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My stress led me to procrastinate:

Temporal relations between perceived stress and academic procrastination

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Abstract

Academic procrastination is widespread among college students, leads to poorer academic

performance and has been related to concurrent stress. Because the direction of effects between

procrastination and stress is unclear, two longitudinal studies were conducted. Study 1 (n = 454)

showed that mid-semester levels of stress were related to end of semester procrastination

controlling for mid-semester procrastination but not vice versa. Study 2 (n = 326) examined

procrastination and stress both before and during a quarantine occasioned by the coronavirus

pandemic. Although procrastination increased during the quarantine, this study replicated the

Study 1 finding that earlier stress is associated with later procrastination rather than vice versa.

The importance of these findings is emphasized by the need for empirically based interventions

for academic procrastination in tertiary education.

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Procrastination is associated with poorer performance in student, teacher, and community samples (e.g., Cao, 2012; Laybourn, Frenzel, & Fenzl, 2019; Nguyen, Steel, & Ferrari, 2013) with economists estimating that procrastination consumes about 25% of the working day (D'Abate, & Eddy, 2007; Nguyen et al., 2013). Among college students, academic procrastination has been described as "a problem of epidemic proportions" (Balkis, 2013, p. 57) and even though estimates vary, the finding that half of all students (52%) report regular academic procrastination is not atypical (e.g., Ozer, Demir, & Ferrari, 2009). This dilatory behavior defined as the "voluntarily delay of an intended course of study-related action, despite expecting to be worse off for the delay" (Steel & Klingsieck, 2016, p. 37), has serious consequences. A meta-analysis of 33 studies (N = 38,529 participants) showed that procrastination was inversely related to indices of academic performance (e.g., assignment grades, GPA, examination scores, course grades), although the magnitude of the association varied (from -.12 to -.64) depending on the indicator of performance (Steel, 2007). Academic procrastination is also associated with dropping out of tertiary education (Wollscheid, Stensaker, Jongbloed, et al., 2015).

There is clearly a need to understand what leads to academic procrastination. As theoretical explanations of procrastination specific to academics draw heavily from the generalized procrastination literature, attempts to explain procrastination have been characterized as falling into approximately four categories (Klingsieck, 2013). The differential psychology perspective seeks to explain procrastination in terms of personality traits. Second, the motivational and volitional psychology perspective attributes procrastination to motivational variables (e.g., intrinsic motivation, self-efficacy, mastery motivation) and volitional variables (e.g., decreased self-control). The third perspective, that of clinical psychology, focuses on the

negative correlates of procrastination (e.g., depression, anxiety) and seeks to explain it in terms of theories that underlie psychological intervention (e.g., psychoanalysis, cognitive behaviorism). Unlike these three perspectives that focus on the individual, the fourth approach focuses on situational variables emphasizing task characteristics such as difficulty and attractiveness.

Although identified within the clinical perspective, research on the role of stress in understanding procrastination has focused on subclinical levels of stress (Klingsieck, 2013). It is now well documented that an association exists between perceived stress and procrastination (e.g., Arslan, Qian, Wei, & Abdul, 2019; Beutel, Klein, & Aufenanger, 2016; Sirois, 2007, 2014; Sirois & Kitner, 2015; Tice & Baumeister, 1997). This association can be understood from a stress and coping perspective in that procrastination is viewed as a short-term emotional regulation strategy providing immediate relief from an aversive task or perceived stressor such as schoolwork (Sirois & Pychyl, 2013). Sirois and Kitner (2015) argue further that because procrastination avoids rather than solves the problem at hand its leads ultimately to greater perceived stress. They cite two published studies to support their view that procrastination is the source of stress rather than vice versa (Rice, Richardson, & Clark, 2012; Tice & Baumeister, 1997).

Close examination of Rice et al.'s (2012) three wave study of perfectionism, academic procrastination, and distress across a college semester shows that despite strong cross-sectional correlations between academic procrastination and distress ($r = .45$ to $.51$) hypothesized temporal associations between academic procrastination and distress did not emerge. They attribute this result, in part, to the high levels of stability in the constructs found in their psychology undergraduate sample. Tice and Baumeister (1997) report intriguing findings from two studies. In the first study (n = 44) they found that procrastination was inversely related to perceived stress

(r = -.29). They speculated that this finding could have reflected the timing of the data collection at the beginning of the semester before the effects of procrastination might be felt. In their second study (n = 57) they replicated the inverse association between procrastination and stress (r = -.31) at the beginning of the semester but found a strong positive correlation at the end of the semester (r = .68). Unfortunately, longitudinal associations are not reported, and questions can be raised about statistical power in these studies.

The need for longitudinal research on the relationship between procrastination and stress is apparent. This need is emphasized by the argument that stress could lead to procrastination. That is, negativity evoked by a task could lead to engagement in a preferred activity as a means of restoring positive mood. Indeed, Tice, Bratslavsky, and Baumeister (2001) showed that a negative mood induction can lead to more procrastination. Consistent with this finding, in a daily diary study Pollack and Herrres (2020) found that students reported more procrastination on days after they had experienced negative affect but that procrastination did not predict negative affect the next day. Therefore, the purpose of the following research is to examine the temporal relationship between academic procrastination and stress.

Study 1

In light of the observations made thus far a short-term longitudinal study was conducted in which perceived stress and academic procrastination were assessed at two points in time. On the basis of existing evidence showing a concurrent relationship between procrastination and stress, data suggesting that procrastination leads to stress, and the argument that stress can give rise to procrastination, three hypotheses were tested.

Hypothesis 1. There will be a statistically significant correlation between reported stress and academic procrastination at both Time 1 and at Time 2.

Hypothesis 2. Academic procrastination at Time 1 will predict later perceived stress at Time 2, controlling for initial levels of stress at Time 1.

Hypothesis 3. Reported stress at Time 1 will predict later academic procrastination at Time 2, controlling for initial levels of procrastination at Time 1.

Method

Participants and procedure

Participants were college students taking courses that met university liberal studies requirements. Most were from human and social sciences where the vast majority of students are female. Of the 454 participants (412 female), 45 identified as Black (9.9%), 15 as Asian (3.3%), 75 as Latino/Hispanic (16.5%), 2 as American Indian (.4%), 305 as White (67.2%), 1 as Middle Eastern (.2%), 10 as "other" (2.2%) and one person preferred not to disclose their racial/ethnic identification.

At the beginning of the semester, students were provided with the option to participate in online surveys seven weeks apart. This was one of several options to obtain a small amount of extra course credit. Those who chose to participate completed a larger online survey which contained the measures reported in this study. The surveys were administered at mid-semester and seven weeks later at the end of the semester. Participants read a brief description of the study and provided informed consent before responding to any measures. The study was approved by the university's Institution Review Board.

Measures

Stress. The stress subscale of the Depression Anxiety Stress Scale–21 (Lovibond & Lovibond, 1995) was used to measure stress. Participants were asked to rate how much each of 7 statements pertaining to stress (e.g., "I found it hard to wind down" and "I found myself getting

agitated") applied to them in the past week. The response scale varied from 0 (did not apply to me at all) to 3 (applied to me very much, or most of the time). Responses were summed across items with higher scores indicating greater stress. In the present sample, coefficient alpha was satisfactory (wave 1 = .87, wave 2 = .89).

Academic procrastination. Academic procrastination was measured with the Academic Procrastination Scale–Short Form (APS-S; Yockey, 2016). The original 25-item APS was designed to focus on general academic procrastination deemphasizing specific types of academic tasks. The five-item short form was created by selecting items from the original full-length scale (see McCloskey, 2011) that consisted of high factor loadings and item-total correlations (r's > .70). Replication of the psychometric properties of the short form indicated a unidimensional factor structure with good internal consistency and convergent validity with at least moderate correlations with other measures of academic procrastination (Yockey, 2016). This unidimensional scale comprises the items: "I put off projects until the last minute," "I know I should work on schoolwork, but I just don't do it, "I get distracted by other, more fun, things when I am supposed to work on schoolwork," "When given an assignment, I usually put it away and forget about it until it is almost due," and "I frequently find myself putting important deadlines off". Respondents were asked how much they agree with each item and indicated their response on a 5-point scale ranging from disagree (1) to agree (5) with higher score indicating more procrastination. Coefficient alpha was high in the present sample (wave 1 = .93, wave 2 = .94).

Results

The inter-correlations among the measures, as well as their means and standard deviations, are shown in Table 1. These data provided support for Hypothesis 1 in that academic

procrastination and stress correlated significantly at both Time 1 and Time 2. To test the second

and third hypotheses, we analyzed a cross-lagged stability model (in which each Time 2 variable

is simultaneously regressed on each Time 1 variable) using structural equation modeling. This

model controlled for the stability of each construct in exploring the longitudinal relations

between them. Significant cross-lagged effects reflect the presence of a relationship beyond that

which can be accounted for by the stability of the constructs and the magnitude of their

association at Time 1. Because the model is fully saturated (without any degrees of freedom),

there are no estimates of model fit and the focus is on parameter estimates only.

<div align="center">Insert Table 1 and Figure 1 about here</div>

Hypothesis 2 was not supported as the cross-lagged coefficient for the path from Time 1

procrastination to Time 2 stress was not significant, $\beta = .04$, $p = .261$. In contrast Hypothesis 3

was supported. The cross-lagged coefficient for the path from Time 1 stress to Time 2

procrastination was significant, $\beta = .09$, $p = .011$. To examine whether there was a difference in

the magnitude of the cross-lagged paths they were constrained to be equal and the model was

recomputed. With the two paths constrained, the model fit the data, $\chi^2(1) = 1.86$, $p = .172$,

RMSEA $= .044$, and the constrained paths were significant ($p = .013$).

Because the cross-lagged paths did not differ significantly in magnitude we explored

potential bidirectional or synchronous effects between procrastination and perceived stress. To

do this we estimated a nonrecursive model (see Figure 1). For a synchronous effects model to be

empirically identified, earlier measures of procrastination and stress are presumed to be

predetermined variables and thereby uncorrelated with the disturbance terms in both Time 2

equations, and both cross-lagged effects are constrained to be zero. The present model satisfies

these conditions. Again, this is a fully saturated model and hence only parameter estimates are of

interest. The results for this model are consistent with those that were found for the cross-lagged

stability model. That is, the path from procrastination to stress was not significant, $\beta = .06$, $p =$

.255, whereas the path from stress to procrastination was significant, $\beta = .14$, $p = .009$. Finally,

when the two paths were constrained to be equal the model fit the data, $\chi 2(1) = 2.38$, $p = .123$,

RMSEA= .055, and the constrained paths were significant ($p = .018$).

Discussion

The present study contributes to a very limited longitudinal literature on the temporal

relationship between procrastination and stress. In doing so, it replicated previous findings

showing that the two constructs are related concurrently. Although we replicated Tice and

Baumeister's (1997) finding that procrastination and stress were positively correlated at the end

of the semester, the magnitude of the correlation we found was substantially smaller ($r = .31$)

than the one they reported ($r = .68$). Given that their small sample (n = 57) came from a single

psychology class whereas our much larger sample (n = 454) came from multiple classes, it is

likely that the estimate found in the present study is more likely to represent the actual

relationship between procrastination and stress at the end of a semester.

This study is among the first to show a temporal relationship between procrastination and

stress. It showed that stress predicts later procrastination but not vice versa. Our hypothesis that

procrastination predicts later stress was therefore not supported (Hypothesis 2). However, stress

did predict later procrastination supporting Hypothesis 3. The finding of a temporal relation

between stress and procrastination is not consistent with Rice et al.'s (2012) null finding even

though relatively high stability coefficients were found for stress (.62) and procrastination (.68)

in the present study. Because of the novelty of our findings and the fact that they are inconsistent

with the findings of Rice et al. (2012), a second study was conducted to examine whether the temporal relationship found between stress and procrastination in Study 1 would replicate.

Study 2

The goal of this study was not only to determine whether the temporal relationship between procrastination and stress could be replicated, but to examine whether the coronavirus pandemic impacted stress and procrastination and the temporal relationship between them among emerging adults engaged in tertiary education.

The coronavirus pandemic lead to the implementation of "lockdowns" in numerous countries. These lockdown orders soon prompted concerns about their psychological effects (e.g., Brooks, Webster, Smith, et al., 2020; Razai, Oakeshott, Kankam, et al., 2020; Xiang, Yang, Li, et al., 2020). It was widely assumed that such orders would, inter alia, increase stress. This was a reasonable assumption given the potential loss of income occasioned by them as well as concern, worry, or even fear occasioned by the possibility of contracting a potentially deadly virus. Consistent with this view initial data on the coronavirus pandemic showed higher levels of anxiety, depression, and distress among people (Qiu et al., 2020; Wang et al., 2020).

This study therefore tests the following two hypotheses.

Hypothesis 1. Perceived stress will increase among emerging adults once the university is closed following a state-wide stay at home order.

Hypothesis 2. Stress will predict later academic procrastination, controlling for initial levels of procrastination.

It is unclear how procrastination might manifest itself in the context of a quarantine. In the absence of data pertaining to the coronavirus pandemic and procrastination, no hypothesis is

offered for this variable. Instead, we simply ask: does a stay at home order lead to change in procrastination?

Method

Participants and procedures

Participants were again students taking courses that met university liberal studies requirements and were primarily from human and social sciences. The 326 participants were predominantly female (n = 307) and averaged 20.12 (SD = 1.64) years of age. As regards ethnic/racial identification, 28 identified as Black (8.6%), 9 as Asian (2.8%), 50 as Latino/Hispanic (15.3%), 1 as American Indian (.3%), 224 as White (68.7%), 5 as Middle Eastern (1.5%), 8 as "other" (2.5%) and one person preferred not to disclose their racial/ethnic identification.

As in Study 1, students were given with the opportunity to participate in online surveys seven weeks apart as one of several options to earn a small amount of extra course credit. This opportunity was again offered to a new sample in the semester immediately following the one in which data were collected for Study 1. As in the previous study, participants completed a larger online survey which contained the same measures of procrastination (Academic Procrastination Scale-Short Form, Yocky, 2016: coefficient alpha; wave 1 = .93, wave 2 = .95) and stress (stress subscale of the Depression Anxiety Stress Scale–21, Lovibond & Lovibond, 1995: coefficient alpha; wave 1 = .92, wave 2 = .88) used in Study 1. Again, an initial wave of data was collected at mid-semester (2 weeks before a stay at home order was issued) and a second wave of data in the last week of the semester (4 weeks after the order).

Results

The inter-correlations among the measures, as well as their means and standard deviations, are shown in Table 2. It can be seen that the mean scores for stress before and after

the stay at home order were very similar. A paired sample t-test confirmed that they did not significantly differ from each other, $t(325) = 0.94$, $p = .350$. Thus, no support was obtained for the hypothesis that a stay at home order would lead to increased stress (Hypothesis 1). In contrast, procrastination scores increased significantly from Time 1 to Time 2, $t(325) = -2.43$, $p = .015$.

<div align="center">Insert Table 2 and Figure 2 about here</div>

Turning to the second hypothesis, that stress will predict later academic procrastination, controlling for initial levels of procrastination, we conducted a cross-lagged analysis like the one reported in Study 1. That is, we controlled for the stability of procrastination and stress in exploring the longitudinal relations between them. As in Study 1, the cross-lagged coefficient for the path from Time 1 stress to Time 2 procrastination was significant, $\beta = .08$, $p = .041$ whereas the cross-lagged coefficient for the path from Time 1 procrastination to stress at Time 2 was not significant, $\beta = .004$, $p = .926$. Again, we examined whether the magnitude of the cross-lagged paths differed significantly by constraining them to be equal and recomputing the model. The model provided a poor fit for the data, $\chi^2(1) = 2.76$, $p = .096$, RMSEA= .07, and the constrained paths were not significant ($p = .232$).

To explore potential bidirectional or synchronous effects between procrastination and perceived stress we estimated a nonrecursive model in the same manner as described in Study 1. The path from procrastination to stress was not significant, $\beta = .01$, $p = .926$, whereas the path from stress to procrastination was significant, $\beta = .12$, $p = .039$. Finally, when the two paths were constrained to be equal the model was a poor fit for the data, $\chi^2(1) = 3.00$, $p = .083$, RMSEA= .08, and the constrained paths were not significant ($p = .280$).

<div align="center">Discussion</div>

The present results build on those obtained for Study 1. First, they replicate the finding that earlier stress is linked to later procrastination rather than vice versa. Second, by examining data both before and after a stay at home order during the coronavirus pandemic they demonstrate that the longitudinal relationship between stress and procrastination is robust and not altered by the dramatic shift in social conditions brought about by the pandemic. Surprisingly, the change in conditions occasioned by COVID-19 did not result in greater reported stress as anticipated. This finding might be unique to college students and could reflect the fact that most students returned to the safety of their family and possibly even the home and neighborhood in which they were raised. Third, unlike Study 1 the magnitude of the cross-lagged associations between stress and procrastination differed in Study 2. That is, the path from earlier stress to latter procrastination was significantly larger than the one from earlier procrastination to later stress. This difference also emerged in a second model that tested bidirectional or synchronous effects.

In sum, Study 2 replicated the finding that stress is related to later procrastination. Moreover, it is the first study to show that the direction of effect from stress to later procrastination was significantly larger than that from procrastination to later stress.

General Discussion

Taken together, the results of the two studies suggest that the link between procrastination and stress is one in which stress gives rise to later procrastination. Although it is reasonable to argue that procrastination ultimately leads to greater stress (Sirois & Kitner, 2015), we did not find any evidence to support this viewpoint. Nor were we able to identify previous research to support this direction of effects. As noted in the introduction, studies cited by Sirois

and Kitner (2015) to support procrastination leading to greater distress/stress (Rice, Richardson, & Clark, 2012; Tice & Baumeister, 1997) did not withstand close scrutiny.

Study 2 showed that the temporal link from earlier stress to later procrastination did not change in the face of a pandemic that wrought dramatic change in student's lives such that they could not attend classes in person and had to remain in quarantine. This resulted in a major change in their education as all in-person classes were transformed into on-line classes. As many classes were asynchronous this gave students greater latitude in completing their academic work requiring greater self-discipline which might, in part, account for the increase found in procrastination. A second factor that might account for the increased procrastination is access to distractions that they normally did not encounter in the course of the semester, namely, daily access to family members. Finally, instructional faculty were asked to be sensitive to students changed circumstances, and their reactions to the pandemic which could have lead some students to take their academic work less seriously in the belief that in these circumstances they would "pass" anyway. In combination, these factors render increased procrastination during the quarantine understandable. They also might help account, along with the safety of being home and cared for by parents, for why stress levels did not increase.

Several limitations of the research point to the need for caution when interpreting the findings. First, and most obvious, is that the samples comprised primarily females. There are data to suggest that males procrastinate more than females (Steel & Ferrari, 2013) and therefore the current findings need to be replicated in a male student sample. Second, even though the measure used to assess procrastination shows good convergent validity with other procrastination scales, it measures only one dimension of general academic procrastination, a construct that has also been conceptualized as multidimensional. Whether similar findings would emerge for other

procrastination dimensions remains open to question. Third, and relatedly, as in this study, use of the academic procrastination scale has been largely limited to students in tertiary education (Yockey, 2016). Thus, to better understand how the current findings generalize to other academic populations (e.g., high school students, graduate students, etc.), additional investigations are required.

Notwithstanding the above limitations, the present studies make a valuable contribution to research on procrastination which is badly in need of longitudinal studies. Such studies have the potential to elucidate the antecedents of procrastination and thereby contribute to the development of evidence-based interventions. The need for such interventions is emphasized by the adverse effects of procrastination on a wide variety of academic outcomes.

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Table 1. Means, standard deviations (SD) and correlations among study variables.

	1	2	3	4
1 Stress (T1)		.63**	.21**	.23**
2 Stress (T2)			.18**	.31**
3 Procrastination (T1)				.70**
4 Procrastination (T2)				
Mean	6.08	5.85	12.66	12.87
SD	4.38	4.51	5.34	5.63

* $p < .05$, ** $p < .01$

Table 2. Means, standard deviations (SD) and correlations among study variables.

	1	2	3	4
1 Stress (T1)		.67**	.22**	.24**
2 Stress (T2)			.15**	.22**
3 Procrastination (T1)				.73**
4 Procrastination (T2)				
Mean	5.52	5.33	12.70	13.27
SD	4.34	4.35	5.60	5.85

* $p < .05$, ** $p < .01$

Figure 1. Non-recursive model for Study 1. *p* < .01 for all coefficients on solid line.
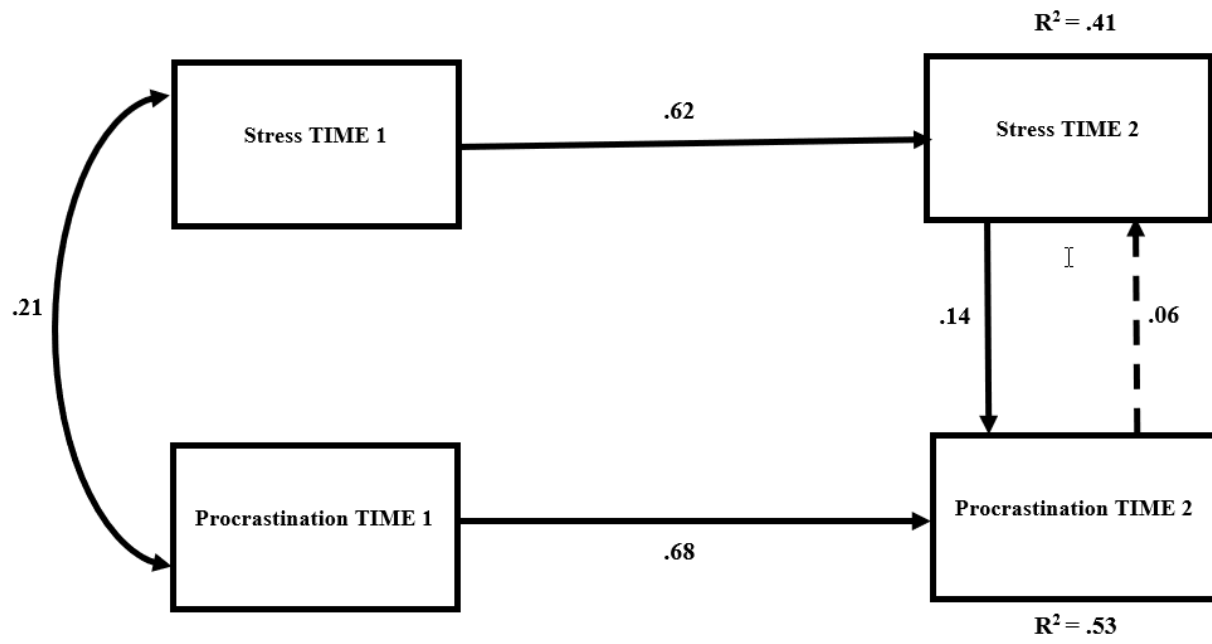
Figure 2. Nonrecursive model for Study 2. $p < .01$ for all coefficients on solid line.