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On the Development of Perfectionism:

The Longitudinal Role of Academic Achievement and Academic Efficacy

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Abstract

Objective: Although perfectionism is a prominent personality disposition, only a few longitudinal studies have investigated how perfectionism develops. Theoretical models and qualitative studies have posited that academic success is a developmental antecedent of perfectionism. Yet, quantitative studies tend to interpret the cross-sectional relationships as academic success being an outcome of perfectionism. In light of these gaps in the literature, the present study was the first to investigate the longitudinal relationships between perfectionistic strivings, perfectionistic concerns, academic achievement, and academic efficacy examining academic success as an antecedent of perfectionism.

Method: The study examined 487 adolescents (aged 12-19 years, 54% female) using a cross-lagged longitudinal design with three time points spaced 4-5 months apart.

Results: Results showed that academic achievement predicted relative increases in both perfectionistic strivings and perfectionistic concerns, even when including academic efficacy. In addition, academic efficacy predicted relative increases in perfectionistic strivings.

Discussion: This is the first study to show that academic achievement is a common factor in the development of perfectionistic strivings and perfectionistic concerns, whereas academic efficacy plays a role only in the development of perfectionistic strivings.

Conclusions: Implications of the findings for the development of perfectionism are discussed.

Keywords: perfectionism; academic achievement; academic efficacy; adolescents; longitudinal data

On the Development of Perfectionism:

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Perfectionism is a personality disposition characterized by exceedingly high standards of performance and concerns about making mistakes and the social consequences of not being perfect (Frost, Marten, Lahart, & Rosenblate, 1990; Hewitt & Flett, 1991). Perfectionism is an important topic for personality psychology. Not only do many people have perfectionistic tendencies (Stoeber & Stoeber, 2009), but perfectionism is also associated with a wide range of indicators of psychological maladjustment ranging from negative affect and anxiety to depressive symptoms and suicide ideation (e.g., Damian, Stoeber, Negru, & Băban, 2014a; Hewitt et al., 2002; Roxborough et al., 2012). However, perfectionism also has positive aspects as perfectionistic strivings have shown to be associated with higher performance and academic achievement (see Stoeber, 2012, for a review). Consequently, it is important to examine what factors contribute to the development of individual differences in perfectionism. Whereas the majority of theory and research focused on parental factors as playing a key role in the development of perfectionism (Flett, Hewitt, Oliver, & Macdonald, 2002; Gilman & Ashby, 2006; Stoeber & Childs, 2011), there may be other factors that also play a role. In particular, Flett et al. (2002) proposed that experiences of academic success at school might play a role in the development of perfectionism such that higher academic achievement may predispose students to become more perfectionistic. So far, however, this proposition was never tested empirically. Instead, studies investigating the relationships between perfectionism and indicators of academic success—such as academic achievement and academic efficacy (i.e., beliefs about one's capabilities to learn or perform academic tasks at designated levels; cf. Bandura, 1997)— usually interpret the relationships they find between perfectionism and academic success in a way that regards academic success as an outcome of perfectionism (e.g., Bong, Hwang, Noh, &

Kim, 2014; Nounopoulos, Ashby, & Gilman, 2006; Stoeber, 2012). The majority of these studies, however, was cross-sectional or did not measure perfectionism and indicators of academic success at multiple time points. Therefore, the relationships cannot be interpreted in a causal or temporal sense, and the direction of the relationships between perfectionism, academic achievement, and academic efficacy is still an open question. The aim of the present study was to provide a first investigation of the longitudinal role that academic success plays in the development of perfectionism.

Multidimensional Perfectionism

When investigating perfectionism, it is important to take into account that perfectionism is best conceptualized as a multidimensional personality disposition (see Enns & Cox, 2002, for a review). Factor analytic studies suggest perfectionism is comprised of two higher-order factors: perfectionistic strivings and perfectionistic concerns (Stoeber & Otto, 2006; see also Dunkley, Blankstein, Halsall, Williams, & Winkworth, 2000; Frost, Heimberg, Holt, Mattia, & Neubauer, 1993). Perfectionistic strivings (also called personal standards perfectionism) reflect those aspects of perfectionism associated with self-oriented striving for perfection and setting exceedingly high personal standards of performance. In contrast, perfectionistic concerns (also called evaluative concerns perfectionism) reflect those aspects associated with concerns over making mistakes and fears of negative social evaluation. Even though the two dimensions are positively associated and often show considerable overlap, they show different, sometimes opposite relationships. Perfectionistic strivings often show positive correlations with characteristics, processes, and outcomes that are considered "adaptive" (e.g., conscientiousness, problem-focused coping, positive affect), particularly when the negative influence of perfectionistic concerns is controlled for (R. W. Hill, Huelsman, & Araujo, 2010; Gotwals, Stoeber, Dunn, & Stoll, 2012; Stoeber & Otto, 2006). The question of whether perfectionistic

strivings themselves are "adaptive," however, is debated as some researchers argue that

perfectionism can never be healthy (Greenspon, 2002) and others suggest that the positive

relationships perfectionistic strivings show with psychological adjustment do not reflect

perfectionism, but a striving for excellence or a conscientious achievement striving (Flett &

Hewitt, 2006; A. P. Hill, 2014). In contrast, perfectionistic concerns consistently show positive

correlations with characteristics, processes, and outcomes that are considered "maladaptive"

(e.g., neuroticism, avoidant coping, negative affect). This suggests that perfectionistic concerns

capture those aspects of perfectionism that are responsible for the positive relationships

perfectionism shows with indicators of psychological maladjustment (cf. Stoeber & Otto, 2006,

for a comprehensive review) which is a view that is generally agreed upon (e.g., Lo & Abbot,

2013).

The Development of Perfectionism

There is general agreement that adolescence is a sensitive period in the development of

perfectionism (Flett et al., 2002; Gilman & Ashby, 2006; Stoeber & Childs, 2011). It has been

proposed that contextual factors such as a school environment emphasizing evaluation represent

factors involved in developing, maintaining, or increasing perfectionism in adolescents (Flett et

al., 2002). The importance of formal evaluations, grades, competitions, and comparisons is

increasingly emphasized by the environment (i.e., school, teachers, parents) as students progress

in the school system, meaning that formal evaluations are more important in middle and high

school than in elementary school (cf. Eccles & Midgley, 1989). Hence, from an environmental

perspective, the time that adolescents are attending middle and high school should represent a

key period for developing perfectionism. Moreover, the developmental changes that occur in

adolescence such as increases in cognitive abilities, self-consciousness, and awareness of social

standards (Steinberg, 2008) make it a period of elevated susceptibility for the development of

perfectionism. Adolescents are more sensitive to others' achievement expectations and more aware of the implications that school performance has for them. Consequently, adolescence is a key period for investigating the factors that contribute to the development of perfectionism.

So far, theory and research on the development of perfectionism in adolescents have mainly focused on the role of parents (Flett et al., 2002). Qualitative and quantitative studies have provided preliminary evidence that indicators of perfectionistic strivings develop through a social learning mechanism (Bandura, 1977), that is, by observing and imitating parents' perfectionism. In comparison, indicators of perfectionistic concerns develop through a social expectations mechanism, that is, as a consequence of contingent parental approval associated with parental expectations, criticism, and parental control (e.g., Appleton, Hall, & Hill, 2010; Damian, Stoeber, Negru, & Băban, 2013; Soenens et al., 2008; Speirs Neumeister, 2004; Speirs Neumeister, Williams, & Cross, 2009).

Going beyond parental factors, Flett et al. (2002) proposed a theoretical model which entails further factors that contribute to the development of perfectionism. One such factor is adolescents' perceived or actual ability to attain perfection which is based on the personal history of achievement successes in the school setting. In particular, Flett et al.'s model suggests that adolescents who experience success at school and gain an increased sense of academic efficacy are more prone to show increases in perfectionistic strivings because perfection seems possible to them. Moreover, the model maintains that perfectionists are highly sensitive to evaluative feedback as represented by the grades they achieve in school. Consequently, adolescents with high academic achievement and high perceived skills (i.e., academic efficacy) may develop perfectionistic strivings based on their repeated experiences of success indicating that perfection is achievable (cf. Flett et al., 2002). This hypothesis is also maintained by the social cognitive theory of personality which posits that experiences of success altogether with an increased self-

efficacy lead to striving for higher goals as people have the general tendency to surpass their past performance and to strive for progress (Bandura, 1989, 1997; Bandura & Cervone, 1986). In addition, qualitative research by Speirs Neumeister (2004) and Speirs Neumeister et al. (2009) suggests that experiences of academic success contribute not only to the development of perfectionistic strivings, but also to the development of perfectionistic concerns. Adolescents who are high achievers may think that their academic success increases others' expectations and perceive increased external pressure to succeed which, in turn, increases their perfectionistic concerns. So far, however, no one has examined whether high academic achievement and high academic efficacy in adolescence predict longitudinal increases in perfectionism. Hence, the present study aims to investigate the hypothesis that high levels of academic achievement and academic efficacy may be not only an outcome of perfectionism (as described in the next section), but also an antecedent.

Perfectionism and Indicators of Academic Success

Research on perfectionism in adolescent school students has shown that perfectionism is associated with numerous outcomes that are indicative of academic success (Stoeber & Childs, 2011). In this, however, perfectionistic strivings and perfectionistic concerns have shown different associations. Perfectionistic strivings are mostly associated with positive outcomes indicative of academic success such as mastery goals, low academic procrastination, academic efficacy, and academic achievement (e.g., Accordino, Accordino, & Slaney, 2000; Bong et al., 2014; Damian, Stoeber, Negru, & Băban, 2014b; Nounopoulos et al., 2006; Stoeber & Rambow, 2007; Stornelli, Flett, & Hewitt, 2009). In contrast, perfectionistic concerns are mostly associated with negative outcomes indicative of low academic success such as fear of failure, test anxiety, low academic efficacy, and low academic achievement (Bong et al., 2014; Herman, Wang, Trotter, Reinke, & Ialongo, 2013; Nounopoulos et al., 2006; Stoeber & Rambow, 2007). There

are, however, a few studies in which perfectionistic concerns have been associated with high academic achievement (e.g., Bong et al., 2014; Stornelli et al., 2009). Hence, the relationships between perfectionistic concerns and academic achievement still warrant further research.

Furthermore, the majority of the quantitative studies investigating the relationships between perfectionism and indicators of academic success such as academic achievement and academic efficacy was cross-sectional or did not measure perfectionism and indicators of academic success at multiple time points. Therefore, the relationships these studies found cannot be interpreted in a causal or temporal sense. Nevertheless, the studies interpreted their findings as if perfectionism was an antecedent, and academic achievement and academic efficacy were outcomes of perfectionism (e.g., Bong et al., 2014; Nounopoulos et al., 2006; Stoeber, 2012). Hence, the direction of the relationships between perfectionism and indicators of academic success still represents an open question.

The Present Study

The hypothesis that high academic achievement and academic efficacy are factors in the development of perfectionism has not been tested empirically, and only four studies have considered the role of academic success in the development of perfectionism. The first two were qualitative studies based on interviews with gifted high school students (Speirs Neumeister et al., 2009) and gifted first-year university students (Speirs Neumeister, 2004) with high levels of perfectionistic strivings and perfectionistic concerns. Students were asked retrospectively what factors they thought played a role in the development of their perfectionism, and many of them indicated that high academic achievement and academic efficacy played a role for the development of both perfectionistic strivings and perfectionistic concerns. Students high in perfectionistic strivings saw their academic success adding to perceived internal pressure whereas students high in perfectionistic concerns saw their academic success as adding to

perceived external pressure to maintain or increase their high academic achievement. The third and fourth study (Herman, Trotter, Reinke, & Ialongo, 2011; Herman et al., 2013) were quantitative studies and examined the relationship between perfectionism and academic achievement longitudinally, but unfortunately did not measure perfectionism and academic achievement at a sufficient number of points of time. Moreover, the studies applied a person-centered approach investigating how different groups of perfectionists developed instead of a variable-centered approach investigating how perfectionism developed. Examining sixth graders, Herman et al. (2011) found that the adaptive perfectionists group (defined by high levels of perfectionistic strivings and low levels of perfectionistic concerns) was characterized by higher teacher-rated academic achievement compared to the maladaptive perfectionists group (defined by high levels of perfectionistic strivings and high levels of perfectionistic concerns). However, perfectionism was not measured at Time 1, so the longitudinal effects of perfectionism were not examined. Herman et al. (2013) found that the group of adolescents who increased in both dimensions of perfectionism between 6th and 12th grade was characterized by higher levels of academic achievement compared to the group who decreased in their levels of perfectionism. However, academic achievement was only measured at Time 1, so the longitudinal effects of perfectionism on academic achievement were not examined.

Against this background, this study presents the first investigation of the longitudinal relationships between perfectionism, academic achievement, and academic efficacy in adolescents. Regarding perfectionism, the study focused on (a) personal standards (Frost et al., 1990) and self-oriented perfectionism (Hewitt & Flett, 1991) as combined indicators of perfectionistic strivings and (b) concern over mistakes, doubts about actions (Frost et al., 1990), and socially prescribed perfectionism (Hewitt & Flett, 1991) as combined indicators of perfectionistic concerns (e.g., Dunkley et al., 2000; Enns, Cox, Sareen, & Freeman, 2001;

Stoeber & Otto, 2006). The study examined a large sample of adolescents over nine months, employing a longitudinal design with three waves each spaced four to five months. We chose this time frame because previous longitudinal studies on perfectionism in adolescents found relative changes in perfectionism over periods of five to eight months (Stoeber, Otto, & Dalbert, 2009) and seven to nine months (Damian et al., 2013). Based on the theoretical model proposed by Flett et al. (2002), the social cognitive theory of personality (Bandura, 1989, 1997), and findings from cross-sectional studies (Stoeber, 2012), we expected to find bidirectional longitudinal relationships between perfectionistic strivings and academic achievement and academic efficacy. That is, we expected perfectionistic strivings to predict relative increases (cf. Roberts & DelVecchio, 2000) in academic achievement and academic efficacy, and academic achievement and academic efficacy to predict relative increases in perfectionistic strivings. Furthermore, based on the findings of Speirs Neumeister (2004) and Speirs Neumeister et al. (2009), we examined whether high academic achievement would predict relative increases in perfectionistic concerns.

Method

Participants and Procedure

A sample of adolescents attending 6th to 12th grade of urban public schools in Romania was recruited for a longitudinal study with three time points over three academic semesters. Data collection for Time 1 took place at the end of the second semester of the academic year, for Time 2 five months later in the first semester of the next academic year, and for Time 3 four months later in the second semester. The total sample comprised 487 adolescents (54% female) of whom 44% were early-to-middle adolescents (age range 12-15 years) and 56% were middle-to-late adolescents (age range 16-19 years). Mean age of adolescents at Time 1 was 15.9 years (SD = 1.8). At all time points, adolescents completed the same paper-and-pencil questionnaire in the

classroom during school hours, but not all adolescents completed all time points (386 adolescents completed the questionnaire at Time 1, 369 at Time 2, and 351 at Time 3). Adolescents received no compensation for participating in the study. Participation was voluntary: Adolescents could opt out of the study and instead do homework or other school activities. The study was approved by the ethics committee of the Faculty of Psychology and Educational Sciences of the first author's university and by the schools' principals through a written collaboration protocol.

Measures

To measure perfectionism, two instruments were used. We used the 22-item Child–Adolescent Perfectionism Scale (CAPS; Flett, Hewitt, Boucher, Davidson, & Munro, 2000) capturing self-oriented perfectionism (12 items; e.g., "I try to be perfect in everything I do") and socially prescribed perfectionism (10 items; "Other people think that I have failed if I do not do my very best all the time"). In addition, we used the three subscales from the Frost Multidimensional Perfectionism Scale (FMPS; Frost et al., 1990) capturing personal standards (7 items; e.g., "I have extremely high goals"), concern over mistakes (9 items; "I should be upset if I make a mistake"), and doubts about actions (4 items; "I usually have doubts about the simple everyday things I do"). All scales have demonstrated reliability and validity in numerous studies with adolescents (e.g., Ablard & Parker, 1997; Damian et al., 2014b; Essau, Leung, Conradt, Cheng, & Wong, 2008; Hewitt et al., 2002; McArdle, 2009; Soenens et al., 2008). To obtain the two higher-order dimensions of perfectionism we followed Dunkley et al. (2000) combining (a) self-oriented perfectionism and personal standards to capture perfectionistic strivings and (b) socially prescribed perfectionism, concern over mistakes, and doubts about actions to capture perfectionistic concerns (see also Enns et al., 2001). In addition, we performed a confirmatory factor analysis with Mplus 6.12 (Muthén & Muthén, 1998-2010) using the maximum likelihood (ML) estimator to confirm the two-dimensional structure of the perfectionism scores. Results

showed that the two-dimension structure fit the data well at all time points (Time 1: χ^2 [4] = 11.33, p = .02, CFI = .989, RMSEA = .069, SRMR = .024; Time 2: χ^2 [4] = 16.04, p = .00, CFI = .979, RMSEA = .091, SRMR = .029; Time 3: χ^2 [4] = 10.79, p = .03, CFI = .990, RMSEA = .070, SRMR = .024; for an explanation of the model fit indices and their cut-off values, see Results, Cross-Lagged Analyses).

To measure academic efficacy, we used the 5-item academic efficacy scale from the Patterns of Adaptive Learning Scales (PALS; Midgley et al., 2000; e.g., "Even if the work is hard, I can learn it"). The PALS were developed for and used in studies with adolescents where they have demonstrated reliability and validity (e.g., Bong, 2001; Friedel, Cortina, Turner, & Midgley, 2007; Ryan & Shin, 2011).

To measure academic achievement, we asked participants to self-report the grade point average (GPA) they had achieved in the previous semester as we had no access to the official school records. Self-reported GPA has shown to be highly correlated with actual GPA (Credé & Kuncel, 2013) and to predict school outcomes similar to actual GPA (Baird, 1976), so it can be a reliable and valid estimate of academic achievement when students' actual GPA is not available. In the Romanian educational system, GPA ranges on a scale from 1 (minimum) to 10 (maximum).

All scales were translated into Romanian following standard back-translation procedures as recommended by Brislin (1986) using two independent translators. A third person then finalized the Romanian version. Participants responded to all items on a scale from 1 (*always false for me*) to 5 (*always true for me*). The translation of the CAPS was previously used in a study with Romanian adolescents, and the two subscales demonstrated validity by showing associations with positive and negative affect in the expected directions (Damian et al., 2014a). The translations of the FMPS and PALS subscales were used for the first time in the present

study.

Data Screening

Because not all students were present or agreed to participate at all three time points, only 76% students provided completed questionnaires at Time 1, Time 2, and Time 3. Moreover, when we inspected the questionnaires responses for missing data, we found 2% of item responses missing across Time 1 to Time 3. Consequently, we compared participants with and without complete data using Little's (1988) Missing Completely at Random (MCAR) test. The MCAR test revealed a normed chi-square (χ^2/df) of 1.04 indicating a good fit between sample scores with and without imputations according to guidelines offered by Bollen (1989). Hence, there was no evidence for attrition-related bias, suggesting that data were likely to be missing at random. Next, we inspected the reliability (internal consistency) of the scale scores by computing Cronbach's alphas. As Table 1 shows, all scores showed satisfactory alphas > .70 (Nunnally & Bernstein, 1994). Consequently, scale scores were computed by averaging answers across items.

Finally, we tested whether the two dimensions of perfectionism and academic efficacy showed longitudinal invariance across gender and age group. For each construct, we compared the metric model in which factor loadings were constrained to be equal across time with the configural (baseline) model. Model comparisons were conducted considering changes in fit indices based on the following three criteria of which at least two had to be met: $\Delta\chi^2$ significant at $p < .05$, $\Delta\text{CFI} \geq -.010$, and $\Delta\text{RMSEA} \geq .015$ (Chen, 2007; Cheung & Rensvold, 2002). All change indices were nonsignificant indicating longitudinal measurement invariance for both constructs (perfectionism: $\Delta\chi^2$ (6) = 2.323, $p = .888$, $\Delta\text{CFI} = .001$, $\Delta\text{RMSEA} = -.004$; academic efficacy: $\Delta\chi^2$ (4) = 4.476, $p = .345$, $\Delta\text{CFI} = -.003$, $\Delta\text{RMSEA} = -.005$) across gender (perfectionism: $\Delta\chi^2$ (15) = 10.854, $p = .763$, $\Delta\text{CFI} = .001$, $\Delta\text{RMSEA} = -.007$; academic efficacy:

$\Delta\chi^2$ (10) = 10.273, p = .417, ΔCFI = –.001, ΔRMSEA = –.008) and age group (perfectionism:

$\Delta\chi^2$ (15) = 8.129, p = .918, ΔCFI = .002, ΔRMSEA = –.006; academic efficacy: $\Delta\chi^2$ (10) =

8.326, p = .597, ΔCFI = .000, ΔRMSEA = –.009).

Results

Bivariate Correlations

Because of the missing data, the means, standard deviations, and bivariate correlations presented in Table 1 were estimated with Mplus using full information maximum likelihood (FIML). FIML is recommended because it handles missing data adequately even when data are not missing at random (Graham, 2009). The correlations showed that, within all time points, perfectionistic strivings were positively related to perfectionistic concerns, academic achievement, and academic efficacy. Perfectionistic concerns were also positively related to academic achievement at Time 2 and Time 3 and to academic efficacy at all time points. Academic achievement was positively related to academic efficacy at all time points. Age at Time 1 showed positive correlations with perfectionistic strivings at all time points and with academic achievement and academic efficacy at Time 2 indicating higher levels of perfectionistic strivings, academic achievement, and academic efficacy in older adolescents. Gender (female) showed a positive correlation with academic achievement at all time points, with academic efficacy at Time 2 and Time 3, and with perfectionistic strivings at Time 3 indicating that girls showed higher levels of perfectionistic strivings, academic achievement, and academic efficacy.

Cross-Lagged Analyses

To examine the bidirectional longitudinal relationships between perfectionism, academic efficacy, and academic achievement, we conducted cross-lagged analyses with Mplus using FIML following a two-step approach. In the first step, we examined the relationships of

perfectionism and academic achievement (models excluding academic efficacy). In the second

step, we examined the relationships of perfectionism, academic efficacy, and academic

achievement (models including academic efficacy). To evaluate the different models, we

followed a model comparison approach (Kline, 2010) assessing model fit through multiple

indices (Byrne, 2012): the Comparative Fit Index (CFI) and Tucker-Lewis Index (TLI), with

values higher than .90 indicative of an acceptable fit and values higher than .95 suggesting an

excellent fit; the Root Mean Square Error of Approximation (RMSEA) and the Standardized

Root Mean Square Residual (SRMR), with values below .08 suggesting acceptable fit and values

less than .05 good fit; and the Akaike information criterion (AIC) and Bayesian information

criterion (BIC) with lower values indicating better fit.

Models excluding academic efficacy. We tested a first model (Model 1) with cross-

lagged effects between perfectionistic strivings, perfectionistic concerns, and academic

achievement. In this model, perfectionistic strivings at Time 1 predicted perfectionistic concerns

and academic achievement at Time 2, perfectionistic concerns at Time 1 predicted perfectionistic

strivings and academic achievement at Time 2, and academic achievement at Time 1 predicted

perfectionistic strivings and concerns at Time 2; perfectionistic strivings at Time 2 predicted

perfectionistic concerns and academic achievement at Time 3, perfectionistic concerns at Time 2

predicted perfectionistic strivings and academic achievement at Time 3, and academic

achievement at Time 2 predicted perfectionistic strivings and concerns at Time 3. In addition, we

controlled for first-order autoregressive paths (i.e., stability paths from Time 1 to Time 2 and

from Time 2 to Time 3 for all variables) and second-order autoregressive paths (i.e., stability

paths from Time 1 to Time 3 for all variables) and also included within-time correlations among

all variables (Geiser, 2013). To test whether the cross-lagged effects were time-invariant (i.e.,

assumed to be stationary), we compared two submodels: Model 1.1 in which cross-lagged paths

were constrained to be equal across time (fixed) and Model 1.2 in which cross-lagged paths were unconstrained (free to vary).

To examine whether Model 1.1 showed a better fit than Model 1.2, we compared the models based on the three criteria of changes in fit indices used for model comparison in the Data Screening section: $\Delta\chi^2$ significant at $p < .05$, ΔCFI $\geq -.010$, and ΔRMSEA $\geq .015$ (Chen, 2007; Cheung & Rensvold, 2002). All change indices were nonsignificant indicating that both models fitted the data equally well (see Table 2). Hence, we retained Model 1.1 (the time-invariant model) as the final model because it was the more parsimonious of the two models. Figure 1 shows Model 1.1 with all significant longitudinal paths. (To avoid overloading the figure, the within-time correlations of Model 1.1 are reported in Table 3.) Although the significant cross-lagged effects are small, they are meaningful when predicting relative changes in longitudinal autoregressive models, because controlling for autoregressive paths and within-time correlations removes a great amount of the variance to be predicted in the outcome variables (cf. Adachi & Willoughby, 2015). Results showed a positive bidirectional effect between perfectionistic strivings and academic achievement, and a positive unidirectional effect from academic achievement to perfectionistic concerns. Academic achievement predicted relative increases in perfectionistic strivings and perfectionistic concerns, but only perfectionistic strivings predicted relative increases in academic achievement.

Models including academic efficacy. Next, we examined the effects of academic efficacy by including it in the model. Therefore we tested a second model (Model 2) in which we added academic efficacy. Else, we followed the same procedure as for Model 1. Again, we compared two submodels: Model 2.1 in which cross-lagged paths were constrained to be equal across time (fixed) and Model 2.2 in which cross-lagged paths were unconstrained (free to vary). Again all change indices were nonsignificant indicating that both models fitted the data equally

well (see Table 2). Hence, we retained Model 2.1 (the time-invariant model) as the final model because it was the more parsimonious of the two models. Figure 2 shows Model 2.1 and all significant longitudinal paths. (To avoid overloading the figure, the within-time correlations of Model 2.1 are reported in Table 3). As in Model 1.1, the cross-lagged path analyses showed a positive unidirectional effect from academic achievement to perfectionistic concerns, suggesting that academic efficacy played no role in the longitudinal relationships of perfectionistic concerns and academic achievement. Else, Model 2.1 showed three differences from Model 1.1. First, the positive effect from academic achievement to perfectionistic strivings was now unidirectional (and not bidirectional). Second, there was a positive unidirectional effect from academic efficacy to perfectionistic strivings. Third, there was a positive bidirectional effect between academic efficacy and academic achievement. Academic achievement still predicted relative increases in perfectionistic strivings and perfectionistic concerns, but perfectionistic strivings did not predict relative increases in academic achievement anymore. Instead, academic efficacy predicted relative increases in academic achievement and perfectionistic strivings. In addition, academic achievement predicted relative increases in academic efficacy.

Additional Analyses

Finally, we explored whether the models were invariant across gender and age groups. To this effect, we conducted multi-group analyses examining whether the cross-lagged paths were significantly moderated by gender (0 = male, 1 = female) and age group (0 = 12-15 years, 1 = 16-19 years). Results indicated that the cross-lagged paths were not moderated by gender or age-group, as all change indices were nonsignificant suggesting that the constrained model in which parameters were fixed across groups was not significantly different from the unconstrained model in which the parameters were free to vary across gender (Model 1.1: $\Delta\chi^2$ (6) = 8.562, p = .200, ΔCFI = −.002, ΔRMSEA = .018; Model 2.1: $\Delta\chi^2$ (12) = 11.260, p = .507, ΔCFI = .000,

ΔRMSEA = −.003) and age group (Model 1.1: $\Delta\chi^2$ (6) = 5.966, p = .427, ΔCFI = .000, ΔRMSEA = −.006; Model 2.1: $\Delta\chi^2$ (12) = 18.066, p = .114, ΔCFI = −.003, ΔRMSEA = .002). Consequently, the models shown in Figure 1 and Figure 2 fitted equally well for boys and girls and for early-to-middle and middle-to-late adolescents.

Discussion

Presenting the first investigation of the longitudinal relationships between perfectionism, academic achievement, and academic efficacy, the present study examined a large sample of adolescents aged 12-19 years using a longitudinal design with three waves each spaced four to five months. As expected, results showed a positive bidirectional effect between perfectionistic strivings and academic achievement when academic efficacy was not included in the model: Perfectionistic strivings predicted relative increases in academic achievement, and academic achievement predicted relative increases in perfectionistic strivings. However, when academic efficacy was included in the model, the path from perfectionistic strivings to academic achievement became nonsignificant whereas a positive unidirectional effect from academic efficacy to perfectionistic strivings emerged: As expected, academic efficacy predicted relative increases in perfectionistic strivings. In addition, as was suggested by qualitative research, there was a positive effect from academic achievement to perfectionistic concerns. This effect remained the same even when including academic efficacy in the model.

The Development of Perfectionistic Strivings

The study is the first to provide supportive evidence for Flett and colleagues' (2002) proposition that high academic achievement plays a role in the development of perfectionistic strivings. In addition, the study provides supportive evidence for academic efficacy playing a role in the development of perfectionistic strivings over and beyond academic achievement: Adolescents who achieved high grades in school and believed they had high academic efficacy

showed increases in perfectionistic strivings over time. This finding also provides supportive evidence for the proposition following the social cognitive theory of personality (Bandura, 1989, 1997; Bandura & Cervone, 1986) that experiences of academic success together with high academic efficacy contribute to increases in strivings for higher goals or standards. This result is in line with the findings from the qualitative studies by Speirs Neumeister (2004) and Speirs Neumeister et al. (2009). The studies interviewed gifted students showing high levels of perfectionism and found that many of them perceived high academic achievement and academic efficacy as factors in the development of their perfectionism. When students achieved high grades often and easily, they learned that perfection was an acceptable standard of performance that they could and should attain.

The effect of perfectionistic strivings predicting relative increases in academic achievement, however, disappeared when academic efficacy was included in the model. This suggests that the longitudinal effect of perfectionistic strivings on academic achievement could be the result of the positive relationship between perfectionistic strivings and academic efficacy. Moreover and more importantly, the finding suggests that academic achievement and academic efficacy are antecedents rather than outcomes of perfectionistic strivings. In line with the social cognitive theory of personality, high academic achievement seems to push adolescents to strive for more and, as they realize they can attain their high goals (academic efficacy), to keep on increasing their standards (perfectionistic strivings). With this, the present findings expand on the findings of the cross-sectional studies by Bong et al. (2014) and Nounopoulos et al. (2006) in which academic efficacy was seen as a mediator between perfectionism and academic achievement. The present findings show that, when examined longitudinally, the relationships between perfectionism, academic achievement, and academic efficacy are more complex than suggested by cross-sectional findings.

The Development of Perfectionistic Concerns

It is noteworthy that the present study found academic achievement to play a role also in the development of perfectionistic concerns. Adolescents who achieved high grades in school showed longitudinal increases not only in perfectionistic strivings, but also in perfectionistic concerns. This finding dovetails with the accounts of the gifted high-school students in Speirs Neumeister et al.'s (2009) study and those of the gifted first-year university students in Speirs Neumeister's (2004) study reporting high levels of perfectionistic concerns. One possible explanation is that students with a history of high academic achievement may receive praise from parents and teachers for their high grades and high intelligence level (Speirs Neumeister et al., 2009). This might result in developing self-worth contingent on others' approval which has been associated with perfectionistic concerns (A. P. Hill, Hall, & Appleton, 2011). Another possible explanation is that if adolescents have a history of high academic achievement, others start to expect them to always be the best based on their previous performance. This would explain increases in the socially prescribed aspect of perfectionistic concerns, that is, externally motivated beliefs that striving for perfection and being perfect are important to others (Speirs Neumeister, 2004).

Some of the gifted students in Speirs Neumeister et al.'s (2009) study also reported that, at some point, high academic achievement became a responsibility for them as they felt the need to maintain the image that they (but also others) formed about their perfect achievements. These reports would additionally explain increases in the concern over mistakes and doubts about actions aspects of perfectionistic concerns. When students are preoccupied about maintaining their past and current achievement at a very high level, they may tend to worry about making mistakes or wrong decisions that would negatively affect this high-achieving image. In support of this explanation are also the results of Damian et al.'s (2014b) study showing that high

academic achievement was associated with a mastery-avoidance orientation in adolescents.

Adolescents who achieved high grades at school also had higher levels of goal orientations

directed at avoiding the loss of competence, learning, and mastery of a task (cf. Elliot &

McGregor, 2001).

Another possible explanation for academic achievement predicting longitudinal increases

in perfectionistic concerns may reside in the fear of positive evaluation and social anxiety. It has

been shown that individuals high in perfectionistic concerns also experience higher levels of fear

of positive evaluation and social anxiety (Yap, Gibbs, Francis, & Schuster, 2016) and that social

anxiety predicts increases in perfectionistic concerns (Gautreau, Sherry, Mushquash, & Stewart,

2015). The fear of positive evaluation is a characteristic of socially anxious individuals and

refers to the worry that positive evaluation of one's performance will raise the standards of future

evaluations whereas one's performance will not increase which will lead to future failure

(Wallace & Alden, 1997; Weeks, Heimberg, Rodebaugh, & Norton, 2008). Consequently, it is

possible that adolescents high in perfectionistic concerns interpret their high academic

achievement in a negatively biased way: The standards based on which they will be evaluated in

the future will increase, but their academic achievement will not, which will eventually lead to

failure.

Finally, the finding that academic achievement was a common factor in the development

of both dimensions of perfectionism suggests that high academic success may lead to multiple

outcomes. This finding mirrors the principle of multifinality positing that perfectionism leads to

multiple outcomes through different pathways (Sherry, Mackinnon, & Gautreau, 2016). For

example, academic achievement was found to predict the development of adolescents'

educational identity (Pop, Negru-Subtirica, Crocetti, Opre, & Meeus, 2016). Similarly, Speirs

Neumeister (2004) and Speirs Neumeister et al. (2009) found that academic success lead to

perfectionistic strivings through lack of failure and lack of challenge whereas academic success lead to perfectionistic concerns through perceived expectations from others. Future studies may want to investigate possible mediators and moderators of these relationships.

In contrast to academic achievement, academic efficacy played a role only in the development of perfectionistic strivings, but not in the development of perfectionistic concerns. This finding is in accordance with the hypothesis of both Bandura's (1989, 1997) social cognitive theory of personality and Flett et al.'s (2002) model on the development of perfectionism positing that high academic efficacy leads to increases in one's goals and standards and the perfectionistic strivings dimension of perfectionism, respectively. In addition, this finding is noteworthy for the debate in the literature on the adaptiveness of perfectionistic strivings (Flett & Hewitt, 2006; Stoeber & Otto, 2006). Future studies may want to further investigate whether high academic efficacy is partly responsible for the positive relationships that perfectionistic strivings show with academic performance (Stoeber, 2012), as it was the case in the present study.

Limitations and Future Research

The present study has a number of limitations. First, the study is the first to investigate the role of academic achievement and academic efficacy in the development of adolescent perfectionism with a longitudinal design taking all cross-lagged relationships into account. Consequently, future studies need to replicate the present findings before firm conclusions can be drawn. Second, the study examined Romanian adolescents and used translations of self-report measures that had not been used previously. Future studies should reexamine the present findings in English-speaking samples using the original measures. Third, the study measured academic achievement using adolescents' self-reported grade point average (GPA). Whereas self-reported GPA has shown to be highly correlated with actual GPA (Credé & Kuncel, 2012) and predict

school outcomes similar to actual GPA (Baird, 1976), future studies may profit from including objective measures and more diverse indicators of academic achievement (e.g., teacher ratings). Finally, the present findings may be limited to the particular time spans investigated (four to five months from Time 1 to Time 2 and from Time 2 to Time 3, overall nine months). Future studies may therefore want to investigate if the present findings generalize to other time spans as the relationships between perfectionism and academic achievement may be bidirectional, but the effects could unfold over different time spans. In particular, the effect of high academic achievement on the development of perfectionism may take shorter periods of time whereas the effect of perfectionism on increases in academic achievement may take longer periods (cf. Dormann & Griffin, 2015).

Conclusions

Notwithstanding these limitations, the present findings have important implications for our understanding of the development of perfectionism and its relationships with academic achievement and academic efficacy. First, the development of perfectionism is still poorly understood because few longitudinal studies have been conducted. Second, the specific development of perfectionistic strivings is underexplored compared to the development of perfectionistic concerns. Whereas previous studies found parental pressure (e.g., Damian et al., 2013) and parental psychological control (e.g., Soenens et al., 2008) to predict longitudinal increases in perfectionistic concerns in adolescents, these factors did not predict increases in perfectionistic strivings. So far, only one study found a predictor of longitudinal increases in perfectionistic strivings, and that was the personality trait of conscientiousness (Stoeber et al., 2009). Third, the positive cross-sectional relationships between perfectionism and indicators of academic success are usually interpreted in the sense that academic success is an outcome of perfectionism (cf. Stoeber, 2012). This interpretation, however, was only partially supported in

the present study because academic achievement, as an indicator of academic success, was both an antecedent and an outcome of perfectionism. As perfectionism has been shown to be a relevant personality disposition for psychological adjustment and academic success, it is important to pinpoint the factors that contribute to the development of perfectionism. Consequently, the present study makes a significant novel contribution to the literature as it is the first longitudinal study to show that high academic achievement and academic efficacy represent factors in the development of perfectionism in adolescence.

Declaration of Conflicting Interests

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Table 1

Descriptive Statistics and Bivariate Correlations

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13
Time 1													
1. Perfectionistic strivings													
2. Perfectionistic concerns	.64***												
3. Academic achievement	.22***	.00											
4. Academic efficacy	.43***	.10*	.34***										
Time 2													
5. Perfectionistic strivings	.74***	.47***	.28***	.41***									
6. Perfectionistic concerns	.43***	.67***	.05	.01	.58***								
7. Academic achievement	.27***	.06	.70***	.40***	.31***	.10*							
8. Academic efficacy	.31***	.04	.37***	.52***	.46***	.09*	.35***						
Time 3													
9. Perfectionistic strivings	.68***	.41***	.37***	.35***	.74***	.46***	.38***	.41***					
10. Perfectionistic concerns	.40***	.59***	.15***	.03	.48***	.70***	.20***	.12**	.64***				
11. Academic achievement	.27***	.05	.87***	.38***	.32***	.07	.78***	.40***	.41***	.19***			
12. Academic efficacy	.24***	–.01	.38***	.51***	.31***	.05	.41***	.49***	.47***	.16***	.43***		

Control variables

	1	2	3	4	5	6	7	8	9	10	11	12	13
13. Age	$.16^{***}$	$-.01$	$-.01$	$.08$	$.16^{***}$	$-.03$	$.11^{*}$	$.16^{***}$	$.11^{*}$	$.03$	$.06$	$-.02$	
14. Gender (female)	$.03$	$.03$	$.23^{***}$	$.06$	$.01$	$-.01$	$.24^{***}$	$.14^{**}$	$.10^{*}$	$-.04$	$.28^{***}$	$.21^{***}$	$-.10^{*}$
M	3.00	2.35	9.01	3.56	3.01	2.33	9.18	3.50	2.94	2.30	9.04	3.35	15.87
SD	0.69	0.64	0.70	0.82	0.68	0.65	0.72	0.84	0.69	0.68	0.70	0.93	1.77
Cronbach's alpha	.88	.89	n/a	.85	.87	.90	n/a	.86	.89	.92	n/a	.89	n/a

Note. $N = 487$. All scores are mean scores (see Data Screening section for details). Age = age at Time 1. Gender (female) was coded 0 = male, 1 = female. Cronbach's alphas for academic achievement and age are not applicable (n/a) because they were single items.

$^{*}p < .05.$ $^{**}p < .01.$ $^{***}p < .001.$

Table 2

Model Fit Indices and Model Comparisons

Model	Model fit indices								Model comparisons				
	χ^2	df	CFI	TLI	RMSEA	SRMR	AIC	BIC	Comparison	$\Delta\chi^2$	Δdf	ΔCFI	ΔRMSEA
Model 1													
Model 1.1	16.77	12	.997	.992	.029	.026	4593.21	4769.12	1.1 vs 1.2	6.87	6	−.001	−.008
Model 1.2	9.90	6	.998	.987	.037	.013	4598.35	4799.38					
Model 2													
Model 2.1	28.62	24	.998	.994	.020	.025	6884.87	7161.30	2.1 vs 2.2	13.24	12	.000	−.004
Model 2.2	15.38	12	.998	.992	.024	.017	6895.64	7222.32					

Note. $N = 487$. Model 1 included perfectionistic strivings, perfectionistic concerns, and academic achievement; Model 2 included perfectionistic strivings, perfectionistic concerns, academic achievement, and academic efficacy; Model 1.1 and Model 2.1 = bidirectional effects constrained to be equal across time; Model 1.2 and Model 2.2 = bidirectional effects unconstrained to be equal across time (free to vary; see Cross-Lagged Analyses section for details). CFI = Comparative Fit Index; TLI = Tucker-Lewis Index; RMSEA = Root Mean Square Error of Approximation; SRMR= Standardized Root Mean Square Residual; AIC = Akaike Information Criterion; BIC = Bayesian Information Criterion.

Table 3

Model 1.1 and 2.1: Within-Time Correlations

Variable	Time 1			Time 2			Time 3		
	1	2	3	1	2	3	1	2	3
Model 1.1 (excluding academic efficacy)									
1. Perfectionistic strivings									
2. Perfectionistic concerns	.64***			.53***			.57***		
3. Academic achievement	.21***	.00		.05	.06		.05	.04	
Model 2.1 (including academic efficacy)									
1. Perfectionistic strivings									
2. Perfectionistic concerns	.64***			.54***			.57***		
3. Academic achievement	.21***	.00		.04	.08		.05	.04	
4. Academic efficacy	.43***	.10*	.34***	.31***	.13*	.03	.36***	.17**	.10

Note. See Figure 1 for the longitudinal relations of Model 1.1, and Figure 2 for those of Model 2.1.
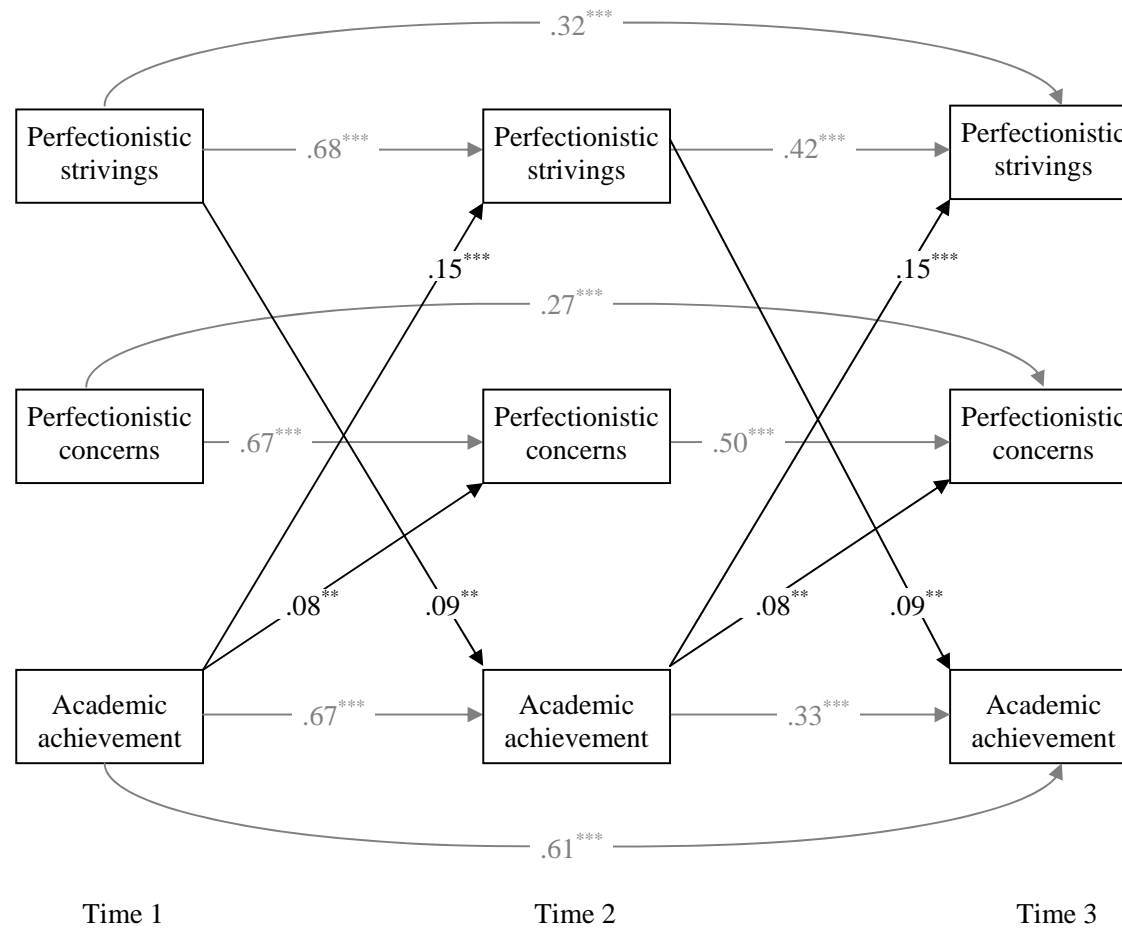
*p < .05. **p < .01. ***p < .001.

Figure 1. Model 1.1 (excluding academic efficacy). All cross-lagged paths, stability coefficients, and within-time correlations were estimated. To reduce model complexity, only significant longitudinal relations (*p* < .05) are displayed (see Table 3 for within-time correlations). Both structural and measurement model were time, gender, and age invariant. **p < .01, ***p < .001.

Perfectionistic strivings ——.63*** —— Perfectionistic strivings ——.37*** —— Perfectionistic strivings

.33***

Perfectionistic concerns ——.66*** —— Perfectionistic concerns ——.50*** —— Perfectionistic concerns

.26***

.14*** .10** .14*** .10**

Academic achievement ——.67*** —— Academic achievement ——.32*** —— Academic achievement

.60***

.08* .08* .21*** .08* .08* .19***

Academic efficacy ——.41*** —— Academic efficacy ——.23*** —— Academic efficacy

.30***

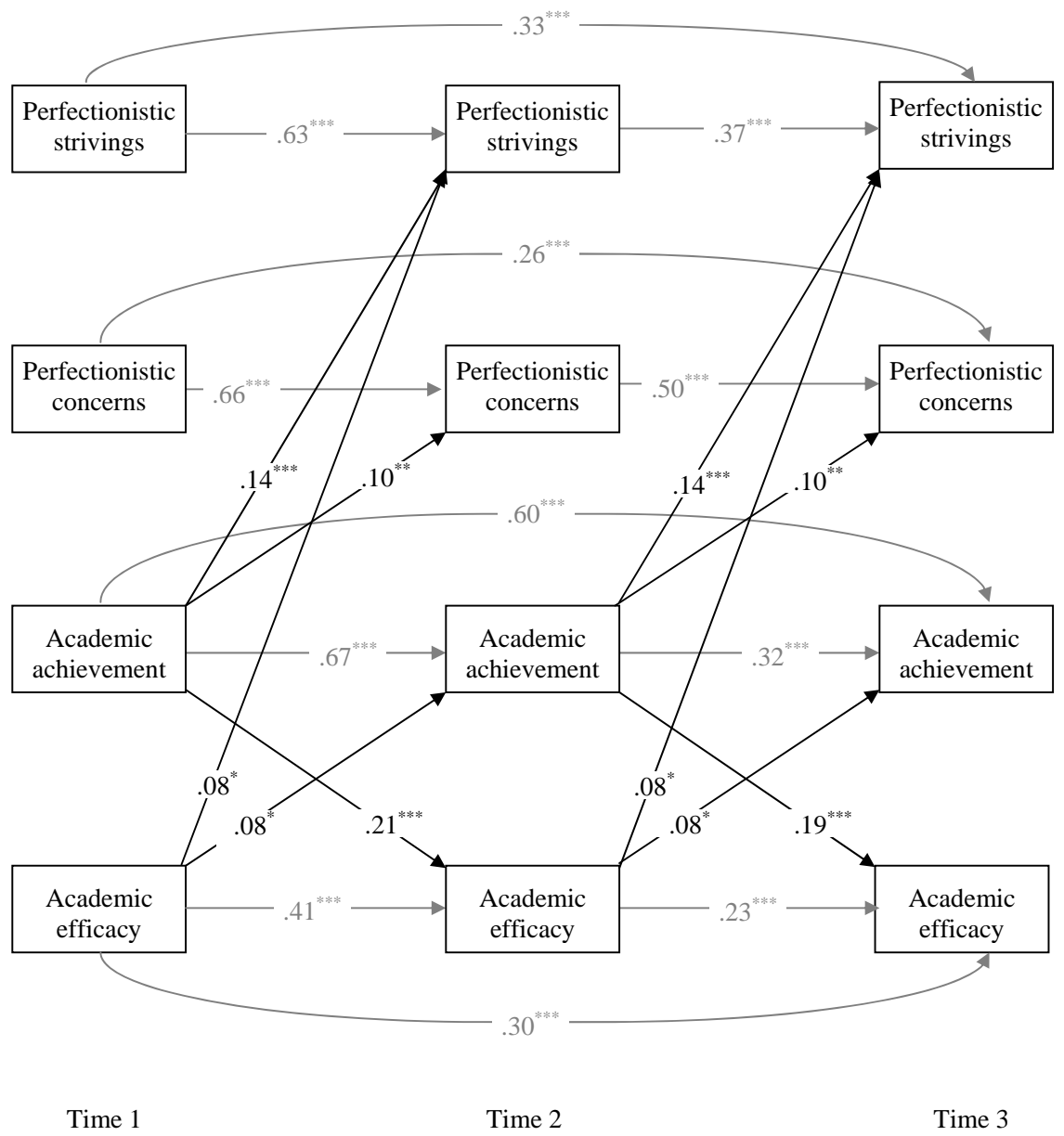Time 1   Time 2   Time 3

40

Figure 2.1. Model 2 (including academic efficacy). All cross-lagged paths, stability coefficients, and within-time correlations were estimated. To reduce model complexity, only significant longitudinal relations ($p < .05$) are displayed (see Table 3 for within-time correlations). Both structural and measurement model were time, gender, and age invariant. $^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$.