Ashton et al., 2002), and they will typically focus on the positive aspects and respond positively (Qi et al., 2013). As a result, civil servants have fewer psychological resources to fight against stress, resulting in less AP to deal with resource consumption (Kim et al., 2017). In contrast, individuals low in extroversion have fewer positive emotions in stressful situations. Instead, they lead to an increase in anxiety, impulsivity, psychological pressure, and ego depletion. As a result, people tend to be more willing to try AP to compensate for ego depletion (Qi et al., 2013).

As conscientiousness is related to capacity for self-control (Hou & Gu, 2017), individuals with high conscientiousness are driven by goal-orientation and have strong self-control abilities in the face of stress, so the level of ego depletion is relatively low (Di Fabio, 2006). However, when faced with pressure, individuals with low conscientiousness are difficult to regulate quickly, resulting in higher ego depletion, which is more likely to require AP to cope with the loss. Therefore, a high-conscientiousness personality may weaken the positive influence of individuals' perceived stress on their own AP through ego depletion.

Individuals with high openness can handle stress better and accept their situation more quickly. They can reevaluate the stress and mobilise positive emotions to regulate it. As a result, fewer control resources are consumed, and resources remain for existing work, which in turn can reduce AP. Conversely, when confronted with stressful events, those with low openness are more prone to stress and generate higher levels of pressure (Qi et al., 2013); as a result, there is more ego depletion caused by resisting stress and then more AP.

Individuals with high agreeableness are more adaptable and will take active measures to deal with stress (Li et al., 2000). Therefore, when they perceive pressure, they can adapt to the

situation as soon as possible and effectively resist ego depletion, thus reducing the occurrence of AP. However, individuals with low agreeableness tend to develop negative emotions, such as anger (Lian & Guo, 2017). Such emotions are prone to high ego attrition, which may produce more AP to resist the loss of resources.

When under pressure, individuals with high neuroticism are prone to emotional instability, psychological burnout, anxiety, and other issues (Bakker et al., 2006). It is difficult to change, making it simple for them to induce ego depletion and engage in AP. However, individuals with low neuroticism have relatively stable emotions and are less sensitive to stress, so they may produce fewer negative emotions (Qi et al., 2013), less ego depletion, and further less AP. We suggest the following hypotheses based on the aforementioned analysis:

H6a–6d: Extroversion (H6a), conscientiousness (H6b), openness (H6c), and agreeableness (H6d) moderate the indirect relationship between perceived stress and active procrastination through ego depletion, such that the mediated relationship is weaker for people with high extroversion, conscientiousness, openness, and agreeableness.

H6e: Neuroticism moderates the indirect relationship between perceived stress and active procrastination through ego depletion, such that the mediated relationship is stronger for people with high neuroticism.

Methods

Sample and procedure

The data was gathered via an online questionnaire survey and samples were received from Chinese government departments. The participants were civil servants from several provinces, including Xinjiang Province, Sichuan Province, and Fujian Province. The respondents were recruited from a Master of Public Administration (MPA) training course by one author, and these students helped us advertise our study among their colleagues. Participants could fill out the questionnaire at their own convenience, and participation was completely voluntary. After their informed consent, participants completed a short questionnaire regarding their feelings of perceived stress, ego depletion, AP, and their five big personality traits.

Out of a total of 716 distributed questionnaires, 651 valid questionnaires were returned, achieving a 90.9% effective response rate. The demographic characteristics of the sample are as follows: male: 46.6%, female: 53.4%. The average age of civil servants was 34.32 years, with a standard deviation (SD) of 7.23. The educational characteristics of the sample are: junior college degree and below: 15.8%; bachelor's degree: 77.1%; master's degree: 6.9%; doctoral degree and above: 0.2%. The mean number of working years was 10.99, with a SD of 7.73. In terms of income level, the average monthly income below ¥5000 accounted for 47.2% of the total, and the monthly income above ¥5000 accounted for 52.8% of the total. And most of them are staff members (39.9%).

Analytical strategy

Firstly, this study used Harman's single-factor test to examine the potential common method bias, confirmatory factor analyses (CFA), the average variance extracted (AVE), and composite reliability (CR) to evaluate discriminant validity. The CFA was conducted using Mplus 8.3 software.

Secondly, the means, SD, and Pearson correlation coefficients among the key variables were calculated.

Finally, this study tested our hypotheses. For predictions regarding the direct effect of perceived stress on active procrastination (Hypothesis 1) and the mediating effect of ego depletion between perceived stress and AP (Hypotheses 2–4), hierarchical regression analysis was first used by selecting different independent variables to build different regression models to compare to illustrate the mediation effect. The Hayes Process Macros were used to test the mediation effect again (Hypothesis 4) and the moderating effect (Hypotheses 5a–5e). We used the general path analytic framework (bootstrapping procedure, 1000 iterations) to test the moderated mediating effect (Hypotheses 6a–6e). The Statistical Package for the Social Sciences (SPSS 26.0) software was used for all hypothesis validation.

Measures

The scales utilised in this study were modified versions of scales that had been used by other researchers. Following the standard translation-back translation procedure, the items' Chinese versions were made. A 7-point Likert scale, ranging from 1 (strongly disagree) to 7 (strongly agree), was used to rate the Big Five personality traits. Perceptual stress, AP, and ego depletion were assessed on a 5-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree).

Perceived stress was measured with the 4-item scale developed by Motowidlo et al. (1986), which contains items such as 'I feel a lot of pressure from this job' and 'My work is under a lot of pressure'. The total scores of the 4 items were deemed an indicator of the extent of each civil servant's perceived stress, with higher scores representing more stress. The scale's Cronbach's α was 0.78 in this study.

Active procrastination was measured with a scale produced by the Chinese scholars Ni et al. (2011), which included 15 items for four factors that were more appropriate for the Chinese context: result satisfaction, preference to pressure, purposeful choice to procrastinate, as well as capacity to satisfy deadlines (e.g., 'I will not do badly when the tasks approach the deadline') that were more suitable for the Chinese context. The total scores of the 15 items were deemed an indicator of the extent of each civil servants' active procrastination with higher scores representing higher AP. The scale's Cronbach's α was 0.81 in this study.

Ego depletion was measured with the Depletion Scale (Twenge et al., 2004), which consists of five items (e.g., 'I feel exhausted'). The total scores of the five items were deemed

an indicator of the extent of each civil servants; ego depletion, with higher scores representing more ego depletion. The scale's Cronbach's α was 0.89 in this study.

The Big Five personality traits were measured using a 40-item scale adapted from Saucier (1994), which contains five dimensions: openness, conscientiousness, extroversion, agreeableness, and neuroticism (such as 'organised', 'cooperative', and 'relaxed'), and each was scored on a 7-point scale (1 representing 'strongly disagree' and 7 representing 'strongly agree'). Cronbach's α for openness, conscientiousness, extroversion, agreeableness, and neuroticism were 0.84, 0.81, 0.76, 0.78, and 0.82, respectively.

As control factors, following the procedure used by researchers (Xie et al., 2018; Yu et al., 2022a; Zhou, 2020), we controlled personal factors of gender (1 = male, 2 = female), age, and education level (1 = junior college and below, 2 = bachelor's degree, 3 = master's degree, 4 = doctoral degree and above), and work-related factors of working years, income, and civil servant's position (1 = director of a division, 2 = deputy director, 3 = section chief, 4 = deputy section chief, 5 = principal staff member, 6 = senior staff member, 7 = consultant, 8 = assistant consultant, 9 = staff member).

Results

Common method variance and validity test

As variables in this study were all measured via self-reported scales, this raised the possibility of common method bias effects. Accordingly, the potential common method bias that usually appears in self-reported data was examined with Harman's single-factor test (Zhou & Long, 2004). We extracted a total of 12 components with feature roots larger than 1. Less than 50% of the criteria were explained by the first component, whose explanatory power was only 24.73%. Consequently, there was no common method bias in our research (Podsakoff et al., 2012).

Using statistical software Mplus 8.3, CFA was carried out to evaluate the fit indexes for the eight-factor model against those of other combination models so as to verify discriminant validity between variables (Anderson & Gerbing, 1988). In order to evaluate the model, Bentler (1990) advised using a sample with at least 5 instances of each parameter; our sample size satisfies this recommendation.

The Tucker-Lewis Index (TLI > 0.95 for good level > 0.90 for acceptable level), the ratio of chi square goodness of fit to degrees of freedom ($\chi^2 / df < 3$ for acceptance), the Root Mean Square Error of Approximation (RMSEA, 0.05 for good level, 0.08 for acceptable level), the comparative fit Index (CFI), and the (RMSEA, 0.05 for good level, 0.08 for acceptable level) were the four indices we used to evaluate model fit (Jackson et al., 2009; Marsh et al., 2004). According to the results (shown in Table 1), the eight-factor model fit best ($\chi^2 / df = 2.30$;

TABLE 1: Confirmatory factor analysis results of the competition model ($N = 651$).

Model	Factor combination	χ^2	df	χ^2/df	CFI	TLI	RMSEA
Eight-factor	PS, ED, AP, E, C, O, A, N	4090.34	1776	2.30	0.88	0.90	0.05
Seven-factor	PS+ED, E, C, O, A, N, AP	7907.16	1919	4.12	0.73	0.71	0.07
Six-factor	PS+ED+E, C, O, A, N, AP	9778.17	1933	5.06	0.64	0.63	0.08
Five-factor	PS+ED+E+C, O, A, N, AP	11978.47	1942	6.17	0.54	0.53	0.09
Four-factor	PS+ED+E+C+O, A, N, AP	12477.79	1946	6.41	0.52	0.50	0.09
Three-factor	PS+ED+E+C+O+A, N, AP	12832.58	1949	6.58	0.51	0.49	0.09
Two-factor	PS+ED+E+C+O+A+N, AP	13146.56	1951	6.74	0.49	0.47	0.09
Single-factor	PS+ED+AP+E+C+O+A+N	13922.48	1952	7.13	0.45	0.43	0.10

Note: + represents the two factors merging into one.

PS, perceived stress; ED, ego depletion; AP, active procrastination; E, extroversion; C, conscientiousness; O, openness; A, agreeableness; N, neuroticism; CFI, comparative fit index; TLI, Tucker–Lewis index; RMSEA, Root Mean Square Error of Approximation.

TABLE 2: Means, standard deviation, average variance extracted, and correlations ($N = 651$).

Variables	Mean	SD	1	2	3	4	5	6	7	8
1. Perceived stress	3.56	0.79	0.60	-	-	-	-	-	-	-
2. Ego depletion	2.95	0.93	0.48***	0.70	-	-	-	-	-	-
3. Active procrastination	2.85	0.54	0.26***	0.55***	0.62	-	-	-	-	-
4. Extroversion	4.28	0.95	-0.24***	-0.36***	-0.34***	0.48	-	-	-	-
5. Conscientiousness	5.19	0.91	-0.18***	-0.41***	-0.50***	0.65***	0.52	-	-	-
6. Openness	4.89	0.93	-0.23***	-0.40***	-0.32***	0.59***	0.43***	0.48	-	-
7. Agreeableness	5.34	0.84	-0.07	-0.38***	-0.48***	0.53***	0.67***	0.40***	0.52	-
8. Neuroticism	4.81	1.06	0.28***	0.51***	0.49***	-0.48***	-0.62***	-0.45***	-0.68***	0.53

Note: The average variance extracted (AVE) is in diagonal.

SD, standard deviation.

*, $p < 0.05$; **, $p < 0.01$; ***, $p < 0.001$.

CFI = 0.88; TLI = 0.90; RMSEA = 0.05), while the single-factor model fit poorly ($\chi^2/df = 7.13$; CFI = 0.45; TLI = 0.43; RMSEA = 0.10) (Sörbom, 1989). To further verify the discriminant validity, the AVE and the CR were calculated simultaneously in this study. The AVE for the perceived stress scale was 0.60 and the CR was 0.86; the AVE for the AP scale was 0.62 and the CR was 0.86; the AVE for the ego depletion scale was 0.70 and the CR was 0.92; the AVE for the extroversion scale was 0.48 and the CR was 0.88; the AVE for the conscientiousness scale was 0.52 and the CR was 0.89; the AVE for the openness scale was 0.48 and the CR was 0.88; the AVE for the agreeableness scale was 0.52 and the CR was 0.89; the AVE for the neuroticism scale was 0.53 and the CR was 0.90. According to the standards given by Fornell and Larcker (1981), CR should be > 0.7 and AVE should be > 0.5 . However, they added that even if AVE is lower than 0.5 but CR is higher than 0.6, the construct's convergent validity is still sufficient. According to given criteria, our eight variables were distinct, indicating good discriminant validity.

Descriptive statistics and correlational analysis for key variables

Table 2 shows the important variables means, SD, AVE, and Pearson correlation coefficients. Perceived stress correlated moderately positively with ego depletion ($r = 0.48$, $p < 0.001$), weakly positively with active procrastination ($r = 0.26$, $p < 0.001$), and weakly positively with neuroticism ($r = 0.28$, $p < 0.001$). Perceived stress had a weakly negative correlation with extroversion ($r = -0.24$, $p < 0.001$), a weakly negative correlation with conscientiousness ($r = -0.18$, $p < 0.001$), and a weakly negative correlation with openness ($r = -0.23$, $p < 0.001$). But it had no correlation with agreeableness ($r = -0.07$, $p = 0.09$). Ego depletion correlated strongly positively

with active procrastination ($r = 0.55$, $p < 0.001$) and with neuroticism ($r = 0.51$, $p < 0.001$) and moderately negatively with extroversion ($r = -0.36$, $p < 0.001$), conscientiousness ($r = -0.41$, $p < 0.001$), agreeableness ($r = -0.38$, $p = 0.09$), and openness ($r = -0.40$, $p < 0.001$). Active procrastination correlated moderately positively with neuroticism ($r = 0.49$, $p < 0.001$) and moderately negatively with extroversion ($r = -0.34$, $p < 0.001$), conscientiousness ($r = -0.50$, $p < 0.001$), openness ($r = -0.32$, $p < 0.001$), and agreeableness ($r = -0.48$, $p < 0.001$). According to Cohen's (1988) suggestion, our results are almost consistent with our theoretical expectations.

Main effect and mediating effect

To evaluate the direct effects of the variables and the role as a mediator of ego depletion, hierarchical regression was used (Baron & Kenny, 1986; Wen & Ye, 2014). Table 3 presents the results. The main effects among the variables were evaluated after controlling for the six demographic factors of gender, age, working time, education level, income, and position (M1). The results demonstrated that perceived stress had a significantly positive impact on civil servants' AP (M2: $\beta = 0.25$, $p < 0.001$). H1 is therefore supported.

We then examined the mediating effect. Ego depletion was significantly impacted positively by perceived stress (M6: $\beta = 0.49$, $p < 0.001$), and with active procrastination (M3: $r = 0.54$, $p < 0.001$). Based on the main effect model (M2), after adding ego depletion as an independent variable, the regression coefficient for perceived stress was no longer significant (M4: $\beta = -0.02$, $p > 0.05$), whereas ego depletion continued to have a significant positive influence

(M4: $\beta = 0.55, p < 0.01$). The fact that ego depletion is a full mediator of perceived stress influencing AP is shown by the ΔR^2 value of 0.23. H2–H4 are therefore supported.

In addition, the effects of mediation were computed using the PROCESS macros running in SPSS 26.0 software (Hayes, 2013), and the six demographic variables were controlled. The bias-corrected confidence intervals (CIs) of each coefficient were calculated after 5000 repeated samplings with returns (bootstrapping procedure), and the results have been presented in Table 4. When perceived stress and ego depletion were taken into consideration, the direct effect was not significant (-0.01 , NS). The indirect effect of perceived stress on AP through ego depletion is estimated at 0.18 with 95% CIs [0.15, 0.22]. The indirect effect is significant because the CIs do not include 0, further supporting H4.

Moderating effect

The Hayes Process Macro was used to test the moderating effect in SPSS 26.0 software (Hayes, 2013). To prevent potential multicollinearity, we first centred the independent variable (perceived stress) and the moderators (extroversion, conscientiousness, openness, agreeableness, and neuroticism) (Aiken & West, 1991). Meanwhile, we also controlled the influence of other moderators when we tested the moderating effect.

TABLE 3: Results of the hierarchical regression analysis ($N = 651$).

Variables	Active procrastination				Ego depletion	
	M1	M2	M3	M4	M5	M6
Control variable						
Gender	-0.06	-0.04	-0.06	-0.06	0.001	0.04
Age	-0.11	-0.11	-0.05	-0.05	-0.09	-0.11
Working time	-0.09	-0.08	-0.09	-0.09	0.01	0.02
Education	0.13**	0.12**	0.11**	0.11**	0.02	0.01
Income	0.02	0.03	0.06	0.06	-0.08	-0.06
Position	-0.09*	-0.07	-0.09*	-0.09*	-0.07	0.04
Independent variable						
Perceived stress	-	0.25***	-	-0.02	-	0.49***
Mediating variable						
Ego depletion	-	-	0.54***	0.55***	-	-
R^2	0.06	0.13	0.35	0.35	0.02	0.26
ΔR^2	0.06***	0.06***	0.29***	0.23***	0.02	0.24***
F	7.17***	13.11***	49.45***	43.27***	1.76	31.78***

*, $p < 0.05$; **, $p < 0.01$; ***, $p < 0.001$.

R^2 , Coefficient of determination, the values become larger, indicating a better model fit; ΔR^2 , The change of R^2 value when the model changes; F , Ratios of mean square between groups to mean square within the groups which is used to judge whether the model is meaningful; if the corresponding P value is less than 0.05, the model is meaningful.

TABLE 4: Results of the of mediating effects ($N = 651$).

Path	Effect	SE	LLCI	ULCI
Total effect (c)	0.17	0.03	0.12	0.22
Direct effect (c')	-0.01	0.03	-0.06	0.04
Indirect effect (ab)	0.18	0.02	0.15	0.22
Perceived stress → Ego depletion (a)	0.58	0.04	0.50	0.66
Ego depletion → Active procrastination (b)	0.32	0.02	0.28	0.36

SE, Standard error; LLCI, lower limit confidence interval; ULCI, Upper limit confidence interval.

The interaction of perceived stress and extroversion was significantly negatively associated with ego depletion ($\beta = -0.11, p = 0.003$) after controlling for the demographic variables, as well as the influence of other moderators (four-factor model fitting index of PS, ED, AP, E: $\chi^2/df = 5.07$, CFI = 0.81, RMSEA = 0.08); the interaction of perceived stress and conscientiousness was significantly negatively associated with ego depletion ($\beta = -0.09, p = 0.011$. Four-factor model fitting index of PS, ED, AP, C: $\chi^2/df = 4.79$, CFI = 0.83, RMSEA = 0.08); the interaction of perceived stress and openness was significantly negatively associated with ego depletion ($\beta = -0.10, p = 0.003$. Four-factor model fitting index of PS, ED, AP, O: $\chi^2/df = 5.08$, CFI = 0.82, RMSEA = 0.08); the interaction between perceived stress and neuroticism was significant positively ($\beta = 0.08, p = 0.012$. Four-factor model fitting index of PS, ED, AP, N: $\chi^2/df = 4.79$, CFI = 0.83, RMSEA = 0.08). H5a, H5b, H5c, and H5e were verified. H5d was not verified considering the fact that the interaction between perceived stress and agreeableness was not significant ($\beta = -0.04, p = 0.287$), showing that agreeableness had no moderating influence. The moderating effect can be seen in Figure 1.

Moderated mediating effect

To examine whether there were significant differences in mediating routes at different levels of extraversion, conscientiousness, openness, and neuroticism, this study adopted a general path analytic framework (which combines moderated regression analysis and path analysis) (Edwards & Lambert, 2007). According to this method, two equations were established based on the hypotheses to test the moderated mediation effect, where E is extroversion, C is conscientiousness, O is openness, N is neuroticism, PS is perceived stress, ED is ego depletion, and AP is active procrastination. These variables were formerly mean-centred. SPSS 26.0 was used to estimate the results of each parameter in Equations 1 and 2 (Yu et al., 2022b), as shown in Table 5:

$$ED = a_{05} + a_{x5}PS + a_{z5}E(C, O, N) + a_{xz5}[PS * E(C, O, N)] + e_{m5} \quad [\text{Eqn 1}]$$

$$AP = b_{04} + b_{x4}PS + b_{m4}ED + e_{y4} \quad [\text{Eqn 2}]$$

The coefficients of 1000 bootstrap samples were estimated using the constrained nonlinear regression (CNLR) approach. The constrained nonlinear model used the default loss function to minimise the sum of squared errors and calculate the parameter estimates using the least square method. These estimated coefficients were then imported into Edwards and Lambert's (2007) Excel template, where the coefficients, differences, and 95% CIs of the mediation model's first, second, direct, indirect, and total effects with high and low moderator levels were obtained. The results are shown in Table 6.

Table 6 shows significant differences in the indirect effect between the high and low groups of extroversion ($r = -0.084, p < 0.01$), conscientiousness ($r = -0.071, p < 0.01$), openness ($r = -0.072, p < 0.01$), and neuroticism ($r = 0.070, p < 0.05$). Thus, each of the four moderators significantly moderated

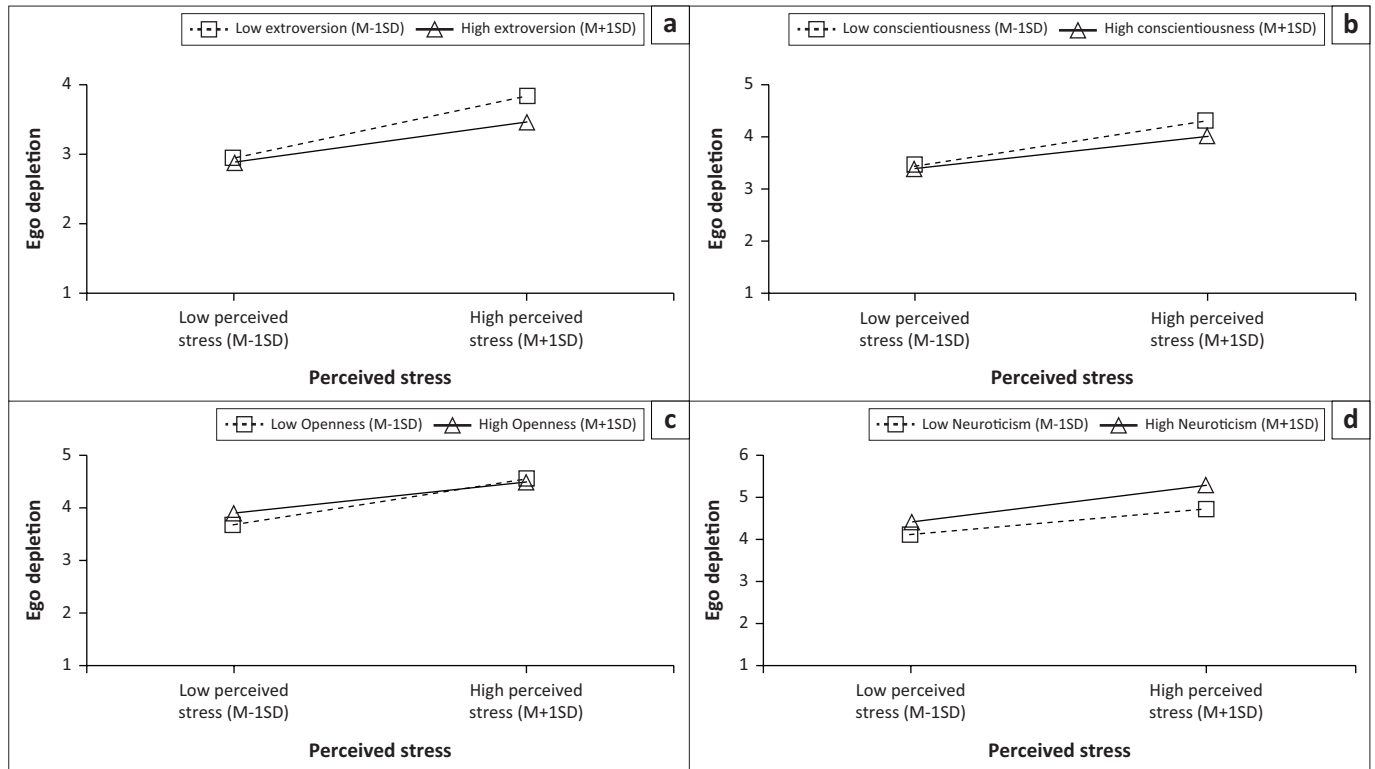


FIGURE 1: Moderating effect of extroversion (a), conscientiousness (b), openness (c), and neuroticism (d) on the path of perceived stress and ego depletion.

TABLE 5: Coefficient estimates ($N = 651$).

Moderators	Equation 1 coefficient estimates					Equation 2 coefficient estimates			
	a_{05}	a_{x5}	a_{z5}	a_{xz5}	R^2	b_{04}	b_{x4}	b_{m4}	R^2
Extroversion	-0.02	0.43***	-0.30***	-0.08*	0.33***	0.00	-0.01	0.55***	0.30***
Conscientiousness	-0.01	0.44***	-0.34***	-0.07*	0.35***	-	-	-	-
Openness	-0.02	0.44***	-0.26***	-0.07*	0.31***	-	-	-	-
Neuroticism	-0.02	0.38***	0.41***	0.06*	0.39***	-	-	-	-

Note: a_{05} , a_{x5} , a_{z5} , and a_{xz5} are unstandardised coefficient estimates from Equation 1, and b_{04} , b_{x4} , and b_{m4} are unstandardised coefficient estimates from Equation 2, using regression analysis.
*, $p < 0.05$; **, $p < 0.01$; ***, $p < 0.001$.

the mediating effect. Specifically, ego depletion was a full mediator when the four moderators were high or low (the indirect effect was significant compared with the direct effect), while the mediation effect was stronger with low extroversion (the difference in indirect effects was -0.084 , $p < 0.01$), conscientiousness (the difference in indirect effects was -0.071 , $p < 0.01$), or openness (the difference in indirect effects was -0.072 , $p < 0.01$), and with high neuroticism (the difference in indirect effects was 0.070 , $p < 0.05$). H6a, H6b, H6c, and H6e were supported.

Discussion

We start by discussing the main results of this research. Firstly, AP was positively connected with perceived stress among civil servants. Our study has significant ramifications for comprehending the benefits of managing stress factors that are typically seen negatively. Active procrastination is the practice of purposefully delaying the completion of a task, which will result in greater performance. Therefore, additional empirical studies on AP have been called for by the academic community (Bui, 2007; Choi & Moran, 2009).

The effects of perfectionism, internal motivation, and external supervision on AP have been demonstrated in prior researches also (Onwuegbuzie, 2004; Seo, 2013). Active procrastination can be inextricably linked to stress based on its definition. Research on stress has shown that how people perceive and evaluate stressful stimuli can affect their emotions and behaviours. Undesirable emotions and undesirable behaviours result from excessive stress (Ye et al., 2018). Therefore, it is worthwhile to research stress-coping strategies. Especially in the public sector, where AP may help civil servants to cope with stress. The results broaden the scope of research on AP.

Secondly, we found that ego depletion is a full mediator of perceived stress, affecting AP. In particular, ego depletion expands the stress coping approach to understand how perceived stress affects civil servants. Because of external factors such as high job demands and internal factors such as self-expectations, civil servants experience great work pressure. Researchers have been examining approaches to better understand the mechanisms through which work stress affects workers, emphasising the significance of self-

TABLE 6: Results of the moderated mediation model ($N = 651$).

Moderators	Level	Stage		Effect		
		First	Second	Direct	Indirect	Total
Extroversion	Low	0.506**	0.554**	-0.012	0.280**	0.268**
	High	0.354**	0.554**	-0.012	0.196**	0.184**
	Difference	-0.152**	0.000	0.000	-0.084**	-0.084**
Conscientiousness	Low	0.504**	0.554**	-0.012	0.279**	0.267**
	High	0.376**	0.554**	-0.012	0.208**	0.196**
	Difference	-0.127*	0.000	0.000	-0.071**	-0.071**
Openness	Low	0.505**	0.554**	-0.012	0.280**	0.268**
	High	0.375**	0.554**	-0.012	0.208**	0.196**
	Difference	-0.130*	0.000	0.000	-0.072*	-0.072*
Neuroticism	Low	0.316**	0.554**	-0.012	0.175**	0.163**
	High	0.444**	0.554**	-0.012	0.246**	0.234**
	Difference	0.127*	0.000	0.000	0.070*	0.070*

Note: Difference = coefficient of high moderator group – coefficient of low moderator group. The grouping is based on $Z_{high} = \text{mean} + 1\text{sd}$, $Z_{low} = \text{mean} - 1\text{sd}$, because all variables were centralised in advance, the high-level moderator threshold value of extroversion, conscientiousness, openness, and neuroticism are 0.95, 0.91, 0.93, 1.06, while the low-threshold values are -0.95, -0.91, -0.93, -1.06, respectively. On the basis of bias-corrected confidence intervals calculated from bootstrap estimates, the difference test for the indirect and total effects were conducted.

*, $p < 0.05$; **, $p < 0.01$.

regulation (Xia et al., 2020). By demonstrating that perceived stress influences AP via ego depletion, our study supports this point. Specifically, pressure means that civil servants need to consume more resources, and when the consumption reaches a critical point, they will develop a sense of depletion, and their own perceptions, attitudes, and behaviours are also affected (Baumeister et al., 1998). Civil servants use AP for ego regulation to lessen the effects of low psychological energy. The mediating role of ego depletion expands research on the effects of ego depletion.

Thirdly, the study's results support the Big Five personality traits' moderating influence, analyse the boundaries of civil servants' AP, and demonstrate how the ego depletion of civil servants' perceived stress and their AP are influenced by their own personality traits. Because of the fact that how stress is perceived differs among individuals, not everyone responds to similar situations with the same level of stress, and as a result, not everyone needs the same coping mechanisms. Specifically, civil servants with high extroversion, openness, and conscientious personalities experience less ego depletion when under pressure and are less likely to benefit from AP's energising effects. High-neurotic public servants experience greater ego depletion and are more likely to engage in AP when under pressure. The moderating impact of agreeableness, however, was not observed in this study. In response, we propose that extroversion, openness, conscientiousness, and neuroticism are associated with thrill-seeking, curiosity, responsibility, and emotion. These traits can reflect an individual's ability to control behaviour and emotions. Agreeableness indicates people's compassion and trustworthiness, which are more indicative of a person's characteristics in interactions and thus have less impact on their own state. In conclusion, this study systematically analysed the boundaries of the mediating effects of perceived stress on AP via ego depletion in civil servants based on personality trait theory and expanded the research related to perceived stress and AP.

Practical implications

This study aims to address organisational efficiency concerns in the public sector. Firstly, ego depletion among government officials might be caused by perceived stress. Organisations should implement some strategies to help workers release stress and reduce their ego depletion. For example, the public sector can implement an 8-h working day system, an overtime compensatory policy to compensate workers for the extra working hours they put in, and a paid vocation system to protect their rights and interests in paid vocation. It is also advised to arrange for short (5–10 min) breaks during working hours to help restore depleted resources and keep them from spending a lot of time in an ego-depleting state.

Secondly, the public sector should appropriately understand civil servants' AP behaviour. Actively delaying tasks is a form of stress management and self-adjustment that is good for one's mental health. Managers need to modify the 'able individuals should do more work' culture, in which workers who perform better are more likely to gain managers' trust and receive more work assignments, while those who are considered to be 'unable to do well' are frequently assigned unimportant or simple tasks, which increases stress and exhaustion for the 'capable' individuals. Therefore, the public sector needs to rationalise the deployment of work based on clear job responsibilities. Managers also need to strengthen communication with subordinates, take the initiative to listen to their opinions and suggestions on improving work arrangements, and make timely adjustments and feedback to create a good interactive atmosphere.

Thirdly, this study also demonstrated that civil servants were more likely to experience stress and ego depletion if they had lower levels of extroversion, openness, neuroticism, and conscientiousness. On the one hand, civil employees should be mentally prepared to handle their own strain as well as be willing to step outside of their comfort zone and handle the pressure of their jobs. On the other hand, they should concentrate on forming productive work habits, such as creating a work plan and setting staged goals. Additionally, civil servants should actively self-regulate when under stress by changing their mindset, viewing stress as motivation, and maintaining a high level of motivation at work.

Limitations and future directions

The results of this study are generally significant, but there are certain limitations. Civil servants' personalities moderated the effect of perceived stress on AP. Stress plays a significant role in predicting the presence of PP (Munjal & Mishra, 2019). Our study did not look further into how the Big Five personality traits affect perceived stress and PP. Personality may cause individuals to delay important boundary conditions of different natures. For example, neuroticism is prone to restlessness and anxiety (McCrae & Costa, 1997). People who are influenced by this personality are more emotionally unstable under stress and may adopt more PP. In order to better comprehend the concept of delay, future studies may further distinguish between the circumstances in which delays occur. Secondly, this study only

analysed cross-sectional and self-reported data. Therefore, we advise conducting longitudinal or experimental study designs in future studies. Meanwhile, this study did not take into consideration the impact of differences in unit level and unit character on the AP of civil servants, more control factors may be taken into account. At the same time, the sample is composed of civil servants from non-first-tier cities. Future research can replicate our findings in different contexts. Thirdly, this study ignored other possible influences on AP. People with psychological resilience, for instance, are able to handle and respond to stress (Herrman et al., 2011), but they can also engage in AP to use time to complete tasks. Meanwhile, AP has negative impacts on performance, task initiation, working memory, and other functions (Wang et al., 2018). Therefore, its subsequent impact is either good or bad, which needs follow-up research to further reveal the logical relationship between AP and related variables.

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Competing interests

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Authors' contributions

All four authors contributed to conceptualisation, investigation, and original draft preparation. Z.S. and Y.C. designed the study. Z.S., C.Z., and Y.C. analysed the data. C.Z., Z.S., and Y.C. made contributions for editing. Z.S. was responsible for funding acquisition and supervision.

Ethical considerations

This article followed all ethical standards for research without direct contact with human or animal subjects.

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Data availability

The data that support the findings of this study are available from the corresponding author, C.Z., upon reasonable request.

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References

- Aiken, L.S., & West, S.G. (1991). *Multiple regression: Testing and interpreting interactions*. Sage.
- Akerlof, G.A. (1991). Procrastination and obedience. *American Economic Review*, 81(2), 1–19. Retrieved from <https://www.proquest.com/scholarly-journals/procrastination-obedience/docview/233031163/se-2>
- Anderson, J.C., & Gerbing, W. (1988). Structural equation modeling in practice: A review and recommended two-step approach. *Psychological Bulletin*, 103(1), 5–24. <https://doi.org/10.1037/0033-2909.103.3.411>
- Ashton, M.C., Lee, K., & Paunonen, S.V. (2002). What is the central feature of extraversion? Social attention versus reward sensitivity. *Journal of Personality and Social Psychology*, 83(1), 245–252. <https://doi.org/10.1037/0022-3514.83.1.245>
- Bakker, A.B., Van Der Zee, K.I., Lewig, K.A., & Dollard, M.F. (2006). The relationship between the big five personality factors and burnout: A study among volunteer counselors. *The Journal of Social Psychology*, 146(1), 31–50. <https://doi.org/10.3200/SOCP.146.1.31-50>
- Balkis, M., & Duru, E. (2016). Procrastination, self-regulation failure, academic life satisfaction, and affective well-being: Underregulation or misregulation form. *European Journal of Psychology of Education*, 31(3), 439–459. <https://doi.org/10.1007/s10212-015-0266-5>
- Barlett, C., Oliphant, H., Gregory, W., & Jones, D. (2016). Ego depletion and aggressive behavior. *Aggressive Behavior*, 42(6), 533–541. <https://doi.org/10.1002/ab.21648>
- Baron, R.M., & Kenny, D.A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*, 51(6), 1173–1182. <https://doi.org/10.1037/0022-3514.51.6.1173>
- Barrick, M.R., & Mount, M.K. (1991). The big five personality dimensions and job performance: A meta-analysis. *Personnel Psychology*, 44(1), 1. <https://doi.org/10.1111/j.1744-6570.1991.tb00688.x>
- Baumeister, R.F., Bratslavsky, E., Muraven, M., & Tice, D.M. (1998). Ego depletion: Is the active self a limited resource? *Journal of Personality and Social Psychology*, 74(5), 1252–1265. <https://doi.org/10.1037/0022-3514.74.5.1252>
- Bentler, P.M. (1990). Comparative fit indexes in structural models. *Psychological Bulletin*, 107(2), 238–246. <https://doi.org/10.1037/0033-2909.107.2.238>
- Beswick, G., Rothblum, E.D., & Mann, L. (1988). Psychological antecedents of student procrastination. *Australian Psychologist*, 23(2), 207–217. <https://doi.org/10.1080/00050068808255605>
- Bui, N.H. (2007). Effect of evaluation threat on procrastination behavior. *Journal of Social Psychology*, 147(3), 197–209. <https://doi.org/10.3200/SOCP.147.3.197-209>
- Chen, B., Yang, D.T., & Pan, L. (2020). The influence of team relationship conflict on employees procrastination behavior: Exploring the effects of core self-evaluations. *Chinese Journal of Management*, 2, 216–224. Retrieved from http://manu68.magtech.com.cn/jwk_glx/EN/
- Chen, J., Wang, Q., & Tian, M. S. (2015). Study on the influence of open personality traits on voice behavior. *Leadership Science*, 23, 42–44.
- Chen, X. (2020). Management of working pressure and counseling methods for mental health of grass-roots civil servants. *Revista Argentina De Clínica Psicológica*, 29(2), 214. <https://doi.org/10.24205/03276716.2020.226>
- Ching, C.M., Church, A.T., Katigbak, M.S., Reyes, J.A.S., Tanaka-Matsumi, J., Takaoka, S., Zhang, H.S., Shen, J.L., Arias, R.M., Rincon, B.C., & Ortiz, F.A. (2014). The manifestation of traits in everyday behavior and affect: A five-culture study. *Journal of Research in Personality*, 48, 1–16. <https://doi.org/10.1016/j.jrp.2013.10.002>
- Choi, J.N., & Moran, S.V. (2009). Why not procrastinate? Development and validation of a new active procrastination scale. *The Journal of Social Psychology*, 149(2), 195–211. <https://doi.org/10.3200/SOCP.149.2.195-212>
- Chu, A.H., & Choi, J.N. (2005). Rethinking procrastination: Positive effects of “active” procrastination behavior on attitudes and performance. *Journal of Social Psychology*, 145(3), 245. <https://doi.org/10.3200/SOCP.145.3.245-264>
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Routledge.
- Cohen, S., Kamarck, T., & Mermelstein, R. (1983). A global measure of perceived stress. *Journal of Health and Social Behavior*, 24(4), 385–396. <https://doi.org/10.2307/2136404>
- Costa, P.T., & McCrae, R.R. (1980). Influence of extraversion and neuroticism on subjective well-being happy and unhappy people. *Journal of Personality and Social Psychology*, 38(4), 668–678. <https://doi.org/10.1037/0022-3514.38.4.668>
- Crant, J.M. (2000). Proactive behavior in organizations. *Journal of Management*, 26(3), 435–462. <https://doi.org/10.1177/0149206300026003>
- Deng, X., Zhang, M.Y., & Che, H.B. (2021). The influence of behavior inhibition/activation system and personality characteristics on the psychological resilience of police school students. *China Journal of Health Psychology*, 30(04), 608–614. <https://doi.org/10.13342/j.cnki.cjhp.2022.04.026>
- Diessel, S., & Schmidt, K.H. (2011). Costs of simultaneous coping with emotional dissonance and self-control demands at work: Results from two German samples. *Journal of Applied Psychology*, 96(3), 643–653. <https://doi.org/10.1037/a0022134>
- Di Fabio, A. (2006). Decisional procrastination correlates: Personality traits, self-esteem or perception of cognitive failure? *International Journal for Educational and Vocational Guidance*, 6(2), 109–122. <https://doi.org/10.1007/s10775-006-9000-9>
- Edwards, J.R., & Lambert, L.S. (2007). Methods for integrating moderation and mediation: A general analytical framework using moderated path analysis. *Psychological Methods*, 12(1), 1–22. <https://doi.org/10.1037/1082-989X.12.1.1>

- Fischer, P., Greitemeyer, T., & Frey, D. (2007). Ego depletion and positive illusions: Does the construction of positivity require regulatory resources? *Personality and Social Psychology Bulletin*, 33(9), 1306–1321. <https://doi.org/10.1177/0146167207303025>
- Folkman, S. (2008). The case for positive emotions in the stress process. *Anxiety, Stress, and Coping*, 21(1), 3–14. <https://doi.org/10.1080/10615800701740457>
- Folkman, S., & Lazarus, R.S. (1985). If it changes it must be a process: Study of emotion and coping during three stages of a college examination. *Journal of Personality and Social Psychology*, 48(1), 150–170. <https://doi.org/10.1037/0022-3514.48.1.150>
- Fornell, C., & Larcker, D.F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*, 18(1), 39. <https://doi.org/10.2307/3151312>
- Graziano, W.G., Jensen-Campbell, L.A., & Hair, E.C. (1996). Perceiving interpersonal conflict and reacting to it: The case for agreeableness. *Journal of Personality and Social Psychology*, 70(4), 820–835. <https://doi.org/10.1037/0022-3514.70.4.820>
- Guo, J.Y., & Chen, Z.X. (2023). An empirical study on dual motivational preference and job performance: The inhibiting effect of civil servants' red tape perceptions. *Public Administration and Policy Review*, 12(01), 47–63. Retrieved from <http://ggglyzc.ruc.edu.cn/EN/Y2023/V12/I1/47>
- Habelrih, E.A., & Hicks, R.E. (2015). Psychological well-being and its relationships with active and passive procrastination. *International Journal of Psychological Studies*, 7(3), 25–34. <https://doi.org/10.5539/ijps.v7n3p25>
- Hagger, M.S., Wood, C., Stiff, C., & Chatzisarantis, N.L.D. (2010). Ego depletion and the strength model of self-control: A meta-analysis. *Psychological Bulletin*, 136(4), 495–525. <https://doi.org/10.1037/a0019486>
- Halbesleben, J.R.B., & Bowler, W.M. (2007). Emotional exhaustion and job performance: The mediating role of motivation. *Journal of Applied Psychology*, 92(1), 93–106. <https://doi.org/10.1037/0021-9010.92.1.93>
- Han, R., & Zhou, L. (2020). The four-dimensional structure of civil servants' role behavior and its influence mechanism in China. *Journal of Xi'an Jiao tong University (Social Sciences)*, 40(4), 115–125. <https://doi.org/10.15896/j.xjtuskb.202004012>
- Hao, S.W., Hong, W., Xu, H.H., Zhou, L., & Xie, Z. (2015). Relationship between resilience, stress and burnout among civil servants in Beijing, China: Mediating and moderating effect analysis. *Personality and Individual Differences*, 83, 65–71. <https://doi.org/10.1016/j.paid.2015.03.048>
- Hayes, A.F. (2013). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach*. Guilford Press.
- He, Q., Wu, M., Wu, W., & Fu, J. (2021). The effect of abusive supervision on employees' work procrastination behavior. *Frontiers in Psychology*, 12, 596704. <https://doi.org/10.3389/fpsyg.2021.596704>
- Herrman, H., Stewart, D.E., Diaz-Granados, N., Berger, E.L., Jackson, B., & Yuen, T. (2011). What is resilience? *The Canadian Journal of Psychiatry*, 56(5), 258–265. <https://doi.org/10.1177/070674371105600504>
- Hicks, R.E., & Storey, J. (2015). Can procrastination be effective? A study of white-collar employees and university students. *International Journal of Business Research*, 15(1), 39–48. <https://doi.org/10.18374/IJBR-15-1.4>
- Hobfoll, S.E. (1989). Conservation of resources: A new attempt at conceptualizing stress. *American Psychologist*, 44(3), 513–524. <https://doi.org/10.1037/0003-066X.44.3.513>
- Hou, Y.B., & Gu, S.Y. (2017). Perfectionism and procrastination: The moderating role of conscientiousness. *Acta Scientiarum Naturalium Universitatis Pekinensis*, 53(03), 573–578. <https://doi.org/10.1016/j.lindif.2017.04.010>
- Huang, Q., Zhang, K., Ali, A.B., & Wang, Y. (2022). The influence of perceived red tape on public employees' procrastination: The conservation of resource theory perspective. *International Journal of Environmental Research and Public Health*, 19(7), 4368. <https://doi.org/10.3390/ijerph19074368>
- Jackson, D.L., Gillasp, J.A., Jr., & Purc-Stephenson, R. (2009). Reporting practices in confirmatory factor analysis: An overview and some recommendations. *Psychological Methods*, 14(1), 6–23. <https://doi.org/10.1037/a0014694>
- Kaiseler, M., Passos, F., Queiros, C., & Sousa, P. (2014). Stress appraisal, coping, and work engagement among police recruits: An exploratory study. *Psychological Reports*, 114(2), 635–646. <https://doi.org/10.2466/01.16.PRO.114k21w2>
- Kim, S., Fernandez, S., & Terrier, L. (2017). Procrastination, personality traits, and academic performance: When active and passive procrastination tell a different story. *Personality and Individual Differences*, 108, 154–157. <https://doi.org/10.1016/j.paid.2016.12.021>
- Li, J.P., Lu, Y., & Li, J.Y. (2012). The influential relationship between working pressure and job burnout: A survey study on Y district of X city. *Journal of Northwest University (Philosophy and Social Sciences Edition)*, 42, 144–150. <https://doi.org/10.16152/j.cnki.xdxbsk.2012.01.024>
- Li, W.D., Niu, L.L., & Zou, H. (2000). The influence of stressful life events, personality on the middle school students' coping styles. *Psychological Development and Education*, 04, 8–13. Retrieved from <http://www.devpsy.com.cn/CN/Y2000/V16/I4/8>
- Lian, L., & Guo, S.Z. (2017). Effect of agreeableness on psychological well-being: The chain mediating effect of perceived social support and gratitude in college students. *Chinese Journal of Clinical Psychology*, 25, 163–166. <https://doi.org/10.16128/j.cnki.1005-3611.2017.01.036>
- Liao, J. (2019). Civil servant pressure management under the perspective of positive psychology. *Management Observer*, 29, 44–45.
- Liu, G., Cheng, G., Hu, J., Pan, Y., & Zhao, S. (2020). Academic self-efficacy and postgraduate procrastination: A moderated mediation model. *Frontiers in Psychology*, 11, 1752. <https://doi.org/10.3389/fpsyg.2020.01752>
- Ly, X.J., Xu, X.R., & Sun, Y.Q. (2012). Relation between emotional labor, organizational justice and job stress: Examples from several districts in Shanghai. *Chinese Journal of Management*, 9(10), 1464–1469. Retrieved from http://manu68.magtech.com.cn/jwk_glb/EN/Y2012/V9/I10/1464
- Marsh, H.W., Hau, K.T., & Wen, Z. (2004). In search of golden rules: Comment on hypothesis-testing approaches to setting cutoff values for fit indexes and dangers in overgeneralizing Hu and Bentler's (1999) findings. *Structural Equation Modeling*, 11(3), 320–341. https://doi.org/10.1207/s15328007sem1103_2
- McCrae, R.R., & Costa, P.T. (1997). Personality trait structure as a human universal. *American Psychologist*, 52(5), 509–516. <https://doi.org/10.1037/0003-066X.52.5.509>
- Mitchell, M.S., Greenbaum, R.L., Vogel, R.M., Mawritz, M.B., & Keating, D.J. (2019). Can you handle the pressure? The effect of performance pressure on stress appraisals, self-regulation, and behavior. *Academy of Management Journal*, 62(2), 531–552. <https://doi.org/10.5465/amj.2016.0646>
- Motowidlo, S.J., Packard, J.S., & Manning, M.R. (1986). Occupational stress: Its causes and consequences for job performance. *Journal of Applied Psychology*, 71(4), 618–629. <https://doi.org/10.1037/0021-9010.71.4.618>
- Munjal, S., & Mishra, R. (2019). Associative impact of personality orientation and levels of stress on procrastination in middle-level managers. *Indian Journal of Public Administration*, 65(1), 53–70. <https://doi.org/10.1177/0019556118820456>
- Ni, S.G., Li, H., & Huang, L.Y. (2012). Further exploration and integration for studies on academic procrastination. *Psychological Development and Education*, 05, 545–553. Retrieved from <http://www.devpsy.com.cn/EN/Y2012/V28/I5/545>
- Ni, S.G., Li, H., Xu, J.H., & Choi, J. (2011). Revision of a new active procrastination scale for Chinese undergraduates. *Chinese Journal of Clinical Psychology*, 19(04), 462–465. Retrieved from <http://clinicalpsychojournal.yywkt.cn/Magazine/Show.aspx?ID=139657>
- Onwuegbuzie, A.J. (2004). Academic procrastination and statistics anxiety. *Assessment & Evaluation in Higher Education*, 29(1), 3–19. <https://doi.org/10.1080/0260293042000160384>
- Petrou, P., Kouvonen, A., & Karanika-Murray, M. (2011). Social exchange at work and emotional exhaustion: The role of personality. *Journal of Applied Social Psychology*, 41(9), 2165–2199. <https://doi.org/10.1111/j.1559-1816.2011.00812.x>
- Podsakoff, P.M., MacKenzie, S.B., & Podsakoff, N.P. (2012). Sources of method bias in social science research and recommendations on how to control it. *Annual Review of Psychology*, 63(1), 539–569. <https://doi.org/10.1146/annurev-psych-120710-100452>
- Qi, S.H., Yu, L., & Ma, J.L. (2013). The effect of personality traits on cognitive aging and the mechanisms. *Advances in Psychological Science*, 21(01), 96–107. <https://doi.org/10.3724/SP.J.1042.2013.00096>
- Saucier, G. (1994). Mini-marker: A brief version of Goldberg's unipolar big-five markers. *Journal of Personality Assessment*, 63(3), 506–516. https://doi.org/10.1207/s15327752jpa6303_8
- Schmidt, K.H., & Neubach, B. (2007). Self-control demands: A source of stress at work. *International Journal of Stress Management*, 14(4), 398–416. <https://doi.org/10.1027/1866-5888/a000123>
- Seo, E.H. (2013). A comparison of active and passive procrastination in relation to academic motivation. *Social Behavior and Personality: An International Journal*, 41(5), 777–786. <https://doi.org/10.10224/sbp.2013.41.5.777>
- Shin, J., & Grant, A.M. (2021). When putting work off pays off: The curvilinear relationship between procrastination and creativity. *Academy of Management Journal*, 64(3), 772–798. <https://doi.org/10.5465/amj.2018.1471>
- Sörbom, D. (1989). Model modification. *Psychometrika*, 54, 371–384. <https://doi.org/10.1007/BF02294623>
- Stead, R., Shanahan, M.J., & Neufeld, R.W.J. (2010). "I'll go to therapy, eventually": Procrastination, stress and mental health. *Personality and Individual Differences*, 49(3), 175–180. <https://doi.org/10.1016/j.paid.2010.03.028>
- Steel, P. (2007). The Nature of procrastination: A meta-analytic and theoretical review of quintessential self-regulatory failure. *Psychological Bulletin*, 133(1), 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(1), 95–106. [https://doi.org/10.1016/S0191-8869\(00\)00013-1](https://doi.org/10.1016/S0191-8869(00)00013-1)
- Tatsuse, T., Sekine, M., & Yamada, M. (2019). The contributions made by job satisfaction and psychosocial stress to the development and persistence of Depressive symptoms. *Journal of Occupational and Environmental Medicine*, 61(3), 190–196. <https://doi.org/10.1097/JOM.0000000000001491>
- Tian, Q., Deng, S.C., & Guo, J. (2012). The influence of self-determination motivation on test anxiety: Procrastinations as a different mediator. *Journal of Psychological Science*, 35(05), 1096–1101. Retrieved from <http://www.psyci.com/CN/Y2012/V35/I5/1096>
- Tice, D.M., Baumeister, R.F., Shmueli, D., & Muraven, M. (2007). Restoring the self: Positive affect helps improve self-regulation following ego depletion. *Journal of Experimental Social Psychology*, 43(3), 379–384. <https://doi.org/10.1016/j.jesp.2006.05.007>
- Twenge, J.M., Muraven, M., & Tice, D.M. (2004). *Measuring state self-control: Reliability, validity, and correlations with physical and psychological stress*. San Diego State University.
- Wang, H., Zhou, Y.X., Wang, K.X., & Zhou, M.J. (2015). Personality and job burnout in teachers: Cross-level moderating of group identification. *Chinese Journal of Clinical Psychology*, 23(04), 741–745. <https://doi.org/10.3724/SP.J.1042.2022.00906>
- Wang, H.Z., Geng, Z.Z., Ding, L., & Shan, C.X. (2022). Antecedents of abusive supervision. *Advances in Psychological Science*, 30(4), 906–921. <https://doi.org/10.3724/SP.J.1042.2022.00906>

- Wang, X.X., Dai, M.X., Wang, Z.J., & Jing, J. (2018). Differences of executive functions among different types of procrastinators in college students. *Chinese Mental Health Journal*, 32, 415–419.
- Webb, T., & Sheeran, P. (2003). Can implementation intentions help to overcome ego-depletion? *Journal of Experimental Social Psychology*, 39(3), 279–286. [https://doi.org/10.1016/S0022-1031\(02\)00527-9](https://doi.org/10.1016/S0022-1031(02)00527-9)
- Wen, Z.L., & Ye, B.J., (2014). Different methods for testing moderated mediation models: Competitors or backups? *Acta Psychologica Sinica*, 46(5), 714–726. <https://doi.org/10.3724/SP.J.1041.2014.00714>
- Westman, M., Hobfoll, S.E., Chen, S., Davidson, O.B., & Laski, S. (2004). Organizational stress through the lens of conservation of resources (COR) theory. *Research in Occupational Stress and Well Being*, 4, 167–220. [https://doi.org/10.1016/S1479-3555\(04\)04005-3](https://doi.org/10.1016/S1479-3555(04)04005-3)
- Williams, P.G., Rau, H.K., Cnibbet, M.R., & Gumn, H.E. (2009). Openness to experience and stress regulation. *Journal of Research in Personality*, 43(5), 777–784. <https://doi.org/10.1016/j.jrp.2009.06.003>
- Wilson, R.S., Bennett, D.A., Mendes de Leon, C.F., Bienias, J.L., Morris, M.C., & Evans, D.A. (2005). Distress proneness and cognitive decline in a population of older persons. *Psychoneuroendocrinology*, 30(1), 11–17. <https://doi.org/10.1016/j.psyneuen.2004.04.005>
- Xia, Y., Schyns, B., & Zhang, L. (2020). Why and when job stressors impact voice behaviour: An ego depletion perspective. *Journal of Business Research*, 109, 200–209. <https://doi.org/10.1016/j.jbusres.2019.11.053>
- Xie, H.M., Wang, J.J., & Xu, X. (2018). Analysis of intermediate relationship among perfectionism, active procrastination and anxiety of normal college students. *Chinese Journal of School Health*, 39(02), 219–221+225. <https://doi.org/10.16835/j.cnki.1000-9817.2018.02.018>
- Ye, B.J., Zhu, L.J., Fang, X.T., Liu, M.F., Wang, X.K. & Yang, Q. (2018). The effect of perceived stress on college students' depression: Moderated mediating effect. *Psychological Development and Education*, 34(4), 497–503. Retrieved from <http://www.devpsy.com.cn/EN/Y2018/V34/I4/497>
- Yu, G.Y., Zeng, J.J., & Kang, Y.J. (2022). Illegitimate tasks and workplace procrastination: The effect of ego depletion and proactive personality. *Journal of Psychological Science*, 41(1), 164–170. Retrieved from <http://www.psyci.org/CN/Y2022/V41/I1/164>
- Yu, H., Yan, C., Dong, Z., Hou, Y., & Guan, X. (2022). Influence of proactive personality and career calling on employees' job performance: A moderated mediation model based on job crafting. *South African Journal of Business Management*, 53(1), a2533. <https://doi.org/10.4102/sajbm.v53i1.2533>
- Yu, H.J., Ye, Y., Tang, Q.K., Zhang, D.P., & Zhang, Q. (2021). Mediating effect of psychological capital in the relationship between the big five personality and anxiety of medical workers on the front line of epidemic prevention. *Modern Medicine Journal of China*, 23(4), 22–25. <https://doi.org/10.3969/j.issn.1672-9463.2021.04.005>
- Yu, Z.J., Yue, L.M., Wang, C.Z., Feng, Q., Jiang, K., Zhang, C., Zhang, L., & Ma, W.Y. (2017). The relationship between coal enterprise executives perceived stress, coping styles and mental health. *China Journal of Health Psychology*, 25(8), 1165–1168. <https://doi.org/10.13342/j.cnki.cjhp.2017.08.01>
- Zhang, S.F., Zhang, B., Bo, L.T., & Wei, J.C. (2021). Research on the mechanism of illegitimate tasks on employees' innovative behaviors – Based on the perspective of emotional exhaustion and ethical leadership. *Soft Science*, 09, 88–92+99. <https://doi.org/10.13956/j.ss.1001-8409.2021.09.13>
- Zhang, Y., Bai, X., & Yang, W. (2022). The chain mediating effect of negative perfectionism on procrastination: An ego depletion perspective. *International Journal of Environmental Research and Public Health*, 19(15), 9355. <https://doi.org/10.3390/ijerph19159355>
- Zhou, H., & Long, L.R. (2004). Statistical remedies for common method biases. *Advances in Psychological Science*, 06, 942–950. Retrieved from <https://journal.psych.ac.cn/xlkxjz/EN/Y2004/V12/I6/942>
- Zhou, M.M. (2020). Gender differences in procrastination: The role of personality traits. *Current Psychology*, 39, 1445–1453. <https://doi.org/10.1007/s12144-018-9851-5>