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Perfectionism, Procrastination, and Psychological Distress

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Using a cross-panel design and data from 2 successive cohorts of college students ($N = 357$), we examined the stability of maladaptive perfectionism, procrastination, and psychological distress across 3 time points within a college semester. Each construct was substantially stable over time, with procrastination being especially stable. We also tested, but failed to support, a mediational model with Time 2 (mid-semester) procrastination as a hypothesized mechanism through which Time 1 (early-semester) perfectionism would affect Time 3 (end-semester) psychological distress. An alternative model with Time 2 perfectionism as a mediator of the procrastination–distress association also was not supported. Within-time analyses revealed generally consistent strength of effects in the correlations between the 3 constructs over the course of the semester. A significant interaction effect also emerged. Time 1 procrastination had no effect on otherwise high levels of psychological distress at the end of the semester for highly perfectionistic students, but at low levels of Time 1 perfectionism, the most distressed students by the end of the term were those who were more likely to have procrastinated earlier in the semester. Implications of the stability of the constructs and their association over time, as well as the moderating effects of procrastination, are discussed in the context of maladaptive perfectionism and problematic procrastination.

Keywords: perfectionism, procrastination, psychological distress, cross-panel longitudinal modeling, college students

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Definitions have varied, but most would likely agree that certain elements of perfectionism have adverse consequences for mental health, relationships, and academic or job-related performance. These problematic aspects of perfectionism have been described at the facet or subscale level to include characteristics such as excessive concerns about making mistakes, pernicious self-doubt, harsh self-criticism, impossibly high standards or expectations for performance, and a strong and chronic tendency to evaluate one's performance as not measuring up to levels expected by oneself or others (Slaney, Rice, Mobley, Trippi, & Ashby, 2001). These facets have also been conceptually and empirically combined into higher order dimensions or typologies of problematic perfectionism, referred to as maladaptive evaluative concerns, self-critical perfectionism, perfectionistic concerns, or more simply, maladaptive perfectionism (Stoeber & Otto, 2006). Individuals with elevated scores on these dimensions take little pride or pleasure in their work and often feel inadequate or evaluate themselves negatively. About one fifth to one third of high school or college

student samples have been identified as maladaptively perfectionistic, with a combination of high personal performance standards and elevations on some other problematic dimension(s) of perfectionism, such as self-criticism or concerns about making mistakes (Boone, Soenens, Braet, & Goossens, 2010; Rice & Ashby, 2007).

For some time, the maladaptive label for perfectionism clearly has been appropriate given its concurrent association with indicators of maladjustment or some form of distress (Stoeber & Otto, 2006). Contemporary studies have expanded the understanding of perfectionism by testing complex models of associations between perfectionism and psychological outcomes, including those that address moderators and mediators of perfectionism–outcome relations. For example, perfectionism and psychological outcomes have been linked through mechanisms such as coping, catastrophic thinking, self-esteem, and emotion regulation (e.g., Aldea & Rice, 2006). Relatively few of these studies were designed to yield rigorous tests of mechanism (mediator) models (Maxwell & Cole, 2007) such as through experimental or longitudinal designs. Of course, as Cole and Maxwell (2003) pointed out, simply measuring variables at different time points is not sufficient to demonstrate support for a mediator; there should be good reasons for causal ordering of a predictor, mediator, and outcome.

Procrastination is, to our knowledge, an untested mechanism by which perfectionism might be linked to various performance and adjustment outcomes. According to Egan, Wade, and Shafran's (2011) revised model of clinical perfectionism, procrastination is one of several performance-related behaviors likely associated with perfectionism and likely contributing to the maintenance of perfectionism. To define procrastination, we borrowed from Steel (2007) who wrote that "to procrastinate is to voluntarily delay an

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intended course of action despite expecting to be worse off for the delay" (p. 66), although our more specific interest is with respect to delays on academic-related tasks for college students. Understood in this manner, procrastination is highly prevalent despite its apparent adverse consequences on performance, stress, and well-being. For example, Solomon and Rothblum (1984) reported that in their sample of undergraduate college students, 30% to nearly 50% procrastinated on typical academic tasks (e.g., writing a paper, studying for exams, keeping up with regular reading assignments). On the basis of his review, Steel concluded that, in general, about 50% of students regularly experience problems from procrastination.

Perfectionism already has been identified as a common correlate and possible precursor of procrastination (Flett, Hewitt, Davis, & Sherry, 2004). As Flett, Blankstein, Hewitt, and Koledin (1992, p. 85) speculated, "One common belief about the nature of procrastinatory behavior is that it *stems from* excessively high standards" (emphasis added). In their factor analysis, Solomon and Rothblum (1984) found evaluation anxiety, perfectionism, and low self-confidence represented in a dominant procrastination factor. Egan et al. (2011) stressed the importance of evaluating goal-related behavior with perfectionists and, in particular, exploring whether perfectionists have difficulty meeting goals due to procrastination as a result of fear of failure. Seo (2008) and others (e.g., Flett et al., 1992) have reported small to moderate associations between maladaptive aspects of perfectionism and different indicators of procrastination (see Fee & Tangney, 2000, for an exception).

As noted by Steel (2007), procrastination has been conceptualized and operationalized in various ways. In an attempt to understand the reasons for, and effects of, procrastination, many researchers have examined both performance and mood as outcomes of procrastination. The premise is that intentionally delaying may be problematic for performance but that the delaying behavior persists because it temporarily relieves anxiety, resulting in a positive mood (Steel, 2007). Unfortunately, emotional relief and positive mood are only temporary, with some researchers finding that participants reported negative moods following procrastination (e.g., Lay & Schouwenburg, 1993).

Our position, supported in much of the research, is that although there may be some underlying positive elements of or reasons for procrastination, procrastinating is likely to be a problematic behavior, especially for college students who are in environments where performance is regularly evaluated. Procrastination may be particularly problematic during times when multiple deadlines exist for completed projects or examinations, resulting in little to no lasting benefit for reduced anxiety or positive mood. Indeed, one reason for some inconsistencies in prior research associating perfectionism with procrastination may be traced to the timing of the single assessments used in those studies. In two studies of college students across a semester, Tice and Baumeister (1997) found that procrastination was associated with less stress and fewer health symptoms earlier in the semester, but those effects were reversed for the students later in the semester. In terms of effect-size estimates, the effects for early semester benefits were in the medium range, but the end-of-semester costs in terms of more stress and health problems were large ($r_s > .65$). Procrastinating students also received lower grades on papers and on a course exam than nonprocrastinating students. Moon and Illingworth (2005) found no shift in the effects of procrastination; higher rates

of procrastination were associated with lower performance throughout their semester-long study. The performance results of the previous two studies are consistent with those from a recent meta-analysis in which the average association between procrastination and performance was weak but consistently negative across different indicators of performance (overall $r = -.19$; Steel, 2007).

Aggregated effects of procrastination on stress and mood have been inconsistent in the literature, perhaps because, as Steel (2007) observed, studies have not been consistent in the times in which mood has been assessed. Thus, the association between mood and procrastination may vary depending on different factors, including time in the semester, amount of time following dilatory behavior, performance on procrastinated tasks, and number of current deadlines. Steel recommended that researchers more frequently test such effects. He also emphasized the value of assessing associations over longer time periods to gain a clearer understanding of the links between procrastination and mood.

Indeed, much of the research on procrastination with college students is based on measuring the construct only once during a semester, which makes it impossible to discern stability or change in procrastination–outcome relations or at what point a change in direction between procrastination and outcomes might occur. As an exception, Moon and Illingworth (2005) measured procrastination at various points in the semester. They found that the growth curve for procrastination followed a curvilinear, quadratic form, with generally higher procrastination in the middle part of the semester compared with earlier and later in the semester.

The present study is similar in some respects to the Moon and Illingworth (2005) study and follows Steel's (2007) recommendations by using repeated measures of the main constructs during a semester. For example, we used multiple time points to better evaluate the stability and psychological implications of perfectionism and procrastination over time. Similar to Tice and Baumeister (1997) and others, the present study also moved beyond an interest in performance-related outcomes to examining health risks or outcomes for procrastinators (in our case, psychological distress), which appear to be linked directly to the stress they experience and indirectly to their tendency to delay important health-related behaviors (Sirois, 2007; Sirois, Melia-Gordon, & Pychyl, 2003). The present study also extends the current literature by testing the perfectionism–procrastination–outcome association over time.

The central model we tested is based on the conceptual distinction between a dispositional trait and a characteristic adaptation. McAdams and Pals (2007, pp. 7–8) wrote that "dispositional traits account for broad individual differences in behavioral trends across situations and over time" whereas "characteristic adaptations address what people want in life and *how they go about getting what they want, and avoiding what they do not want, during particular developmental periods, in particular situations and contexts*, and with respect to particular social roles" (emphasis added). We believe perfectionism is a dispositional trait that, in certain contexts relevant to college students (different times during an academic semester), sets the stage for a characteristic adaptation such as procrastination, which in turn has implications for psychological distress. A straightforward example of this formulation is that a person with maladaptive perfectionistic characteristics who wants to avoid scrutiny (evaluation) or is primed to be dissatisfied with performance may be more likely to procrastinate to avoid that

dissatisfaction, shame, or embarrassment (Sagar & Stoeber, 2009). The procrastination helps on the front end of the formula (with perfectionism) but hurts on the tail end in that it seems likely to result in greater stress and distress during performance- and evaluation-intensive times. In the present study, we operationalized such times to be consistent with naturally-occurring semester events (i.e., midterm examinations and the end of the semester) and with other studies that have observed mid-semester differences in procrastination compared to other time points (Moon & Illingworth, 2005). Such research could form the basis for counseling interventions aimed at improving student mental health. If students experience increased psychological distress at the end of the semester as a result of earlier procrastinatory behaviors and perfectionistic attitudes, it may be possible to intervene early in the semester to decrease these behaviors and attitudes and thereby decrease later distress.

We used a longitudinal, cross-panel design to disentangle the concurrent, prospective, and mediated links between perfectionism, procrastination, and end-of-semester psychological distress. In their clearest maladaptive forms, both procrastination and perfectionism have been well recognized as problems, but there are relatively few longitudinal studies of them, and none that we could locate in which perfectionism, procrastination, and psychological symptoms were each measured concurrently and prospectively across three time points during a semester (see Wei, Heppner, Russell, & Young, 2006, for a cross-lagged model of perfectionism and coping over two time points). Using this time period allows for comparison of results to previous research that has examined these constructs over the academic semester (e.g., Moon & Illingworth, 2005; Tice & Baumeister, 1997), whereas three time points allows for examination of directional effects of the constructs of interest. Also, studying these constructs during the academic semester has implications for college student well-being because this is a time frame in which students confront deadlines and performance expectations; further understanding of stability and effects across a semester will help to target interventions at critical time points.

The main conceptual model of interest is displayed in Figure 1. The model displays a maladaptive dispositional trait (perfectionism) predicting a maladaptive characteristic adaptation (procrastination on academic-relevant tasks), which then has subsequent

implications for a maladaptive outcome (psychological distress). In Figure 1, Path a is from the hypothesized predictor (perfectionism) to the mediator (procrastination), and Path b is from the hypothesized mediator to the outcome (psychological distress). The ab product term provides information about the significance of the indirect effect. Other models could be examined as well within this design to help refine the longitudinal sequence of effects, especially in the event that the primary model of interest was unsupported. For example, although speculative, an alternative conceptual model would examine whether perfectionism operates more as the mediator of procrastination rather than its predictor. For instance, earlier semester procrastination (e.g., not getting off to a good start on meeting academic demands) might trigger mid-semester self-criticism, which later could result in end-of-semester psychological distress. We also considered whether those who were psychologically distressed at an earlier point in time were more likely to procrastinate later in the semester.

Another possibility involved interactive effects between perfectionism and procrastination. In this model, perfectionism would be considered a risk factor for later psychological distress, with the risk enhanced as a function of procrastination; procrastination may exacerbate or, in its relative absence, lessen the effects of perfectionism. For instance, a highly self-critical perfectionist who procrastinates may be at greater subsequent risk for psychological distress than might a perfectionist who is less inclined to procrastinate. Therefore, we tested the interactive effects of earlier perfectionism and procrastination on later psychological distress.

Additional conceptualizations and constructs are also possible, such as adaptive forms of perfectionism (Stoeber & Otto, 2006) or multiple other maladaptive dimensions of perfectionism, procrastination, and psychological adjustment, but those were not directly incorporated in the present model (of course, in each instance, less of a problematic dimension might be suggestive of better psychological health). Similar to other studies focusing on psychological distress as a major outcome (e.g., Park, Heppner, & Lee, 2010) or as a precursor to a maladaptive characteristic adaptation (e.g., Ferrier-Auerbach & Martens, 2009), we developed and tested a model with specific emphasis on maladaptive rather than adaptive perfectionism. The conceptual model is based on previous research

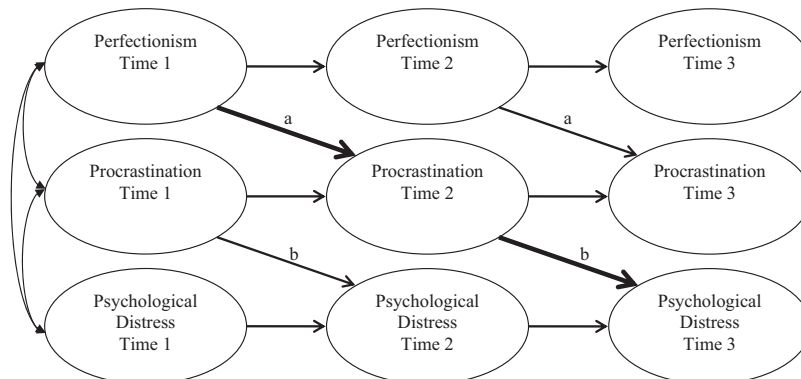


Figure 1. Longitudinal, cross-panel model of predicted paths (major paths are indicated by a and b). Within-Time 2 and -Time 3 factor correlations are not displayed but were included in the models tested. Also not depicted is the c' path between Time 1 Perfectionism and Time 3 Psychological Distress.

suggesting that, for college students, (a) perfectionism is a relatively stable personality characteristic (over a few weeks to several months) and one that predicts later psychological distress for college students (Rice & Aldea, 2006), (b) perfectionism is a possible precursor of procrastinatory behavior (e.g., Seo, 2008), and (c) procrastination has detrimental effects on end-of-semester performance and psychological well-being (Sagar & Stoeber, 2009; Tice & Baumeister, 1997).

Hypotheses Derived From the Conceptual Model

As Figure 1 shows, the main hypothesis was that mid-semester (Time 2) procrastination would mediate the association between early semester (Time 1) perfectionism and end-of-semester (Time 3) psychological distress. In other words, perfectionism was expected to predict later academic procrastination, which would result in end-of-semester distress.

Relative stability in these constructs can also be sensitively evaluated in such designs. In past research, Rice and Aldea (2006) and Graham et al. (2010) found perfectionism to be stable throughout the semester, whereas Moon and Illingworth (2005) found procrastination to be stable, with a slight increase at mid-semester. Psychological distress is typically variable and dependent upon other constructs (Lambert et al., 1996). Our expectations were that the dispositional trait predictor (perfectionism) and characteristic adaptation (procrastination) were likely to be more relatively stable than psychological adjustment (operationalized as recent symptom distress) across the semester.

Stability of associations between constructs (equilibrium) can also be tested with the current design. Steel (2007) suggested that the students who procrastinate experience more stress at the end of the semester, but to our knowledge, no research has addressed the procrastination–distress association at three time points in the semester. The current study design allowed for a better understanding of how these constructs covary throughout the semester rather than simply at the beginning and the end of the academic semester. It was expected that the procrastination–distress effect would increase as the semester progresses.

Finally, we expected that the typically observed strong concurrent association between perfectionism and psychological distress would not only be confirmed longitudinally but would be exacerbated by greater tendencies to procrastinate. Specifically, we expected that perfectionism earlier in the semester combined with an early tendency to procrastinate would not bode well for psychological well-being by the end of the semester. We expected this association to be obtained regardless of the time at which procrastination was observed.

Method

Participants

Two successive cohorts of students from a large, public university in the Southeastern United States participated in the study. The university is relatively selective. In recent years, between 93% and 97% of students offered admission had high school grade point averages (GPAs) of 3.7 or higher. A total of 151 students participated in the fall semester (129 women, 22 men) and another 212 students (179 women, 33 men) participated in the spring semester.

The size of this sample would be sufficient to detect approximately medium-sized indirect effects and other similarly sized or larger direct effects of most interest in the structural models (Westland, 2010).

There were no significant differences in the cohorts in terms of gender distribution, $\chi^2(1, N = 366) = 0.015, p = .904$. There was about a half-year difference in age between the cohorts ($M = 19.84, SD = 1.64$, and $M = 19.21, SD = 1.27$, respectively), $t(360) = 4.13, p = .00018, d = .43$. There was not a significant difference in the distribution of race/ethnicity categories between the cohorts, of those reporting race/ethnicity, about 53.5% of the students were White/European American, 14.2% were Black/African American, 14.2% were Hispanic/Latino, 12.7% were Asian/Asian American, and 0.8% were Pacific Islanders. Another 4.5% of the students reported mixed race/ethnicity. Eighty-nine percent of the students ($N = 318$) reported having a university GPA. Students in the fall semester had higher self-reported GPAs ($M = 3.54, SD = .36$) compared with those in the spring term ($M = 3.38, SD = .47$), $t(322) = 3.12, p = .002, d = .38$.

Instruments

Perfectionism. The 12-item Discrepancy subscale from the Almost Perfect Scale–Revised (Slaney et al., 2001) was used to measure perfectionism. Discrepancy is an indicator of maladaptive, self-critical perfectionism because it taps the discrepancy or gap between self-standards and the degree to which the individual believes she or he is measuring up to those standards (Slaney, Rice, & Ashby, 2002). Respondents are asked to consider attitudes they have toward themselves and their performance and then respond to items using options that range from 1 = *Strongly Disagree* through 7 = *Strongly Agree*. As a personality measure, there is no time frame specified in the directions that respondents should consider as they answer items. In the present study, all scores for subscales and parcels were based on average item responses across the item subsets. Therefore, scores on Discrepancy could range from 1 to 7, with higher scores consistent with greater levels of maladaptive perfectionism. A sample Discrepancy item is “I am hardly ever satisfied with my performance.”

In comparisons with other measures of perfectionism, the Discrepancy subscale has been shown to be one of the psychometrically stronger indicators of maladaptive perfectionism (e.g., Blankstein, Dunkley, & Wilson, 2008), with considerable evidence supporting the factor structure, internal consistency, and validity of its scores (e.g., Slaney et al., 2001). On the basis of college student samples, the internal consistency (Cronbach’s coefficient alpha) of the Discrepancy score tends to be in the .90 range (Rice & Ashby, 2007). Coefficients alpha for the parcels scores used in the measurement and structural models (see the supplemental material available online for items) ranged from .85 to .91.

Procrastination. Two measures of procrastination were used. Following Haycock, McCarthy, and Skay’s (1998) recommendation, the Procrastination Assessment Scale–Students (PASS; Solomon & Rothblum, 1984) was selected because it consists of items measuring dysfunctional delay (Steel, 2007, 2010) associated with six academic tasks (writing papers, studying for exams, reading assignments, general administrative academic tasks such as completing forms and registering for class, attending meetings, and

participating in school activities). However, as is likely apparent from the list of academic tasks, some are more academically relevant than others to college students across the semester (e.g., completing forms and registering would likely only be relevant at the beginning or possibly the end of a semester). Therefore, consistent with others who used item subsets from established procrastination measures (e.g., Díaz-Morales, Ferrari, Díaz, & Argumedo, 2006; Seo, 2008; Steel, 2010), we used items relevant to the first three academic tasks in the current study (writing papers, studying for exams, and keeping up with reading).

For each task, respondents complete three items indicating the degree to which they generally delay or procrastinate on the task (unspecified time frame), the degree to which it is problematic, and the degree to which they desire to decrease their procrastination on that task; this latter item is not scored for overall procrastination so the measure used in the present study was based on two items for each of the three tasks, or six items altogether. Respondents use a 5-point scale with anchors that vary depending on the item, with higher scale points associated with greater procrastination: 1 = *Never procrastinate (Not at all a problem)* through 5 = *Always procrastinate (Always a problem)*. On the basis of average item scores, procrastination scores could range from 1 to 5, and higher scores would denote higher levels of procrastination for each of the three problem areas. A sample item on the PASS is worded in the following manner:

Study for Exams:

To what degree do you procrastinate on this task? To what degree is procrastination on this task a problem for you?

Reliability and validity of the PASS scores have been supported in several studies of college students. Internal consistency estimates for total PASS scores have generally been in the .75–.85 range, and PASS scores tend to be correlated in expected directions with other measures of procrastination and with indicators of mental health (e.g., Haycock et al., 1998; Stead, Shanahan, & Neufeld, 2010). In the present study, reliability (coefficients alpha) for two parcels created from the degree ratings and the problem ratings (see the supplemental material available online) ranged from .69 to .80.

The General Procrastination Scale (GPS; Lay, 1986) measures the degree to which a respondent procrastinates on 20 different tasks (e.g., planning a party, promptly returning calls, paying bills). No time frame for considering the items is specified in the directions. Possible item responses range from 1 = *False of me* through 5 = *True of me*. Scoring based on average item responses means that scores could range from 1 to 5; higher scores indicate greater tendencies to procrastinate. Reliability and validity of scores derived from the GPS have been supported in prior studies of procrastination (e.g., Díaz-Morales et al., 2006; Ferrari, 1992).

In studies of college students (Simpson & Pychyl, 2009) and middle-aged adults (Díaz-Morales et al., 2006; Steel, 2010), factor analyses of GPS items along with items from other measures have suggested that, despite earlier support for its unidimensional structure, several different dimensions may be assessed with the 20 GPS items. In our review, there were five items consistently grouped together across these studies as higher loading indicators of a procrastination dimension that would be relevant to college students (see the supplemental material available online). Coeffi-

cients alpha for scores based on those five items ranged from .85 to .89 across the three time points in the current study.

Psychological distress. The Outcome Questionnaire (OQ-45.2; Lambert et al., 1996) was used to measure psychological distress. A total score or three subscale scores (Symptom Distress, Interpersonal Relations, and Social Role) can be derived from the OQ-45.2. Responses to items are scored based on 5-point scale with options ranging from 0 = *never* to 4 = *almost always*. Although typically summed to obtain scores, in the present study, average item scoring was used such that scores could range from 0 to 4. Higher scores are indicative of more perceived distress over the past week in which the measure was completed.

As originally scored, the OQ-45 has produced good validity coefficients with scores derived from other scales measuring psychological problems (e.g., Umphress, Lambert, Smart, Barlow, & Clouse, 1997). On the basis of a normative sample that included university students, internal consistency estimates for the total and subscale scores ranged from .70 to .92, and test–retest reliability (3-week) estimates ranged from .78 to .84 (Lambert et al., 1996, 2004). In the present study, internal consistency estimates ranged from .59 to .94; estimates were consistently low across time for the Social Role subscale. Because of those reliability concerns and additional problems encountered in fitting models based on the original OQ-45.2 subscale scoring, an alternative scoring derived from Kim, Beretvas, and Sherry (2010) was used in the present study. Kim et al. used factor mixture modeling approaches on a sample of 4,239 college students and identified three factors: Anxiety-Somatization (9 items), Negative Self-Worth (10 items), and Loss of Interest (5 items). Reliability for those scores in the present study and across time ranged from .73 to .90, and coefficients alpha for parcels derived from those indicators ranged from .69 to .92.

Procedure

The study was approved by the university's institutional review board. Students were recruited from multiple sections of undergraduate psychology courses in two successive semesters. A student who participated in the fall was not allowed to participate in the spring. Data collection occurred at approximately the same times within the semester for the two semesters. Time 1 was during Weeks 5–6 of the semester, Time 2 was during Weeks 10–11, and Time 3 was during Weeks 14–15. Both fall and spring semesters lasted 70 school days spread out over approximately the same number of weeks.

Analysis Procedures

We used maximum-likelihood exploratory factor analysis, a priori conceptual considerations, and other recent measurement work (e.g., Kim et al., 2010) to aid the development of indicators for constructs. Consistent with arguments in favor of using parcels as construct indicators (Little, Cunningham, Shahar, & Widaman, 2002), our primary interest was in the nature of relations among perfectionism, procrastination, and psychological distress, and not an attempt to understand relations among items operationalizing those constructs. To that end, parceling was consistent with the pragmatic goals of the study.

We used confirmatory factor analysis to evaluate measurement model questions (e.g., adequacy of parcels, invariance of factor loadings and intercepts over time and between cohorts; see Little, Preacher, Selig, & Card, 2007). Structural equation modeling was used to test strengths of autoregressive and cross-lagged parameters. Model fit was evaluated with the comparative fit index (CFI), root-mean-square error of approximation (RMSEA), and standardized root-mean-square of the residual. Maximum-likelihood chi-square statistics were used for nested-model comparisons. The criterion for significance was $p < .005$ because of the sensitivity of chi-squares to sample size. Criteria for evaluating invariance included the 90% confidence interval (CI) of the RMSEA and the change in CFI ($> .01$). Mplus Version 6.11 (Muthén & Muthén, 1998–2011) was used for all structural equation analyses.

Results

Preliminary Data Analysis

Parcels. Time 1 data served as the initial basis for the development of parcels. Exploratory factor analyses (maximum likelihood) were conducted on the item sets from the Discrepancy subscale and the alternative scoring of subscales for the OQ-45.2. All 12 items from the Discrepancy subscale loaded $> .60$ on a single factor. The 12 items were then organized into three parcels; items were assigned to parcels in a way that balanced high-loading items with lower loading ones (see the supplemental material available online for items). On the basis of separate maximum-likelihood factor analyses for the three OQ-45.2 dimensions, the top four loading items were selected as indicators of each respective factor. Across the three factors, these items had loadings $> .57$. For Procrastination, the GPS items comprised one parcel, and the two sets of PASS items comprised the other two parcels.

The two-facet approach described by Hagtvet and Nasser (2004) was followed to evaluate the assumption of unidimensionality underlying each of the separate factors as assessed by the parcels. Separate second-order factor analyses were conducted to evaluate the adequacy of each item subset as indicators of the respective parcel and to determine whether the parcels loaded adequately onto their respective higher order factors. For Discrepancy, this model provided a reasonable fit for the data (CFI = .909). Standardized factor loadings of items to parcels ranged from .62 to .89. The loadings of parcels onto the Discrepancy factor ranged from .97 to .99. For Procrastination, the results were initially less impressive in terms of model fit (CFI = .872). However, allowing for correlated uniquenesses between two of the PASS items improved model fit to CFI = .928. Standardized factor loadings for the items on the Procrastination parcels ranged from .57 to .82, and the parcels produced loadings on the Procrastination factor that ranged from .66 to .94. The best fitting model derived from the OQ-45 items resulted when the top four highest loading items for each of the three subscales were used as indicators of Psychological Distress (CFI = .950; see the supplemental material available online for the item-to-parcel allocations). Standardized factor loadings for items representing each parcel ranged from .58 to .86. Loadings of the parcels on the Psychological Distress factor ranged from .81 to .89.¹

Data screening. Data from six participants were dropped because of containing univariate or multivariate outliers or other

problematic responses patterns. The final data set consisted of a usable N of 357. A robust estimator was used in the analyses of measurement and structural models in the event of multivariate skew or kurtosis.

Multivariate analyses of variance of Time 1 scores indicated no significant differences between the cohorts on the parcels measuring Perfectionism, $F(3, 353) = 2.22, p = .086$; Procrastination, $F(3, 353) = 1.96, p = .120$; or Psychological Distress, $F(3, 353) = 0.70, p = .551$. There were also no significant effects for gender with any of the parcel sets, $F(3, 353) = 0.21, 1.24, \text{ and } 1.71, p > .165$, respectively. In light of the other ways in which the two cohorts were comparable in demographics and scores, data from both cohorts and genders were combined for subsequent analyses. Descriptive statistics and Cronbach's coefficients alpha for the subscale and parcel scores appear in Table 1 (the full correlation matrix is available on request).

Missing data. As Enders (2010) observed, it is impossible to know with certainty the mechanism responsible for missing data in a study such as the present one because follow-up data from the missing participants were not obtained. Attrition was the key reason for missing data at subsequent time points, but there is not a way to test whether attrition was due to study variables (e.g., highly distressed students stopped attending school and therefore stopped participating) or other unmeasured variables (e.g., because of poor, within-semester academic performance, students withdrew from college and stopped participating in the study).

We followed procedures described by Enders (2010) and Schlomer, Bauman, and Card (2010) to describe and explore missing data. With nine parcel scores across the three time points, the proportion of participants for whom data were available ranged from .35 to 1.0. About 65% of participants had data for the first two waves of data collection, but by the third wave, there was a substantial drop-off, with only about 38% of participants with data across all three time points. Ranges of missingness rates are noted in Table 1. Although this was not a planned missingness design, Brown (2006) and Enders (2010) noted that the amount of complete data in such designs might be as low as 25%–33% for some indicators, approximating the rate in the current study. As noted by Enders (2010), power decrements to detect medium-sized effects are actually quite small because of the strength of maximum-likelihood estimation.

We conducted analyses to distinguish missing completely at random (MCAR) and missing at random (MAR) based on composite scores of constructs within each time point. We first compared scores on all study Time 1 and Time 3 variables between participants who had data at Time 2 (nonmissing) and participants

¹ Numerous models were tested using the original scoring for the OQ-45.2. These models consistently produced problematic solutions (i.e., Heywood cases of negative variances and out-of-range factor loadings). Several options were followed in efforts to locate and repair what were initially presumed to be problems internal to the data or specification of the models (see Brown, 2006), but none resolved the initial problems. Kim et al.'s (2010) alternative to the original scoring for the OQ-45.2 resolved the problems, though, as indicated, the reduced parcel sets identified for the current study produced a better fitting model than the more complete item sets described by Kim et al. Although not our intent to conduct a measurement study regarding the OQ-45.2, these independent findings suggest that more measurement work on that instrument may be warranted.

Table 1
Means, Standard Deviations, and Cronbach's Coefficients Alpha

Variable	Time 1	Time 2	Time 3
Perfectionism			
Discrepancy (DIS)			
<i>M</i>	3.62	3.54	3.47
<i>SD</i>	1.33	1.31	1.43
α	.95	.96	.96
Parcel 1			
<i>M</i>	3.62	3.55	3.45
<i>SD</i>	1.41	1.36	1.47
Parcel 2			
<i>M</i>	3.57	3.50	3.45
<i>SD</i>	1.38	1.41	1.51
Parcel 3			
<i>M</i>	3.68	3.57	3.51
<i>SD</i>	1.41	1.30	1.44
Procrastination			
General Procrastination Scale			
<i>M</i>	3.00	3.00	2.97
<i>SD</i>	0.64	0.63	0.68
α	.89	.89	.93
Procrastination Assessment Scale—Students			
<i>M</i>	2.94	2.95	2.84
<i>SD</i>	0.59	0.67	0.68
α	.83	.89	.90
Parcel 1			
<i>M</i>	3.32	3.29	3.25
<i>SD</i>	0.85	0.85	0.86
Parcel 2			
<i>M</i>	3.57	3.58	3.63
<i>SD</i>	0.79	0.78	0.87
Parcel 3			
<i>M</i>	3.12	3.03	2.91
<i>SD</i>	0.81	0.87	0.87
Psychological Distress			
Anxiety-Somatization			
<i>M</i>	1.09	1.01	1.05
<i>SD</i>	0.75	0.80	0.74
α	.83	.86	.85
Negative Self-Worth			
<i>M</i>	1.10	1.17	1.56
<i>SD</i>	0.72	0.74	0.91
α	.89	.90	.90
Loss of Interest			
<i>M</i>	1.62	1.64	1.60
<i>SD</i>	0.75	0.78	0.73
α	.74	.79	.73
Parcel 1			
<i>M</i>	1.05	1.05	1.05
<i>SD</i>	0.84	0.90	0.74
Parcel 2			
<i>M</i>	1.08	1.16	1.67
<i>SD</i>	0.80	0.82	1.11
Parcel 3			
<i>M</i>	1.79	1.79	1.77
<i>SD</i>	0.80	0.82	0.78

Note. *Ns* = 357 (Time 1), 236 (Time 2), and 137 (Time 3). The percentage of complete data for the parcels was 100% at Time 1, then ranged from 65% to 66% (Time 2), and from 36% to 38% (Time 3).

who did not have Time 2 data (missing) using a series of *t* tests. None of these analyses revealed a significant effect (*ts* ranged from -0.49 to 1.53 , *ps* > .128). We next examined Time 1 and Time 2 scores by comparing nonmissing and missing participants classi-

fied based on Time 3 data. Again, there were no differences on any of the study variables (*ts* ranged from -1.82 to 1.32 , *ps* > .07). Participants with missing data at Time 2 were not significantly different from nonmissing students on GPA, $t(313) = -1.63$, *p* = .105. However, there was a significant difference in GPA when comparing missing and nonmissing students based on their Time 3 data, $t(314) = -2.34$, *p* = .02. Those with missing data at the end of the study tended to have lower GPAs (*M* = 3.40, *SD* = 0.45, compared with *M* = 3.52, *SD* = 0.40). Missingness at Time 2 or Time 3 was not significantly associated with gender, $\chi^2(1, N = 354) = 0.82$, *p* = .365, and $\chi^2(1, N = 355) = 2.84$, *p* = .092, respectively. Missingness at both time points was, however, significantly associated with age, $t(351) = -2.07$, *p* = .039, and $t(352) = -3.18$, *p* = .002, respectively. At both time points, participants with missing data were more likely to be younger by approximately half a year. This pattern of findings indicates that missingness was unrelated to other substantive variables in the model but was associated with GPA and age. Because GPA could be considered a relevant though unmodeled variable in a study of procrastination for college students, the results could be interpreted as supporting the MAR mechanism. Had we determined that data were MCAR, the recommended strategy to address missing data in analyses would still be full information maximum likelihood (FIML, or multiple imputation; see Enders, 2010).

We used FIML in the Mplus 6.11 program (Muthén & Muthén, 1998–2011) to generate unbiased parameter estimates under the MAR assumption. As recommended by Enders (2010), to correct for any possible systematic differences, age and GPA at Time 1 were incorporated as auxiliary variables into the FIML procedures. This procedure improves accuracy and statistical power.

Measurement Model

In longitudinal research, it is important to establish measurement invariance prior to examining more substantive questions. The data analytic process aims either to rule out measurement fluctuation as a rival hypothesis for observed longitudinal effects or to determine whether inferences from cross-panel results must be qualified because of measurement variations over time. Following procedures described by Little, Preacher, et al. (2007), we initially evaluated configural invariance, weak factorial invariance (loading invariance, metric equivalence), and strong factorial invariance (intercept invariance, scalar equivalence). These nested models can be compared via chi-square and CFI difference tests (see Cheung & Rensvold, 2002). Given the estimator we used in these analyses, the Satorra-Bentler scaled chi-square difference ($\Delta\text{SBS}\chi^2$) was used to compare models. In the comparisons, the test statistic for the unconstrained or less constrained model is subtracted from the test statistic for the more constrained model. Factorial invariance can be indicated by a nonsignificant difference in the chi-square test and by differences in the CFI value of < .01. Little, Card, Slegers, and Ledford (2007) also described using the RMSEA as a test with intuitive appeal when comparing nested models. They suggested that factorial equivalence could be supported if the RMSEA value for a more constrained model falls within the CI for the RMSEA value in a less constrained model.

Measurement invariance. As a starting point, the model for configural invariance simply examines whether the expected pat-

terms of indicators to factors seem to be a reasonable portrayal of the data over the different time points (Little, Preacher, et al., 2007). In this unconstrained model, the within-time indicators of each fixed factor were constrained to load only onto their respective factors at each of the three time points. Correlations between constructs were allowed to be freely estimated. Residuals of the same indicators in this and other models were allowed to correlate with one another over time.

The configural invariance model provided a close fit for the data (e.g., 90% CI for RMSEA ranged from .035 to .049). Constraining factor loadings to be invariant over time and constraining intercepts (means) of corresponding indicators to be invariant over time also produced close fits for the data, with minimal changes observed in both CFI and RMSEA with these increasingly constrained models. The additional constraints imposed by the weak factorial invariance model did not significantly worsen model fit compared with the configural model, $\Delta\text{SBS}\chi^2(12, N = 357) = 20.96, p = .051, \Delta\text{CFI} = -.002$ (fit indices for models appear in Table 2). Likewise, the RMSEA value for the more constrained model (invariant loadings) fell within the CI for the less constrained model. Although the addition of intercept invariance significantly worsened model fit when evaluated with the scaled chi-square difference, $\Delta\text{SBS}\chi^2(12, N = 357) = 61.68, p < .0001$, there was not a substantial difference between the models in terms of ΔCFI ($-.009$) or RMSEA. Thus, the results regarding intercept invariance were less clear but generally supported strong scalar invariance or at least partial metric invariance.

There were a few indications of strong construct correlations. However, a test of the largest such correlation ($r = .72$ between Perfectionism and Psychological Distress at Time 2) indicated that it was significantly different from 1.0 and therefore not of concern with regard to discriminant validity, $\Delta\chi^2(1, N = 357) = 12.77, p = .0004$. Correlations between Procrastination and the other constructs ranged from .114 to .511, with generally small and positive associations with Perfectionism ($r = .14-.23$), and moderate to stronger associations with Psychological Distress ($r = .31-.51$). Of the 36 correlations between the constructs, only three were nonsignificant: Procrastination at Time 1 with Perfectionism at Time 2 ($r = .14, p = .075$), Procrastination at Time 1 with Perfectionism at Time 3 ($r = .16, p = .051$), and Perfectionism at Time 2 with Procrastination at Time 3 ($r = .16, p = .054$). The within-time correlations (see Table 3) revealed a generally consistent pattern of strengths of association between the constructs at

the different time points in the study. Within-time correlations between Perfectionism and Psychological Distress produced the largest effects, followed by strong associations between Procrastination and Distress at each time point.

Structural Models

Mediator models. Three latent variables were evaluated in the initial model: Perfectionism, Procrastination, and Psychological Distress. The initial hypothesized model included autoregressive paths (structural paths between the same constructs over time), cross-lagged paths (structural paths between different constructs over time; see Paths a and b in Figure 1), and covariances between different constructs within time. Autoregressive and cross-lagged paths were not specified from Time 1 to Time 3, reflecting the assumption that any effects on Time 3 would go through Time 2 constructs (i.e., the primary test of interest was in the indirect effect operationalized by the product of Paths a and b).

The model provided a close fit for the data (see Table 2). There was considerable stability in the constructs over time. Estimates of the association between Procrastination over time were especially strong. From Time 1 to Time 2 and then from Time 2 to Time 3, the standardized path coefficients (β) for Procrastination were .95 and .93, respectively. Perfectionism was also highly stable from Time 1 to Time 2 and from Time 2 to Time 3 (β s = .81 and .83, respectively). Contrary to expectations, Psychological Distress was also highly stable (β s = .82 and .88, respectively). Although this model provided a good fit for the data, there was no support for Procrastination (Time 2) as a mediator between Perfectionism (Time 1) and Psychological Distress (Time 3). Perfectionism at Time 1 did not predict Procrastination at Time 2 ($\beta = -.03, p = .626$), nor did Procrastination at Time 2 predict Psychological Distress at Time 3 ($\beta = -.07, p = .425$). On the basis of 1,000 bootstrapped samples, the total (unstandardized) indirect effect was .002 ($SE = .006, p = .780, 95\% \text{ CI } [-.004, .024]$). Other a and b paths (see Figure 1) were also nonsignificant. An alternative mediator model was tested in which Perfectionism (at Time 2) was evaluated as a mediator between Procrastination (Time 1) and Psychological Distress (Time 3), but that indirect effect also was not significant (.002, $SE = .009, p = .630, 95\% \text{ CI } [-.007, .033]$). Alternative models shifting the sequence of effects in which earlier Psychological Distress was positioned as the predictor of later

Table 2
Fit Indices for Model Comparisons

Model	χ^2	<i>df</i>	RMSEA	90% CI	CFI
Measurement models					
Configural invariance	427.58	261	.042	[.035, .049]	.968
Factorial invariance	448.46	273	.042	[.035, .049]	.966
Intercept invariance	507.28	285	.047	[.040, .053]	.957
Structural models					
Time 2 Procrastination as mediator	500.15	290	.045	[.038, .052]	.959
Time 2 Perfectionism as mediator	488.19	290	.044	[.037, .050]	.962
Trimmed model (see Figure 2)	490.47	293	.043	[.037, .050]	.962

Note. $p < .001$ for all chi-square values. RMSEA = root-mean-square error of approximation; CFI = comparative fit index; CI = confidence interval.

Table 3
Within-Time Correlations Between Perfectionism, Procrastination, and Psychological Distress

Variable	1	2	3	4	5	6	7	8	9
Time 1 (early-semester)									
1. Perfectionism	—								
2. Procrastination	.22**	—							
3. Psychological Distress	.66***	.47***	—						
Time 2 (mid-semester)									
4. Perfectionism				—					
5. Procrastination				.16*	—				
6. Psychological Distress				.72***	.51***	—			
Time 3 (end-semester)									
7. Perfectionism							—		
8. Procrastination							.23**	—	
9. Psychological Distress							.64***	.45***	—

Note. Results were derived from the strong factorial invariance measurement model.

* $p < .05$. ** $p < .01$. *** $p < .001$.

Procrastination also yielded nonsignificant paths (for Time 1 to Time 2, $\beta = -.04$, $p = .452$, and for Time 2 to Time 3, $\beta = .02$, $p = .857$).² After trimming nonsignificant paths, the resulting model is displayed in Figure 2.

Moderator models. We initially tested the effect of the Perfectionism \times Procrastination (Time 1) interaction on later (Times 2 and 3) Psychological Distress. We retained the stability paths between Psychological Distress across the three time points to determine whether the Perfectionism \times Procrastination interaction effect was significant over and above what could be attributed to prior distress. We also retained the within-Time 1 residual covariances between Perfectionism, Procrastination, and Psychological Distress. The latent variable interaction term was created using the quasi-maximum-likelihood approach incorporated in the Mplus program (Klein & Moosbrugger, 2000; Klein & Muthén, 2007), which performs at least as well as an orthogonalizing approach to constructing interaction terms (Little, Bovaird, & Widaman, 2006; Little, Card, Bovaird, Preacher, & Crandall, 2007). We tested effects using $-2\log\text{likelihood}$ (distributed as chi-square) with scaling corrections to compare a model without the interaction term to a model that included the interaction (Klein & Moosbrugger, 2000).

From these analyses, the loglikelihood value for the model with interaction terms predicting Time 2 and Time 3 Psychological Distress was $-4,576.08$. Constraining the interactions to zero produced a loglikelihood value of $-4,579.38$. Comparing the two models suggested a significant difference between the models, $\Delta\chi^2(2, N = 357) = 7.82$, $p = .02$. The Time 1 Perfectionism \times Procrastination interaction did not predict Time 2 Psychological Distress but did predict Time 3 Distress (unstandardized $\beta = -.18$, $SE = .08$, $p = .031$). The stability paths for Psychological Distress were, again, statistically significant, and the only other significant effect was that Time 1 Perfectionism predicted Time 2 but not Time 3 Psychological Distress. This model appears in Figure 3.

We used standardized factor scores derived from the structural model ($M = 0$, $SD = 1$), a moderator function (Klein & Moosbrugger, 2000), and the MODPROBE SPSS macro developed by Hayes and Matthes (2009) to aid interpretation of the Time 1 Perfectionism \times Procrastination interaction effect. The simple slopes for Perfectionism were calculated at low ($-1 SD$, $b = .655$,

$SE = .035$, $p < .0001$, 95% CI [.585, .725]), average ($b = .542$, $SE = .025$, $p < .0001$, 95% CI [.493, .591]), and high ($1 SD$, $b = .429$, $SE = .032$, $p < .0001$, 95% CI [.367, .492]) values of Procrastination. On the basis of overlapping CIs, the slopes at the low and average values of Procrastination were statistically comparable and different from the slope at the high level of Procrastination. The plot for high and low levels of both Perfectionism and Procrastination appears in Figure 4. At lower levels of Perfectionism, those more likely to procrastinate early in the term were more distressed at semester's end than those less likely to procrastinate, by approximately a full standard deviation. Nevertheless, it should also be noted that even though the risk for distress was heightened for less maladaptively perfectionistic procrastinators, they still reported relatively low distress levels when compared with the average levels obtained in this sample. Higher levels of Perfectionism appeared problematic for students regardless of their level of Procrastination.³

Clinical Case Analyses

To further explore some of the clinical implications of these data, we used the clinical cutoff (sum) score of 64 on the OQ-45.2 (Lambert et al., 2004) to classify students into clinical case and

² We also explored models with age and GPA as covariates. Although the standard errors for the indirect effects were slightly lowered in these models (e.g., from .006 to .005), none produced substantially different effects from the models in which age and GPA were not covaried.

³ Because the interpretation of the interaction effect resulted in unexpected findings, we tested whether the interaction held for both cohorts. The interaction effects were comparable between the two cohorts (unstandardized $Bs = -.133$ and $-.131$) and consistent with the effect observed with the larger combined sample. However, neither effect was statistically significant when analyzed with the smaller data sets by cohort. In general, such interaction effects are difficult to detect statistically, so the failure to locate these within the smaller cohort samples was likely a function of power.

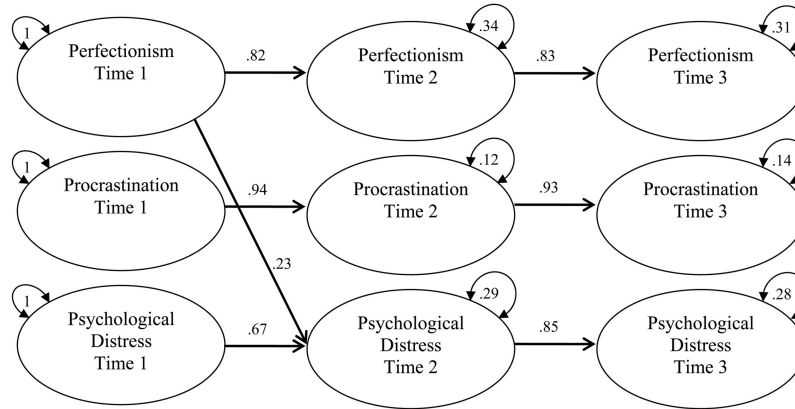


Figure 2. Final trimmed cross-panel model. Not depicted but evaluated were the within-time correlations estimated between the constructs (see Table 3). Estimates are standardized coefficients.

nonclinical case (<64) groups.⁴ Using only complete data from Time 1 to Time 3, 85 of the 136 students obtained nonclinical case designation at both time points, and 30 obtained clinical status both times. Consistent with the relatively high stability in Psychological Distress over time, these results indicated that approximately 85% of the students retained their clinical case status from the beginning to the end of the semester. However, about 15% of the students experienced a change in status. Of the 21 students who changed status, five (24% of 21) shifted from clinical to nonclinical status by the end of the term, but 16 (76% of 21) went from initial nonclinical status to clinical status by Time 3. Those 16 deteriorating students did not experience a significant change in the (composite) Procrastination scores over time, $t(15) = 0.78, p = .224$, one-tailed test; average scores from Times 1 and 3 were 3.08 ($SD = 0.54$) and 3.04 ($SD = 0.43$), respectively. However, those students did experience a significant increase in Perfectionism scores over time, $t(15) = -1.91, p = .038$, one-tailed test. At Time 1, this group had an average Perfectionism score of 3.44 ($SD = 1.26$), and at Time 3, their average score had increased to 4.03 ($SD = 1.62$), an increase of just under half a standard deviation and nearly three fourths of a standard deviation higher than the Time 3 score for the stable nonclinical group ($M = 2.95, SD = 1.14$). None of the other stable or changing clinical status groups showed this much change over time, but clearly, higher levels of Perfectionism were associated with clinical status at either time point (M s ranged from 4.37 to 4.75).

We conducted a logistic regression analysis with clinical status at Time 3 as the criterion and the two Time 1 factors, Perfectionism and Procrastination, and their interaction as predictors. Similar to the results using the Psychological Distress factor, there was a significant effect for Perfectionism ($B = 1.22, SE = .30, p < .0001$) but not Procrastination ($B = 0.44, SE = .30, p = .141$). The Perfectionism \times Procrastination interaction resulted in a possible trend effect ($B = -0.56, SE = .31, p = .075$). The odds ratios for each predictor were 3.40, 1.56, and 0.57, respectively; a separate model without the interaction term produced odds ratios of 2.87 and 1.28, respectively. Controlling for the other predictors, those with higher Perfectionism scores at Time 1 were approximately 3 times more likely to be classified in the clinical group at Time 3 than were those with lower Perfectionism scores. Said differently,

the odds of being in the clinical status group at Time 3 were 190% to 240% higher for those who had Perfectionism scores about one standard deviation above the mean.

Discussion

The purpose of this study was to examine the relationships between perfectionism, procrastination, and psychological distress among undergraduate students across three time points in the semester (i.e., early, middle, and end). This study built upon previous studies (e.g., Moon & Illingworth, 2005; Tice & Baumeister, 1997) by addressing the constructs at multiple time points, moving beyond performance outcomes to consideration of psychological outcomes of procrastinatory behavior, and testing a model to determine whether perfectionism affects psychological distress through its effects on procrastination.

Within- and Across-Time Patterns

To our knowledge, no prior research has addressed the stability or change in the procrastination–distress relationship, at what point in the semester there is a shift, and how perfectionism fits in the model. Our findings suggest that the correlations between the three constructs show very little fluctuation in strengths of association over time; at all three times, procrastination and perfectionism were strongly related to psychological distress, with perfectionism revealing a somewhat stronger effect size, comparable to other studies (e.g., Aldea & Rice, 2006; Graham et al., 2010). This stability held despite differences in academic demands and salience of expectations that typically fluctuate over a semester. Perfectionism and procrastination were also only modestly corre-

⁴ Kim et al. (2010) raised concerns about whether the cutoff scores should be used to differentiate clinical from nonclinical individuals. Although the Time 1 total OQ-45.2 score had strong evidence supporting internal consistency (Cronbach's coefficient $\alpha = .95$) in the present study, based on other limitations of the OQ-45.2 pointed out by Kim et al. and encountered in other analyses in the present study, the results differentiating clinical from nonclinical participants reported here should be conservatively evaluated.

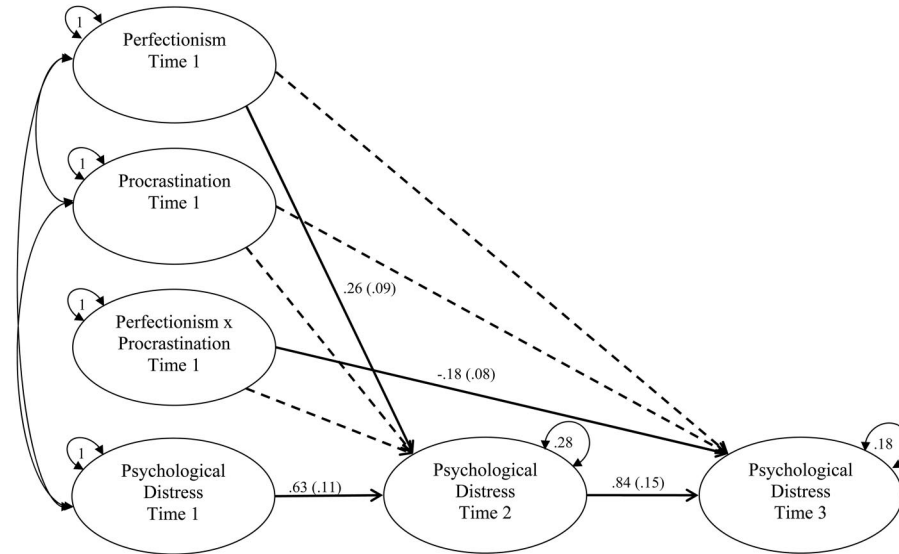


Figure 3. Perfectionism \times Procrastination moderator model. Estimates are unstandardized coefficients (standard errors in parentheses). Paths represented by solid lines were significant ($p < .05$). Paths represented by dashed lines were modeled but nonsignificant (coefficients have been omitted from the figure).

lated with each other, suggesting that, overall, academic procrastinators may be psychologically distressed, but they seem only minimally self-critical. These effects were similar in magnitude but opposite in direction to those observed by Seo (2008) in a study of self-oriented perfectionism; Seo used a more ambiguous indicator of perfectionism (Stoeber, Feast, & Hayward, 2009) and did not use a longitudinal design to more clearly examine directions of effects. Of course, it is possible that perfectionism had a

directional influence on procrastination as a characteristic adaption for students before they entered this study or that perfectionism leads to some forms of procrastination but not others. Perhaps perfectionistic and procrastinatory students are, as the results suggest, accustomed to their traits and correlates of those traits and relatively unaffected by time in semester or academic demands. A question for future research would be whether the level of stability across constructs and across their interrelations observed in the

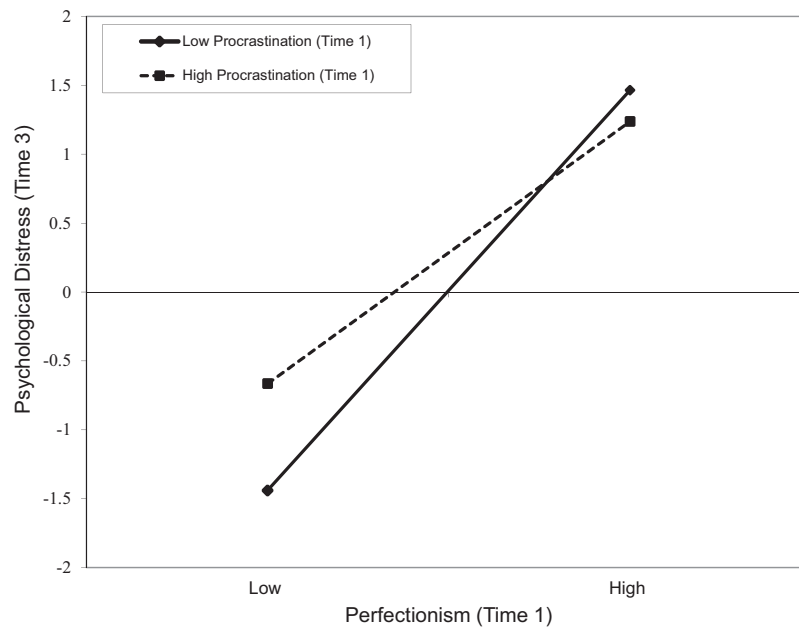


Figure 4. Conditional regression of Time 3 Psychological Distress on Time 1 Perfectionism at low (1 SD below mean) and high (1 SD above mean) levels of Time 1 Procrastination, controlling for Time 1 and Time 2 Psychological Distress.

present study holds in earlier developmental or educational contexts (e.g., high school).

Mediator Model

On the basis of previous research suggesting procrastination stems from perfectionism (e.g., excessively high standards and concern over mistakes in performance; Flett et al., 1992) and is related to greater stress and health symptoms later in the semester (Tice & Baumeister, 1997), we hypothesized that procrastination would mediate the relationship between earlier perfectionism and later psychological distress. Contrary to our initial hypothesis, the results did not support Time 2 Procrastination (mid-semester) as a mediator of the relationship between Time 1 Perfectionism (early-semester) and Time 3 Psychological Distress (end-semester). In addition, Time 2 Perfectionism was not a significant mediator of the relationship between Time 1 Procrastination and Time 3 Psychological Distress. Consistent with previous research (e.g., Rice & Aldea, 2006) and, as expected, Perfectionism was highly stable throughout the semester. Although Procrastination was expected to be relatively stable throughout the semester, it turned out to be extremely stable. Psychological Distress, as expected, fluctuated somewhat in terms of relative stability over time. These findings lend some support to considering both Perfectionism and Procrastination as dispositional traits (McAdams & Pals, 2007).

Because Procrastination was not a significant mediator of the relationship between maladaptive perfectionism and the experience of psychological distress at the end of the semester, it is possible that maladaptive perfectionists may well be distressed, as evidenced in this and other studies, but procrastination does not appear to be an important mechanism of that association. In fact, the results went further and suggested that, although perfectionism and procrastination are associated, procrastination was not likely a characteristic adaptation, or maladaptation, of perfectionism. If it had been, it seems likely that earlier perfectionism would have had stronger associations with concurrent and later procrastination.

Perhaps the failure to find this linkage can be attributed to other predictors of procrastination playing a more dominant role than perfectionism, as well as to the different motivations for, and relative adaptive value of, procrastination. On the one hand, students might procrastinate to cope with stress, because they fear failure, or because they have insecurities about their performance (Flett et al., 1992). On the other hand, some students might procrastinate by default rather than by design, which is to say that the intentionality and correspondingly adaptive value of procrastination may explain why it had little association with later distress in the current study. For some, it may be a stronger indicator of psychological health than psychological distress. Indeed, several researchers have suggested a positive form of procrastination termed active or intentional procrastination (Choi & Moran, 2009; Chu & Choi, 2005) that is associated with apparently successful time management rather than mismanagement (e.g., able to meet deadlines and feel satisfied with, rather than distressed by, outcomes). Such a differentiation may explain why meta-analytic results indicate that the overall association between procrastination and performance is relatively small (Steel, 2007). Alternatively, one reason for failing to support the mediator model is that one or more presumed important constructs may not be as relevant as other dimensions. For instance, we measured more general psy-

chological distress, but perhaps academic stress (or adjustment) or academic performance indicators would be reasonable outcomes to examine in a study of perfectionism and procrastination. In sum, our results suggest broader and perhaps more differentiated models might be tested in future research on perfectionism and procrastination: ones that incorporate adaptive as well as maladaptive expressions of both key constructs and outcomes from them.

Stress could be another variable to consider in future research. Tice and Baumeister (1997) found that stress and health symptoms were higher for procrastinators at the end of the semester (see also Sirois, 2007; Sirois et al., 2003), and Rice, Leever, Christopher, and Porter (2006) found higher perceived stress among perfectionists at the end of the semester. Although stress was not directly measured in the current study, it is likely that high stress levels at the end of the semester exacerbated psychological distress for individuals with higher levels of perfectionism and, to a lesser extent, procrastination. As indicated, the results did not support procrastination as the mechanism through which distress emerged. Perhaps future research might more directly investigate stress, other indicators of stress (e.g., health-related problems), and stress management throughout the semester as potential moderators of our proposed mediator model.

Moderator Model

We also examined the moderating role of Procrastination (Time 1) and Perfectionism (Time 1) predicting later Psychological Distress (Time 3). Decomposition of the Perfectionism \times Procrastination interaction predicting later Psychological Distress and closer inspection of clinical and nonclinical cases (Lambert et al., 2004) revealed that Perfectionism was generally associated with higher levels of Psychological Distress, almost regardless of the level of Procrastination. In fact, earlier Perfectionism was a strong predictor of those students who would be categorized as significantly clinically distressed by the end of the semester. The interaction effect revealed higher levels of Psychological Distress associated with higher levels of Procrastination, but only when perfectionism was not a salient dispositional trait for the student. These findings suggest that high levels of Perfectionism may be concurrently and prospectively problematic, regardless of Procrastination, but that the later detrimental effects of Procrastination may only become apparent for nonperfectionists.

Practice Implications

The relatively stable constructs of Perfectionism and Procrastination and their interactive relation to later Psychological Distress point to the importance of not only targeting them early in the semester but understanding that they may be rather entrenched ways of being among students. Indeed, some limited randomized clinical trials indicate not only that maladaptive perfectionism is rather persistent but that it may hinder otherwise positive treatment processes (Zuroff et al., 2000) or may show improvement as a function of treatment but those changes may not emerge until months after treatment (Rice, Neimeyer, & Taylor, 2011; but see also Steele & Wade, 2008). Because students are most likely to seek counseling services when they are in distress and our results indicate that such distress could be strongly associated with relatively stable characteristics such as perfectionism, procrastination,

or both, it would seem useful to address both correlates earlier rather than later in a college semester. Moreover, because the association between those constructs appeared relatively stable over time but the worst academic consequences may not befall students until later in the term, it may be beneficial for university and college counseling centers to conduct outreach programming on these topics at multiple times during the semester. Such programming may need to incorporate an arousal component to facilitate readiness for change to bring otherwise “out of sight, out of mind” issues into sharper focus for students. Our results also suggest that, among perfectionists, treatment may focus around increasing feelings of adequacy surrounding performance, whereas treatment may target procrastinatory behaviors among distressed nonperfectionists.

Limitations

There were several limitations to this study. The population of students represented by those taking undergraduate psychology courses may not be fully representative of the student body, and students in other disciplines may experience distress associated with procrastination and perfectionism at differing degrees. These factors limit the generalizability of the results and at the same time point to some directions for future research. Our sample was largely composed of women, which could also have implications for the generalizability of the results. Future research should examine the relationships between procrastination, perfectionism, and psychological distress among students of a variety of disciplines and assess whether gender differences exist in these constructs. Another possible limitation involved the accuracy of the MAR assumption for missing data and, therefore, the corresponding analyses and statistical power to detect effects. It is also important to note that the constructs were measured in relation to broad academic demands, and standard instructions on the measures did not refer to a specific time frame or a specific deadline, as was done by Tice and Baumeister (1997). More variability in number of deadlines and workload is expected from the current sample, which makes it difficult to directly examine the impact of procrastination during times of high workload; it can only be assumed in the current study that students had academic demands that likely intensified as the semester progressed. Future studies may employ a design similar to that of Tice and Baumeister with a specific assignment in which procrastination was measured, or deadlines and workload may be measured to examine the relative impact on procrastination and psychological health. Daily diary approaches may be a useful methodology for improving precision in our understanding of the association between procrastination, intensity of workload, and psychological outcomes (see Garrison & Kahn, 2010, for an example involving intensity of daily events).

In conclusion, the present study employed a longitudinal design using multiple indicators of constructs that allowed for examination of stability of the constructs and changes in the relationships of perfectionism, procrastination, and psychological distress throughout the semester. Although procrastination was not a significant mediator of the perfectionism–distress relationship, both procrastination and perfectionism were highly stable at three points in the semester, as was psychological distress, though to a somewhat less degree. Perfectionism was strongly related to psychological distress throughout the semester and only moderately

associated with procrastination. Both were at least moderately (procrastination) or strongly (perfectionism) associated with psychological distress. High levels of perfectionism early in the semester were related to high levels of psychological distress at the end of the semester, regardless of the level of procrastination. Among individuals low in perfectionism, as procrastination increased, psychological distress at the end of the semester increased. Overall, results point to the importance of targeting perfectionism and procrastination at multiple time points in the semester to decrease concurrent and prospective levels of psychological distress among college students.

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