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Perceived social support and procrastination in college students: A sequential mediation model of self-compassion and negative emotions

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Abstract
Perceived social support was found to play an important role in reducing procrastination. However, little is known about the psychological mechanisms underlying this relation. Based on the integrated model of social support, the current study investigated the effect of the perceived social support on procrastination, and further explored the mediating role of self-compassion and negative emotions in this relation in a sample of 874 Chinese college students. Results showed: (a) perceived social support negatively predicted procrastination; (b) both self-compassion and negative emotions partially mediated the association between perceived social support and procrastination separately; (c) self-compassion and negative emotions sequentially mediated the relation between perceived social support and procrastination. This study provides new insights for the mechanisms between perceived social support and procrastination, which has important practical implications for the interventions of college students' procrastination.

Keywords Perceived social support · Self-compassion · Negative emotions · Procrastination · Sequential mediation · College students

Introduction

Procrastination is a pervasive phenomenon among college students. Surveys from different countries have consistently shown that a large proportion of college students have a problem with procrastination (Ferrari et al., 2005; Geng et al., 2018; Mahasneh et al., 2016; Özer et al., 2009). Procrastination refers to the voluntarily delay of the actions necessary to achieve a goal despite knowing the possible negative consequences (Steel, 2007). As the direct consequence, it will affect college students' academic performance (Kim & Seo, 2015; Schraw et al., 2007), which could be a huge obstacle to their career development. Moreover, chronic procrastination can also lead to negative emotions such as stress and depression, harm to individuals' physical health and well-being (Sirois, 2007; Sirois, 2014; Stead et al., 2010; Tice & Baumeister, 1997; Yang et al., 2020). Therefore, it is of great theoretical and practical significance to explore the influencing factors of procrastination, in order to effectively reduce procrastination in college students.

A large number of literatures have explored the antecedents of procrastination. For example, internal factors such as personality traits (Lee et al., 2006), emotions (Rebetez et al., 2016; Tice et al., 2001), cognitive beliefs (Haghbin et al., 2012; Sadeghi et al., 2011) and external factors including parenting styles (Pychyl et al., 2002; Zakeri et al., 2013), environmental unpredictability (Chen & Qu, 2017) have been found to have impact on procrastination. Beyond that, some scholars suggested that procrastination may be related to social relationship factors (Ferrari et al., 1999). Perceived social support, which refers to the subjective feeling of being supported by others (Cohen & wills, 1985), has been found to have an effect on procrastination. For example, Ferrari et al. (1999) found that college students' procrastination tendencies were negatively related to their satisfaction with social support from friends and positively related to the conflicts in social

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relationships, while no correlation was found between procrastination and the size of their social network, indicating a possible association between subjective aspect of social support and procrastination.

Recent research further revealed the influence of perceived social support on domain specific procrastination. For example, some cross-sectional studies showed that perceived social support from family, school and friends was a significant predictor of adolescents' academic procrastination (Erzen & Cikrikci, 2018; Lai & lin, 2018); likewise, this effect have been recently confirmed in college students (Madjid et al., 2021; Sari & Fakhruddiana, 2019). On one hand, social support could broaden individual's problem-solving skills and strengthen social supervision (van Eerde & Klingsieck, 2018); on the other, perceiving social support from important others may change one's evaluation of a problem (Jacobson et al., 2017) and change the way they approach it (Sari & Fakhruddiana, 2019), that is, individuals may feel more capable to accomplish their goals and tend to take action, thereby reducing procrastination. However, there is also evidence demonstrating that although perceived social support positively predicted cancer patients' flouring, it had no correlation with their health procrastination (Fatima et al., 2020), while this may due to the poor health condition and self-regulation resources of cancer patients, the benefit of social support will be mainly operated in the psychological level. Therefore, based on these evidences, it's likely that among college students generally with good physical and psychological resources, perceived social support from close others would reduce their general procrastination tendency.

Furthermore, this study aims to explore the psychological mechanisms underlying this relation, i.e., through which psychological process perceived social support could transform into a more active behavior pattern, which have been rarely studied empirically before and remains largely unknown. In an integrated conceptual framework of social support, Feeney and Collins (2015) concluded that social support can contribute to better development outcomes through a series of positive psychological changes, such as the improvement in self-evaluations, motivational state and emotional experience. They claimed that social support can improve individuals' self-regulation and coping strategies including the ability to regulate one's emotions and thoughts, control one's behaviors (Feeney & Collins, 2015). Procrastination is generally considered as a typical form of self-regulation failure, characterized by a lack of motivation and self-regulation resources to achieve goals (Pychyl & Flett, 2012). From this point, it is reasonable to deduce that perceived social support can reduce procrastination by influencing the internal psychological processes related to self-regulation and coping. Based on this theoretical framework, this study aimed at investigating the roles of two important variables proposed by Feeney and Collins (2015) that linking social support and behavioral outcomes, i.e., self-compassion and negative emotions in the relation between perceived social support and procrastination in a sample of college students, in order to provide a more comprehensive understanding of how social support is associated with procrastination.

The Mediating Role of Self-Compassion

Self-compassion refers to being kind to and understanding oneself in face of failure, which consist of three components: self-kindness (versus self-judgment), common humanity (versus isolation) and mindfulness (versus over-identification) (Neff, 2003). Self-compassion has been shown to be associated with a range of positive mental health outcomes (Barnard & Curry, 2011; Luo et al., 2019; Neff & Mcgehee, 2010), and can be promoted by specific interventions (Dundas et al., 2017; Smeets et al., 2014). Importantly, the attitude of being self-compassionate is considered to stem from a positive self-concept (Barnard & Curry, 2011). In other words, expressing kindness and compassion toward oneself is based on the belief that one is valuable and worthy of love.

Neff (2003) believed that self-compassion can be fostered through the relationships with important others. Since individuals' self-perception is largely determined by the opinions and attitudes of others towards them, especially those close to them (Robinson, 1995), perceived more social support can help people to have more positive thoughts about themselves and improve their self-concept. Prior evidences have demonstrated a strong link between perceived support from significant others and perceived self-worth (Robinson, 1995). Longitudinal studies further revealed that perceived social support could predict one's self-esteem and perceived capability over time (Tomlinson et al., 2016). Therefore, perceived social support will contribute to a positive view on oneself and lead to the improvement in self-compassion. In contrast, lower perceived social support may lead to negative self-concepts. Due to a lack of interpersonal contact and positive feedback from significant others, individuals with lower perceived social support are more likely to make internal attributions for their failures (Ross et al., 1999), which will lead to more rumination (Flynn et al., 2010), and even a vicious circle of self-criticism, result in a decline in self-compassion. Recent studies also showed that perceived social support and self-compassion are positively correlated (Stallman et al., 2018; Wilson et al., 2020). Therefore, we proposed that perceived social support would positively predict college students' self-compassion.

Besides, self-compassion will help people to cope with challenges in a positive way, which may reduce their tendency to procrastinate. Since self-compassion is associated with positive self-evaluation (Stallman et al., 2018), it will promote the intrinsic motivation related to personal growth (Kim et al., 2010) and make individuals put in more effort. For example,

an experimental study found that self-compassion priming promoted individuals' persistence and commitment to the task in the face of difficulties, and those in the self-compassion condition had stronger motivation to change the adversity (Breines & Chen, 2012). When facing difficulties, people with higher self-compassion are more self-accepted rather than self-critical, so they are less afraid of the possible failure, dare to take responsibility and take action. In other words, self-compassion could change one's motivation from avoidance to approach (Flett et al., 2016), this may reduce procrastination due to a lack of motivation. Besides, benefit from good coping style, people with higher self-compassion may be less depleted by external stressors and thereby have more resources for self-regulation (Terry & Leary, 2011), thus reducing the likelihood of procrastination. Combined together, the first hypothesis was raised:

> Hypothesis 1. Self-compassion mediates the relationship between perceived social support and procrastination.

The Mediating Role of Negative Emotions

Negative emotions may operate as another mediator between perceived social support and procrastination, as proposed by Feeney and Collins (2015) in their conceptual model. Substantial evidences showed that people who perceived more social support have lower levels of negative emotions and emotional distress (Jacobson et al., 2017; Lyubomirsky & Layous, 2013; Wilson et al., 2020). On one hand, others' support and can provide emotional comfort and warmth, which could directly reduce individuals' negative emotional experience. On the other hand, since perceived social support can change individuals' evaluation of the problem situation (Feeney & Collins, 2015), it will reduce their stress associated with problem solving. In addition, negative emotions were found a risk factor of procrastination (Tice et al., 2001; Wohl et al., 2010). The misregulation hypothesis of procrastination hold that procrastination may function as an emotion regulation strategy to relieve negative emotions experienced in the moment (Sirois & Pychyl, 2013), so feeling negative emotions will increase the possibility of procrastination. Research showed that people are more likely to procrastinate when they're in a bad mood, engaging in task-unrelated activities that could bring immediate pleasure (Sirois & Pychyl, 2013; Tice et al., 2001). Although one may feel good in the short term by procrastination, it will make things worse in the long run, leading to more negative emotions such as stress (Tice & Baumeister, 1997), and aggravating procrastination. Therefore, we hypothesis that negative emotions would positively predict procrastination.

To sum up, college students often encounter various difficulties in their daily life, such as academic and interpersonal problems, along with negative emotions. Perceived enough social support will help to reduce these bad feelings, otherwise they will experience more negative emotions such as stress and anxiety. In order to alleviate these negative emotions, they tend to participate in more attractive activities unrelated to the task, which can lead to procrastination. Therefore, the second hypothesis is raised:

> Hypothesis 2: Negative emotions mediate the relationship between perceived social support and procrastination.

A Multiple Mediation Model

Above, we have summarized the respective roles of self-compassion and negative emotions, while they may work together in this process. Specifically, we proposed a sequential mediating path from self-compassion to negative emotions in the relation between perceived social support and procrastination. In the theoretical model of social support, Feeney and Collins (2015) took both self-compassion and emotional experience as mediators linking social support to positive adaptative outcomes. However, prior research mostly focused on one factor at a time, and how these factors interact with each other remains to be explored, which is the purpose of the current study.

First, self-compassion is a protective factor of individuals' emotional health, which was well confirmed by substantial evidence showing that people with higher levels of self-compassion tend to experience less negative emotions (Luo et al., 2019; Sirois, 2014; Wilson et al., 2020). Moreover, evidence revealed that self-compassion can promote self-regulation by reducing negative emotions that interfere with successful self-regulation (Terry & Leary, 2011). Another study showed that self-forgiveness, an emotion-oriented strategy similar to self-compassion, could reduce procrastination through decreased negative emotions (Wohl et al., 2010). It was further found that people who are more self-compassionate are less likely to engage in bedtime procrastination, which was explained by their better emotional regulation strategies to downregulate negative emotions (Sirois et al., 2019). Therefore, self-compassion might be an important influencing factor of general procrastination tendency due to its role in downregulate negative emotions. Taking together, we propose that perceived social support could promote self-compassion, which will not only directly reduce procrastination, higher levels of self-compassion are also associated with lower negative emotions, which in turn can reduce procrastination through the emotional self-regulation process. Based on the above analysis, the third hypothesis was proposed:

Hypothesis 3: the effect of perceived social support on procrastination would be sequentially mediated by self-compassion and negative emotions.

The Present Study

In short, this study aims to reveal three research questions: (1) the mediating role of self-compassion in the relationship between perceived social support and procrastination; (2) the mediating role of negative emotions in this relationship; (3) how self-compassion and negative emotions work together in the pathway between perceived social support and procrastination. Specifically, we take stress, anxiety and depression as indicators of negative emotions and focus on the general procrastination behavior of college students, which could examine whether the results of previous studies on academic procrastination can be generalized to more general aspects procrastination. The conceptual sequential mediation model was shown in Fig. 1.

Method

Participants

The participants were recruited from a college in Hebei Province, China. Totally 874 college students (23% male) completed our survey including the measurement of demographic variables, perceived social support, procrastination, self-compassion and negative emotions. The mean age was 19.54 years (SD = 2.16, range = 16–26).

Measures

Perceived Social Support

Perceived social support was measured by the Perceived Social Support Scale (Wen & Lin, 2012), which consists of 11 items. It measures the perceived support of students from three sources including parents (e.g., "My parents respect my feelings"), teachers (e.g., "I can share my happiness and sorrow with my teachers"), and friends (e.g., "My friends are trying to help me"). Each item was rated on a 5-point scale (1 = strongly disagree, 5 = strongly agree), with higher scores indicating greater perceived social support. In this study, Cronbach's α was .91.

Procrastination

Procrastination was measured by the General Procrastination Scale (GPS; Lay, 1986), which consists of 20 items. It measures individual' s procrastination in different situations in daily life (e.g., "I always put off what I have to do"). Each item was rated on a 5-point scale (1 = Never, 5 = Always). All the items were averaged after the coding of 10 reverse scoring items, with higher scores indicating higher tendency to procrastinate. In this study, Cronbach's α was 0.80.

Self-Compassion

Self-compassion was measured by the Self-Compassion Scale - short form (Raes et al., 2011), which consists of 12 items. The scale assesses the three components of self-compassion: self-kindness (self-judgment), common humanity (isolation) and mindfulness (over-identification). A representative item was "When I'm going through a very hard time, I give myself the caring and tenderness." Participants rated each item on a 5-point scale (1 = Never, 5 = Always), A total self-compassion score is calculated by averaging all the items after reverse coding the negative items. In this study, Cronbach's α was 0.82.

Negative Emotions

Negative emotions were measured by the Depression-Anxiety-Stress Scale (DASS-21; Lovibond & Lovibond, 1995), which consists of 21 items (e.g., "I tend to over-react to situations"; "I felt downhearted and blue"). Participants were required to select the response that best describes how

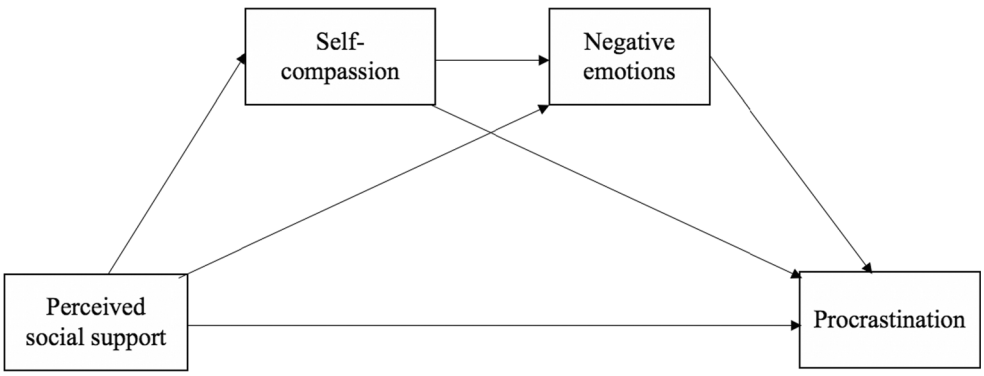

Fig. 1 The proposed sequential mediation model

much it applied to them over the past 2 weeks. Each item was scored on a 4-point scale, ranging from 0 (did not applied to me at all) to 3 (applied to me very much). A composite score was computed by averaging the 21 items, with higher scores indicating the stronger experience of negative emotions. In this study, Cronbach's α was 0.85.

Procedure

All procedures and materials were approved by the research ethics committee of the first author's university. Informed consent was obtained from the participants before the survey. The data were collected in in October 2019 at a college in Hebei Province, China. The convenience sampling method was adopted. The survey was conducted online for all the participants through a survey software. Three well-trained teachers administered the survey. Students were informed that their participation was voluntary and they could terminate their participation anytime they want.

Statistical Analyses

First, descriptive information and bivariate correlation of the variables were analyzed. Second, the mediating effect of self-compassion and negative emotions were tested separately using the PROCESS macro for SPSS (Model 4) (Hayes, 2013). Third, PROCESS macro (Model 6) was used to test the multiple mediation model. Age and gender were controlled as covariates. Bootstrap confidence intervals (CIs) were applied to determine whether the mediating effect were significant. If CI does not include zero, this effect would be significant.

Results

Preliminary Analyses

Descriptive statistics and the correlation matrix of the variables are shown in Table 1. Results of the correlation analysis showed that perceived social support was negatively associated with procrastination ($r = -.37$, $p < .001$). Self-compassion was negatively associated with procrastination ($r = -.40$, $p < .001$). Negative emotions were positively associated with procrastination ($r = .39$, $p < .001$). Besides, perceived social support was positively related to self-compassion ($r = .39$, $p < .001$) and negatively related to negative emotions ($r = -.46$, $p < .001$). Moreover, self-compassion was negatively associated with negative emotions ($r = -.48$, $p < .001$).

Table 1 Descriptive statistics and correlations for all variables

	M	*SD*	1	2	3	4
1. Perceived social support	3.55	.81	1			
2. Self-compassion	3.12	.43	.39***	1		
3. Negative emotions	1.93	.62	−.46***	−.48***	1	
4. Procrastination	2.70	.50	−.37***	−.40***	.39***	1

$N = 874$. ***$p < .001$

The Mediating Role of Self-Compassion

The results indicated that perceived social support was positively associated with self-compassion ($b = .39$, $p < .001$), which in turn was negatively associated with procrastination ($b = -.31$, $p < .001$). Meanwhile, the direct effect of perceived social support on procrastination remained significant ($b = -.25$, $p < .001$), indicating that self-compassion partially mediated the relation between perceived social support and procrastination (indirect effect = −.12, 95% CI = −.16 to −.08, indirect effect/total effect = 32.18%). Therefore, Hypothesis 1 was supported.

The Mediating Role of Negative Emotions

For the mediating role of negative emotions, results showed that perceived social support was negatively associated with negative emotions ($b = -.45$, $p < .001$), which was in turn positively related to procrastination ($b = .28$, $p < .001$). Meanwhile, the residual direct effect was significant ($b = -.24$, $p < .001$), which means that negative emotions partially mediated the relation between perceived social support and procrastination (indirect effect = −.13, 95% CI = −.17 to −.10, indirect effect/total effect = 34.80%). Hypothesis 2 was supported.

The Multiple Mediation Model

As shown in Table 2, the multiple mediation model accounted for a significant variation of procrastination in college students ($R^2 = .24$). The results showed that perceived social support significantly predicted self-compassion ($b = .39$, $p < .001$) and negative emotions ($b = -.32$, $p < .001$). Self-compassion significantly predicted negative emotions ($b = -.35$, $p < .001$), as well as procrastination ($b = -.24$, $p < .001$). Negative emotions also had a significant impact on procrastination ($b = .19$, $p < .001$). Moreover, the direct effect of perceived social support on procrastination was still significant after controlling the effects of self-compassion and negative emotions ($b = -.19$, $p < .001$).

For each mediation pathways, the pathway of "perceived social support → self-compassion → procrastination" was significant (indirect effect = −.09, 95% CI = −.13 to −.06);

Table 2 Testing the pathways of the multiple mediation model

Effect	*b*	95% CI	
		Lower	Upper
Direct effects			
perceived social support → self-compassion	.39***	.33	.45
perceived social support → negative emotions	−.32***	−.38	−.26
self-compassion → negative emotions	−.35***	−.41	−.29
perceived social support → procrastination	−.19***	−.26	−.12
self-compassion → procrastination	−.24***	−.30	−.17
negative emotions → procrastination	.19***	.12	.26
Indirect effects			
perceived social support → self-compassion → procrastination	−.09	−.13	−.06
perceived social support → negative emotions → procrastination	−.06	−.09	−.04
perceived social support → self-compassion → negative emotions → procrastination	−.03	−.04	−.02

$N = 874$. The beta values are standardized coefficients. ***$p < .001$

the pathway of "perceived social support → negative emotions → procrastination" was also significant (indirect effect = −.06, 95% CI = −.09 to −.04); moreover, the pathway of "perceived social support → self-compassion → negative emotions → procrastination" was significant (indirect effect = −.03, 95% CI = −.04 to −.02). Besides, the total indirect effect was significant (indirect effect = −.18, 95% CI = −.23 to −.14). Therefore, self-compassion and negative emotions partially mediated the relation between perceived social support and procrastination, thus Hypothesis 3 was supported.

Discussion

Although the effect of perceived social support on procrastination has been supported by some empirical evidence, the mechanisms underlying this relation are largely unknown. By establishing a sequential mediation model, the current study examined the roles of self-compassion and negative emotions in a sample of college students. These findings revealed a more elaborate mechanism of how perceived social support is associated with procrastination and provided practical reference for better reducing college students' procrastination.

As predicted in hypothesis 1, self-compassion mediated the relationship between perceived social support and procrastination. First, our results showed that self-compassion can be fostered by perceived social support, which replicated the results of existing studies (Stallman et al., 2018; Wilson et al., 2020). People could transform the support from others into self-acceptance (Maheux & Price, 2015), and they are able to express more kindness towards themselves. Besides, self-compassion also negatively predicted college students' procrastination tendency in general, adding to the evidence that self-compassion could promote successful self-regulation (Breines & Chen, 2012; Sirois et al., 2019). Self-compassion may able to enhance intrinsic motivation and successful self-regulation, thereby reduce the tendency to procrastinate. Moreover, self-compassion partially mediated the relation between perceived social support and procrastination, which is consistent with a recent study showing that self-compassion mediated the association between perceived social support and undergraduates' well-being (Wilson et al., 2020), and we add to the evidence by including procrastination as an outcome. Our findings suggested that perceived social support could improve college students' self-compassion, which would lead them to act in a more active way, and consequently reduce procrastination. To our knowledge, this is the first study to explore the mediating role of self-compassion in the relationship between social support and procrastination. These findings provide new evidence for Feeney' s social support theory, which propose that social support can have a positive long-term impact on psychological prosperity through mediating factors such as self-compassion (Feeney & Collins, 2015).

Consistent with hypothesis 2, it was found that negative emotions are another mechanism that accounts for the association between perceived social support and procrastination. Researchers have indicated negative emotions an important risk factor of procrastination (Tice et al., 2001; Wohl et al., 2010). As perceived social support was negatively associated with negative emotional experiences (Lyubomirsky & Layous, 2013; Jacobson et al., 2017), negative emotions may operate as a mediator in the association between social support and procrastination. College students who can hardly perceive social support are more likely to experience negative emotions in their daily life. To get a better feeling, they are

more willing to engage in unrelated activities which can provide immediate pleasure instead of the target task, leading to more procrastination (Tice & Baumeister, 1997). In other words, procrastination may server as a maladaptive emotional regulation strategy (Sirois & Pychyl, 2013), used more often when social support is less perceived. In addition, negative emotions may also impair individuals' self-control (Cho et al., 2017), and procrastination arises from a decline in executive function. These possible mechanisms are likely to work together to increase the risk of procrastination in college students. In short, our work is the first to examine the mediating role of negative emotions between social support and procrastination, which adds to new evidence for the emotional mechanisms of perceived social support on procrastination.

Moreover, the results showed that self-compassion and negative emotions sequentially mediated the association between perceived social support and procrastination. Many studies have shown that self-compassion is a predictor of negative emotions (Luo et al., 2019; Sirois, 2014; Wilson et al., 2020), results of this study once again replicated these findings by showing that they are closely correlated. Luo et al. (2019) pointed out that lack of self-compassion can intensify negative emotional experience through the role negative self-evaluation. Also, self-compassion can be regard as an emotion-oriented coping strategy that allows individuals to openly accept and transform negative emotions from an objective perspective (Zhang et al., 2019). These views all provide insights into how self-compassion can reduce negative emotions. By integrating self-compassion and negative emotions in a model, this study adds evidence to the existing conceptual framework of social support (Feeney & Collins, 2015), and further revealed that these factors can work together in the effect of perceived social support on procrastination in a sequential manner. These findings suggested that self-compassion and negative emotions not only mediated the relation between perceived social support and college students' procrastination separately, but also can mediate this relation sequentially. In brief, we can conclude that the positive perception of social information may improve individuals' self-evaluation, which would influence subsequent emotional experience and behavioral tendency. For college students, lack of perceived social support will cause the feelings of isolation and a decline in self-compassion, which will lead to negative emotions and ultimately increase the risk of maladaptive behaviors such as procrastination. This integrated sequential mediation model can provide a more comprehensive mechanism that account for how perceived social support is associated with procrastination.

In addition, our findings have several practical implications for the prevention and intervention of college students' procrastination. First, the results indicated that perceived social support was a protective factor for procrastination. Therefore, a functional social support network should be established for college students. It is also important to cultivate students' social skills and guide them to recognize and make full use of different sources of social support. Second, considering that self-compassion is an important mechanism through which perceived social support influences procrastination, it is important to improve individuals' self-compassion. Previous research has demonstrated the effectiveness of self-compassion training (Dundas et al., 2017; Smeets et al., 2014), so promoting these methods among college students is a direction in the future. Third, since negative emotions also play a mediating role, reducing negative emotions will be conducive to reduce procrastination. For instance, mindfulness training, cognitive reappraisal are some effective strategies to regulate negative emotions. Finally, as self-compassion and negative emotions sequentially mediate the association between perceived social support and procrastination, interventions targeting both of these factors will be more effective in blocking the forming path of procrastination.

Despite these findings, there are still some limitations that can be improved in the future. First, this study adopted a convenient sample and our findings was based on a sample of Chinese college students, so the generalizability of the results has yet to be tested. Future studies could utilize random sampling and collect data in different culture backgrounds and age groups. Second, due to the cross-sectional design, no causal inference can be made. Future studies could use longitudinal designs or experiments to confirm this causality. Third, since data collection in this study was based on self-reported method, future research could use multiple methods to collect various sources of information, to draw more convincing conclusions. Finally, although the mediating mechanisms between perceived social support and procrastination has been demonstrated, as the results showed, both self-compassion and negative emotions played a partial mediating role. This suggests that there may be other mediating mechanisms through which perceived social support influence procrastination, which have not been included in this study. Future research can explore these possible mediating variables, to further improve our knowledge of how perceived social support is associated with procrastination.

Conclusion

In summary, this study investigated the mediating mechanism in the relationship between perceived social support and procrastination among college students. Results showed that self-compassion and negative emotions sequentially mediated the relation between perceived social support and procrastination. Through the establishment of a multiple mediation model, this

study demonstrated that perceived social support could influence procrastination through the role of self-compassion and negative emotions.

Author's Contributions Xiaofan Yang and Jingru Zhu designed the study; Xiaofan Yang collected and analyzed the data; Jingru Zhu and Xiaofan Yang wrote the manuscript; Ping Hu revised the manuscript.

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Data Availability The datasets generated during and analysed during the current study are available from the corresponding author on reasonable request.

Declarations

Disclosure of Interest Author Xiaofan Yang, Author Jingru Zhu and Author Ping Hu declare that they have no conflict of interest.

References

Barnard, L. K., & Curry, J. F. (2011). Self-compassion: Conceptualizations, correlates, & interventions. *Review of General Psychology, 15*, 289–303.

Breines, J. G., & Chen, S. (2012). Self-compassion increases self-improvement motivation. *Personality & Social Psychology Bulletin, 38*(9), 1133–1143.

Chen, B., & Qu, W. (2017). Life history strategies and procrastination: The role of environmental unpredictability. *Personality and Individual Differences, 117*, 23–29.

Cho, H. Y., Kim, D. J., & Park, J. W. (2017). Stress and adult smartphone addiction: Mediation by self-control, neuroticism, and extraversion. *Stress & Health, 33*, 624–630.

Cohen, S., & Wills, T. A. (1985). Stress, perceived social support, and the buffering hypothesis. *Psychological Bulletin, 98*(2), 310–357.

Dundas, I., Binder, P. E., Hansen, T. G. B., & Stige, S. H. (2017). Does a short self-compassion intervention for students increase healthy self-regulation? A randomized control trial. *Scandinavian Journal of Psychology, 58*(5), 443–450.

Erzen, E., & Cikrikci, O. (2018). The role of school attachment and parental social support in academic procrastination. *Turkish Journal of Teacher Education, 7*(1), 17–27.

Fatima, S., Rizvi, S. Z. S., & Jamal, S. R. (2020). Perceived social support, health procrastination and flourishing in cancer patients. *International Journal of Social Science Studies, 8*(5), 1148–1159.

Feeney, B. C., & Collins, N. L. (2015). A new look at social support: A theoretical perspective on thriving through relationships. *Personality and Social Psychology Review, 19*(2), 113–147.

Ferrari, J. R., Harriott, J. S., & Zimmerman, M. (1999). The perceived social support networks of procrastinators: Friends or family in times of trouble? *Personality and Individual Differences, 26*(2), 321–331.

Ferrari, J. R., O' Callaghan, J., & Newbegin, I. (2005). Prevalence of procrastination in the United States, United Kingdom, and Australia: Arousal and avoidance delays among adults. *North American Journal of Psychology, 7*(1), 1–6.

Flett, A. L., Haghbin, M., & Pychyl, T. A. (2016). Procrastination and depression from a cognitive perspective: An exploration of the associations among procrastinatory automatic thoughts, rumination, and mindfulness. *Journal of Rational-Emotive & Cognitive-Behavior Therapy, 34*(3), 169–186.

Flynn, M., Kecmanovic, J., & Alloy, L. B. (2010). An examination of integrated cognitive-interpersonal vulnerability to depression: The role of rumination, perceived social support, and interpersonal stress generation. *Cognitive Therapy & Research, 34*(5), 456–466.

Geng, J., Han, L., Gao, F., Jou, M., & Huang, C. (2018). Internet addiction and procrastination among Chinese young adults: A moderated mediation model. *Computers in Human Behavior, 84*, 320–333.

Haghbin, M., Mccaffrey, A., & Pychyl, T. A. (2012). The complexity of the relation between fear of failure and procrastination. *Journal of Rational-Emotive & Cognitive-Behavior Therapy, 30*(4), 249–263.

Hayes, A. F. (2013). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach*. Guilford Press.

Jacobson, N. C., Lord, K. A., & Newman, M. G. (2017). Perceived emotional social support in bereaved spouses mediates the relationship between anxiety and depression. *Journal of Affective Disorders, 211*, 83–91.

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

Kim, Y. H., Chiu, C. Y., & Zou, Z. (2010). Know thyself: Misperceptions of actual performance undermine achievement motivation, future performance, and subjective well-being. *Journal of Personality & Social Psychology, 99*(3), 395–409.

Lai, Y., & Lin, W. (2018). Relations among perceived social support, subjective well-being and academic procrastination of rural left-behind children. *Journal of Shaanxi Xueqian Normal University, 34*(5), 23–27.

Lay, C. H. (1986). At last, my research article on procrastination. *Journal of Research in Personality, 20*(4), 474–495.

Lee, D. G., Kelly, K. R., & Edwards, J. K. (2006). A closer look at the relationships among trait procrastination, neuroticism, and conscientiousness. *Personality and Individual Differences, 40*(1), 27–37.

Lovibond, P. F., & Lovibond, S. H. (1995). The structure of negative emotional states: Comparison of the Depression, Anxiety, Stress Scales (DASS) with the Beck Depression and Anxiety Inventories. *Behaviour Research and Therapy, 33*(3), 335–343.

Luo, Y., Meng, R., Li, J., Liu, B., Cao, X., & Ge, W. (2019). Self-compassion may reduce anxiety and depression in nursing students: A pathway through perceived stress. *Public Health, 174*, 1–10.

Lyubomirsky, S., & Layous, K. (2013). How do simple positive activities increase well-being? *Current Directions in Psychological Science, 22*, 57–62.

Madjid, A., Sutoyo, D. A., & Shodiq, S. F. (2021). Academic procrastination among students: The influence of social support and resilience mediated by religious character. *Cakrawala Pendidikan, 40*(1), 56–69.

Mahasneh, A. M., Bataineh, O. T., & Al-Zoubi, Z. H. (2016). The relationship between academic procrastination and parenting styles among Jordanian Undergraduate University students. *The Open Psychology Journal, 9*(1), 25–34.

Maheux, A., & Price, M. (2015). Investigation of the relation between PTSD symptoms and self- compassion: Comparison across DSM IV and DSM 5 PTSD symptom clusters. *Self and Identity, 14*(6), 627–637.

Neff, K. (2003). Self-compassion: An alternative conceptualization of a healthy attitude toward oneself. *Self and Identity, 2*(2), 85–101.

Neff, K. D., & Mcgehee, P. (2010). Self-compassion and psychological resilience among adolescents and young adults. *Self & Identity, 9*(3), 225–240.

Özer, B. U., Demir, A., & Ferrari, J. R. (2009). Exploring academic procrastination among Turkish students: Possible gender differences in prevalence and reasons. *Journal of Social Psychology, 149*(2), 241–257.

Pychyl, T. A., & Flett, G. L. (2012). Procrastination and self-regulatory failure: An introduction to the special issue. *Journal of Rational-Emotive & Cognitive-Behavior Therapy, 30*(4), 203–212.

Pychyl, T. A., Coplan, R. J., & Reid, P. A. M. (2002). Parenting and procrastination: Gender differences in the relations between procrastination, parenting style and self-worth in early adolescence. *Personality and Individual Differences, 33*, 271–285.

Raes, F., Pommier, E., Neff, K. D., & Gucht, D. V. (2011). Construction and factorial validation of a short form of the Self-Compassion Scale. *Clinical Psychology & Psychotherapy, 18*(3), 250–255.

Rebetez, M., Rochat, L., Barsics, C., & Van der Linden, M. (2016). Procrastination as a self-regulation failure: The role of inhibition, negative affect, and gender. *Personality and Individual Differences, 101*, 435–439.

Robinson, N. S. (1995). Evaluating the nature of perceived support and its relation to perceived self-worth in adolescents. *Journal of Research on Adolescence, 5*(2), 253–280.

Ross, L. T., Lutz, C. J., & Lakey, B. (1999). Perceived social support and attributions for failed support. *Personality and Social Psychology Bulletin, 25*(7), 896–908.

Sadeghi, H., Hajloo, N., & Emami, F. (2011). The study of relationship between obsessive beliefs and procrastination among students of Mohagheghe ardabili and Marageh universities. *Procedia Social & Behavioral Sciences, 30*, 292–296.

Sari, W. L., & Fakhruddiana, F. (2019). Internal locus of control, social support and academic procrastination among students in completing the thesis. *International Journal of Evaluation and Research in Education, 8*(2), 363–368.

Schraw, G., Wadkins, T., & Olafson, L. (2007). Doing the things we do: A grounded theory of academic procrastination. *Journal of Educational Psychology, 99*(1), 12–25.

Sirois, F. M. (2007). "I'll look after my health, later": A replication and extension of the procrastination–health model with community-dwelling adults. *Personality and Individual Differences, 43*(1), 15–26.

Sirois, F. M. (2014). Procrastination and stress: Exploring the role of self-compassion. *Self and Identity, 13*(2), 128–145.

Sirois, F. M., & Pychyl, T. A. (2013). Procrastination and the priority of short-term mood regulation: Consequences for future self. *Social and Personality Psychology Compass, 7*(2), 115–127.

Sirois, F. M., Nauts, S., & Molnar, D. S. (2019). Self-compassion and bedtime procrastination: An emotion regulation perspective. *Mindfulness, 10*, 434–445.

Smeets, E., Neff, K., Alberts, H., & Peters, M. (2014). Meeting suffering with kindness: Effects of a brief self-compassion intervention for female college students. *Journal of Clinical Psychology, 70*(9), 1–15.

Stallman, H. M., Ohan, J. L., & Chiera, B. (2018). The role of perceived social support, being present, and self-kindness in university student psychological distress. *Australian Psychologist, 53*, 52–59.

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*, 175–180.

Steel, P. (2007). The nature of procrastination: A meta-analytic and theoretical review of quintessential self-regulatory failure. *Psychological Bulletin, 133*(1), 65–94.

Terry, M. L., & Leary, M. R. (2011). Self-compassion, self-regulation, and health. *Self & Identity, 10*(3), 352–362.

Tice, D. M., & Baumeister, R. F. (1997). Longitudinal study of procrastination, performance, stress, and health: The costs and benefits of dawdling. *Psychological Science, 8*(6), 454–458.

Tice, D. M., Bratslavsky, E., & Baumeister, R. F. (2001). Emotional distress regulation takes precedence over impulse control: If you feel bad, do it! *Journal of Personality and Social Psychology, 80*, 53–67.

Tomlinson, J. M., Feeney, B. C., & Van Vleet, M. (2016). A longitudinal investigation of relational catalyst support of goal strivings. *The Journal of Positive Psychology, 11*, 246–257.

van Eerde, W., & Klingsieck, K. B. (2018). Overcoming procrastination? A meta-analysis of intervention studies. *Educational Research Review, 25*, 73–85.

Wen, M., & Lin, D. (2012). Child development in rural China: Children left behind by their migrant parents and children of nonmigrant families. *Child Development, 83*(1), 120–136.

Wilson, J. M., Weiss, A., & Shook, N. J. (2020). Mindfulness, self-compassion, and savoring: Factors that explain the relation between perceived social support and well-being. *Personality and Individual Differences, 152*, 109568.

Wohl, M. J. A., Pychyl, T. A., & Bennett, S. H. (2010). I forgive myself, now I can study: How self-forgiveness for procrastinating can reduce future procrastination. *Personality and Individual Differences, 48*, 803–808.

Yang, X., Wang, P., & Hu, P. (2020). Trait procrastination and mobile phone addiction among Chinese college students: A moderated mediation model of stress and gender. *Frontiers in Psychology, 11*, 614660.

Zakeri, H., Esfahani, B. N., & Razmjoee, M. (2013). Parenting styles and academic procrastination. *Procedia-Social and Behavioral Sciences, 84*, 57–60.

Zhang, H., Chi, P., Long, H., & Ren, X. (2019). Bullying victimization and depression among left behind children in rural China: Roles of self-compassion and hope. *Child Abuse & Neglect, 96*, 104072.