Canadian Medical Education Journal

Major Contribution/Research Article

Perfectionism, Depression, Anxiety and Academic Performance in Premedical Students

Melina Sevlever[1] and Kenneth Rice[2]

[1]Auburn University, Auburn, Alabama, USA and [2]University of Florida , Gainsville, Florida, USA

Abstract

Background: In this study we examined differences in perfectionism, depression, anxiety, and academic performance between premedical (n = 104) and non-premedical (n = 76) undergraduate students.

Method: Participants completed a series of measures. The Almost Perfect Scale-Revised (APS-R) was used to measure self-critical and personal standards perfectionism; the Center for Epidemiological Studies Depression Scale (CES-D) was used to measure symptoms of depression; and the Self-rating Anxiety Scale (SAS) was used to measure anxiety symptoms. Academic performance was determined by self-reported grade point average (GPA).

Results: Premedical students did not differ significantly from non-premedical students in perfectionistic self-criticism, personal standards perfectionism, depression, or anxiety. Perfectionistic high standards were not correlated with depression or anxiety for either group. Self-critical perfectionism was positively correlated with depression and anxiety, with comparable effect sizes, for both groups of students. Premedical students and non-premedical students drastically differed in their reported academic performance as determined by grade point average (GPA). For premedical students, personal standards perfectionism was related to higher GPA; however personal standards perfectionism in non-premedical students had a negligible effect in increasing GPA.

Conclusions: Our results suggest that distress endured by premedical students is not present during undergraduate training.

Correspondence: Melina Sevlever, University of Auburn, 226 Thach, Auburn, AL 36849, USA. Tel: (334) 844-4412; Fax: (334) 844-4447; Email: mzs0025@auburn.edu

Introduction

Medical students experience a considerable amount of psychological distress during medical training. Stressors inherent in medical education are thought to contribute to medical students' risk for depression, anxiety, and suicide.[1,2,3] Although the distress endured by medical students has been well documented, relatively little has been written about the psychological well being of premedical students. Some writers have portrayed the premedical student stereotype of a person who is, "overachieving, excessively competitive, cynical, dehumanized, overspecialized, and narrow."[4] To our knowledge, no studies have empirically examined premedical students and their stress, anxiety, or depression.

Although relatively little research exists on premedical students, several studies have examined the personality characteristics of medical students. Research in this area has generally focused on determining personality factors that differentiate medical students from other pre-professionals, and that may possibly lead to higher levels of psychological malfunctioning in medical students. Perfectionism is one such personality characteristic that has been used to explain the distress of medical students. Although the definition of this construct is not unanimously agreed upon, many researchers rely on a multidimensional model of perfectionism that is derived from Hamachek's[5] conception of the term. Hamachek distinguished between normal (adaptive) perfectionists and neurotic (maladaptive) perfectionists. Both groups expect the very best from themselves, but adaptive perfectionists "derive a very real sense of pleasure from the labors of a painstaking effort" and feel *"free to be less precise as the situation permits."*[5] In contrast, neurotic perfectionists *"never seem quite good enough, at least in their own eyes."*[5] This multidimensional model has been supported and expanded upon in recent decades[6] and has been a useful approach in assessing the unique personality characteristics of medical students.

Based on past research linking maladaptive (neurotic) perfectionism to a host of psychological problems[7,8] it is possible that high levels of depression and anxiety in medical students result from self-critical perfectionism, a perfectionism construct characterized by self-critical behaviour or thoughts, an inability to recognize achievements or success, and concerns about others'

expectations.[9] In contrast to self-critical perfectionism, personal standards perfectionism is defined as the setting of high standards and goals.[10] High standards, in the absence of self-criticism, are positively correlated with efficacy,[11] positive affect,[12] and academic integration in college.[13]

The established relationship between maladaptive perfectionism and psychological distress in clinical and nonclinical samples has encouraged researchers to assess the perfectionistic characteristics of medical students. Students with elevated conscientiousness and neuroticism are suggested to be particularly at risk for stress during medical training.[14] Additionally, conscientiousness has been positively associated with adaptive perfectionism and neuroticism has been associated with maladaptive perfectionism among medical students.[15,16] This finding is particularly relevant as maladaptive perfectionism in medical students is also associated with indicators of psychological distress, such as depression, hopelessness, and suicidal ideation.[15] In a study of 477 medical, dental, nursing, and pharmacy students, Henning, Sydney, and Shaw[17] found that nearly 30% of their sample was experiencing abnormal levels of distress, and perfectionism was a strong predictor of distress and poor psychological adjustment for the medical students. These findings suggest that perfectionism may be an important dimension in understanding the psychological distress of medical students. However, there has been no study of the role of perfectionism in the psychological adjustment of premedical students. Additionally, the question of whether premedical students experience greater psychological distress in comparison to their peers has not been addressed in the current literature.

It is possible that the distress of medical students originates prior to medical school training; by examining the role of psychological distress and perfectionism in premedical students, the possibility of premorbid personality risk factors can be more clearly delineated for these students. Furthermore, accounting for the perfectionistic tendencies of these students may help to develop more effective interventions aimed at improving the coping skills of premedical students. The present study examined both forms of perfectionism, personal standards and self-critical perfectionism, in premedical undergraduate students, defined in this study as undergraduate students who plan to attend

medical school and are in the process of fulfilling required coursework for entrance into medical programs.

There is reason to suspect that premedical students are under considerably more academic pressure in comparison to their peers. Entrance into medical school is highly competitive and in order to be eligible for medical school, undergraduate students must complete a series of requirements outside of the required coursework for their major (although some overlap occurs when students major in the sciences). In comparison, non-premedical students choose one major and are only required to meet those requirements (generally 30 credits of course work). Thus, determining the relationship between depression, anxiety, and self-critical perfectionism in premedical students may allow for a more complete understanding of the psychological distress that medical students experience.

Given the intensive performance expectations on premedical students, our first hypothesis was that premedical students would have higher personal standards perfectionism and higher self-critical perfectionism in comparison to their undergraduate counterparts. Premedical students not only have to complete a rigorous set of requirements prior to admission into medical school, they must also perform well in those classes in order to be competitive for medical school admissions. High performance standards would seem necessary and adaptive in order to meet these goals. Additionally, because maladaptive or self-critical perfectionism has been identified as a factor in the psychological distress of medical students we expected that premedical students would have higher levels of self-criticism than non-premedical students.

It is possible that rigorous academic requirements play a role in the development of depression and anxiety in premedical students. Based on prior research findings that medical students are considerably more depressed and anxious than their peers,[1,2,3] we hypothesized that premedical students would have higher scores on measures of depression and anxiety compared with a group of non-premedical undergraduates.

A third objective of this study was to assess the relationship between self-critical perfectionism and depression, anxiety, and academic performance (grade point average). We expected that elevated self-critical perfectionism would be correlated with higher levels of depression and anxiety, and poorer academic performance in both premedical and non-premedical groups. This hypothesis was based on previous research that supports a positive association between self-critical perfectionism and other types of psychological distress.[1,2,3,9] High performance standards were not expected to be correlated with depression or anxiety because it is well documented that high standards in the absence of self-criticism are not necessarily associated with psychological distress, and may be adaptive.[6,11,12] However, we did expect high standards to be associated with higher academic performance. We further anticipated that the strength of the association between self critical perfectionism and psychological distress would be moderated by premedical major status. Thus, we hypothesized that self-critical perfectionism, though deleterious for both groups of students, would be more strongly associated with the psychological distress indicators for the premedical students than it would be for the non-premedical students. Ostensibly, our final hypothesis was a group (premedical, non-premedical) x perfectionism (personal standards, self-critical) interaction, with depression, anxiety, and GPA as the criterion variables.

Methods

Participants and Procedure

A total of 180 students participated in this study. Students were required to be 18 years or older in order to participate in the study, and the average age for this sample was 19.34 (*SD* = 1.19), with ages ranging from 18 to 26. Of the 180 students, 112 (62%) were female, 65 (36%) were males, and 3 participants (2%) did not report their sex. The sample was diverse. A total of 82 students (46%) of the sample identified themselves as White, European American, 40 (22%) were African American, 22 (12%) were Asian American, 21 (12%) were Latino American, and 15 (8%) were Multiracial, International, or Other. A total of 51 (28%) students were majoring in biological or physical science, followed by 47 (26%) in liberal arts, 44 (24%) in health professions, 14 (8%) in business, 7 in engineering (5%), and 4 in journalism and telecommunications (2%). A total of 13 students (7%) were undecided in terms of major, though they were able to identify whether they would be pursuing a premedical or non-premedical curriculum. The sample was comprised of 90 freshmen (50%), 38 sophomores (21%), 39 juniors (22%), and 12 seniors (7%).

Participants were students who attended a large, public university in the southeastern U.S. They were recruited from two sources. Leaders in the American Medical Student Association (AMSA), a premedical organization on the campus, informed members about the study and the opportunity to participate. Approximately 850 premedical students are members of this group on the campus where students were recruited. Of the 104 premedical students in the sample, 73 (70%) were recruited at the end of an AMSA meeting. Participants were also recruited from the research participant pool of general psychology and research methods courses. A total of 107 students in the sample were recruited using this method (76 non-premedical students and 31 premedical students). Participants in this group received credit for their participation in the study.

Participants were administered a set of three self-report measures. To control for sequence effects, one of the possible six different orderings of three questionnaires was randomly administered to each participant. Measures were completed in meeting rooms or classroom settings, with approximately 15-30 participants completing the measures during an administration session.

Materials

The Almost Perfect Scale-Revised (APS-R)[18] was used to measure self-critical and personal standards perfectionism. The APS-R is a 23-item, self-report questionnaire that contains three subscales: High Standards (7 items), Order (4 items), and Discrepancy (12 items). Items are responded to using a 7-point scale ranging from strongly disagree to strongly agree. The High Standards subscale measures high personal standards and performance expectations, the Order subscale measures the desire for order and organization, and the Discrepancy subscale measures the degree to which the respondent perceives success or failure in meeting performance expectations. The Discrepancy subscale was used to operationalize self critical perfectionism and High Standards was the indicator of personal standards perfectionism. The Order subscale was not analyzed. Considerable evidence has amassed supporting the factor structure, convergent, concurrent, and discriminant validity, and reliability of scores derived from the APS-R.[19,20,21]

The 20-item, Center for Epidemiological Studies Depression Scale (CES-D)[22] was used to measure symptoms of depression. Participants are asked to read a series of 20 statements that describe a feeling or behavior. Using a 4-point scale (ranging from rarely or none of the time to mostly or all of the time), participants are asked to determine how frequently they felt or behaved in the way described by each statement during the past week. The CES-D is reported to have high internal consistency, moderate test-retest reliability, and good validity.[22]

Anxiety symptoms were measured using the Self-rating Anxiety Scale (SAS).[23] The SAS is a 20-item self-report measure in which participants are instructed to rate each item on a four-point scale (from none or a little of the time to most or all of the time) as the item applied to them during the past week. Scores on the SAS can range from 20 to 80, with higher scores representing higher levels of anxiety symptoms. Evidence of concurrent, convergent, and discriminant validity as well as good internal consistency is reported for the SAS.[23, 24]

Finally, students were asked to self-report their undergraduate grade point average (GPA). For sample descriptive purposes, students also reported sex, age, and race/ethnicity on a demographics questionnaire.

Results

Preliminary Analyses

The data were screened for outliers. Using box plot analyses, four extreme outliers were detected (defined as data points that are more than 3 standard deviations from the rest of the sample). Removing these participants, however, did not alter any of the results, and therefore their data were included in the analyses. All subscale scores were assessed for reliability. The internal reliability coefficients (Cronbach's alpha) and other descriptive statistics are summarized in Table 1. The results showed adequate reliability for all scores with reliability coefficients ranging from 0.82 to 0.93. Additionally, independent sample t-tests were used to test whether the scores obtained from the premedical students recruited from AMSA differed significantly from the premedical students recruited from the participant pool. There were no differences between recruiting source on the APS-R, CES-D, and SAS scores (p > .05). However, students recruited from AMSA reported, on average higher GPAs (M = 3.64, SD = 0.33) than the premedical students recruited from the research participant pool (M = 3.41, SD = 0.52), t (98) = -2.62, p < .01, d = 0.57.

Group Differences on Perfectionism

Multivariate analysis of variance (MANOVA) was used to test differences between the premedical and non-premedical students on the High Standards subscale (personal standards perfectionism) and Discrepancy subscales (self-critical perfectionism) from the APS-R. Means and standard deviations for the two groups appear in Table 1. The multivariate effect was not significant, indicating no significant differences between the two student groups on the perfectionism dimensions: Wilks's lambda = 0.980, F (2, 177) = 1.82, p > .05, partial eta-squared = 0.02.

Group Differences on Psychological Distress and GPA

A MANOVA was also used to test differences between student groups on the two indicators of psychological symptoms (depression and anxiety). As in the analyses of perfectionism, there was no indication of a significant difference between premedical and non-premedical students on CES-D and SAS scores, Wilks's lambda = 0.989, F (2, 177) = 0.97, p > .05, partial eta-squared = 0.011. Grade point average was tested with an independent groups t-test and found to be significantly different between the groups, t (173) = -4.32, p < .0005, d = 0.66. Directions of effects indicated that the premedical students had significantly higher average GPA than the non-premedical students (see Table 1).

Correlations Between Perfectionism, Distress, and GPA

Correlation matrices were calculated to examine the relationship between scores on the Discrepancy, High Standards, CES-D, and SAS subscales, and GPA. Separate matrices were constructed for premedical and non-premedical students. The results of these analyses are summarized in Table 2. Strengths of relationships between the perfectionism scores and the psychological distress indicators were generally consistent between the groups. Discrepancy was significantly correlated with higher CES-D and SAS scores. High Standards was inversely correlated with CES-D and not significantly associated with SAS scores. The two perfectionism scores were significantly correlated with GPA (in different directions) for the premedical students but not significantly associated with GPA for the non-premedical students. The correlation between Discrepancy and GPA was not significantly different for both groups, however the strength of the relationship between High Standards and GPA was significantly different for premedical and non-premedical students, Z = 2.15, p <.05.

Perfectionism by Student Group (Premedical, Non-Premedical) Interactions

Discrepancy and High Standards scores were mean-centered and used to create multiplicative interaction terms with student group variable (coded 0 for non-premedical students, 1 for premedical students).[25] Three sets of hierarchical regression analyses were then used to test interaction effects for each dependent variable (i.e., CES-D, SAS, GPA). In the first step, the main effects for perfectionism and student group were entered. In the next step, the two-way interaction terms of interest were entered (i.e., personal standards perfectionism by student group, self-critical perfectionism by student group). Type I error for the test of interaction effects was set at .10 because of the difficulty detecting significant interaction effects with regression. Any significant interaction effects were probed using the procedures described by Cohen[25] to plot regression lines and test simple slopes for significance.

Using the more liberal Type I error rate, the only significant interaction occurred for the personal standards by student group effect in the prediction of GPA scores, ΔR^2 = .02, β = .19, p < .10. The plot of this interaction appears in Figure 1. For the non-premedical groups, there was no significant effect on GPA for increasing levels of High Standards scores, b = .002, SE_b = .012, t (73) = .14, p > .500. However, the simple slope for the premedical students was significant and indicated an increase in GPA at increasingly higher levels of High Standards scores, b = .024, SE_b = .007, t (98) = 3.55, p < .001. Indeed, at the upper end of High Standards scores (plotted at 1 SD above the mean), the difference in GPA between premedical and non-premedical students was approximately a full standard deviation. Higher performance expectations appear to be associated with higher academic performance for the premedical group, but higher self-expectations have a negligible effect on GPA for the non-premedical students.

Discussion

The purpose of the present study was to assess whether premedical students differed from non-premedical students on self-critical and personal standards perfectionism, depression, and anxiety, with the related expectations that the association between self-critical perfectionism and psychological and academic distress would be greater for the premedical students than the

non-premedical students. Additionally, this study examined whether personal standards perfectionism can be advantageous in terms of psychological and academic functioning, rather than problematic.[13, 20]

Compared with non-premedical students, premedical students did not show higher levels of self-critical perfectionism, depression, or anxiety. Thus, this study was unable to replicate prior findings regarding psychological distress in medical students[1,2,3] with this premedical student sample. Several reasons may account for the absence of psychological distress in premedical students as compared to medical students. It is likely that premedical students are a much more diverse group than medical students. This sample was comprised of primarily junior students (approximately 60% of the sample was under 19 years old), many of whom may decide to not apply to medical school. Additionally, medical schools are highly selective, and applicants and admitted students may differ significantly in GPA and MCAT scores. Finally, the unique experience of medical school may contribute to differences between premedical and medical students. Medical training is a rigorous academic program, and students are often forced to deal with matters of illness and death which can lead to feelings of anxiety and depression,[2,3] experiences that are not as likely to be present in premedical training.

There was also no difference in personal standards perfectionism between premedical and non-premedical students. This contrasts with the findings of Enns and Cox[15] who found that medical students had significantly higher standards than liberal arts students. One possible explanation for the incongruity between findings in the current study and past research is that medical students, as a select and clearly high achieving group, may have higher performance expectations (standards) than premedical students. Medical schools are likely to select students with high standards, and premedical students who eventually apply and are admitted to medical school are likely to be those premedical students with the highest standards. Additionally, Enns and Cox[15] compared their sample of medical students to liberal arts students, and a significant difference in age between these two groups may have served to exacerbate differences in High Standards. In contrast, the average age of premedical students and non-premedical students in this sample was comparable. Lastly, Enns and Cox[15] used the Multidimensional

Perfectionism Scale (MPS)[11] to measure personal standards, whereas the APS-R was used in the current study. Although the High Standards subscale of the APS-R has been correlated with the Personal Standards subscale of the MPS,[20] it is possible that the varying findings between this study and the study by Enns and Cox[15] are due to the difference in measures used.

The relationship between perfectionism and indicators of distress (i.e., depression and anxiety) were similar for both groups of students. As predicted, personal standards perfectionism was not significantly correlated with depression or anxiety for both premedical students and non-premedical students. This finding serves to strengthen existing research, which suggests that high standards are not necessarily problematic. Additionally, self-critical perfectionism was significantly correlated with depression and anxiety for both groups. Many studies have previously established the relationship between self-critical perfectionism and anxiety and depression.[9,13,26] This study serves to replicate this finding and suggests that self-critical perfectionism is associated with anxiety and depression across a variety of undergraduate students, perhaps regardless of intended major or career path.

Interestingly, the relationship between perfectionism and GPA differed for premedical students and non-premedical students. This significant difference in GPA may be due to the distinct relationship between personal standards perfectionism and academic performance for premedical students. Whereas personal standards perfectionism seemed to positively affect GPA for premedical students, personal standards perfectionism seemed to have little effect on the GPA of non-premedical students. This finding may serve to clarify the relationship between perfectionism and academic performance. Although some studies have reported that high standards are significantly correlated with higher GPA[27] other studies have failed to replicate this relationship.[28] Additionally, it has been suggested that high standards may only be related to GPA for certain populations. For example, Castro and Rice[29] found that the Personal Standards subscale on the MPS (a comparable subscale to High Standards) was predictive of GPA only for Asian American students, and not for White/European American or African American students. The current study seems to further suggest that the relationship between perfectionism and GPA may be moderated by other variables. Aside from

clarifying the potential effect of personal standards perfectionism on academic performance, this finding suggests the need to further investigate why personal standards perfectionism may be effective for some students but not others in possibly improving academic performance.

Limitations and Further Research

The results of this study are limited to the sample and not generalizable to all premedical students or all undergraduate students. This study consisted of mostly premedical students who are active members of AMSA and attend meetings. Many premedical students are not members of this organization, and a large proportion of members do not regularly attend meetings. Additionally, the comparison group consisted of undergraduate students enrolled in an introductory psychology course or research methods course, and is also not generalizable to the entire undergraduate population (although these courses tend to draw on a cross-section of students attending the university, as indicated by the diversity of majors represented in this sample). Furthermore, the sample consisted of primarily junior students. Thus, further research could attempt to study a wider and more academically advanced sample of both premedical students (rather than active AMSA members) and undergraduates. It is also possible that an examination of demographic variables would have lead to significant differences between premedical and non-premedical students. That is, male premedical students may have been significantly different from male non- premedical students. Due to limitations in sample size, demographic variables were not addressed; however, an interaction between demographic variables and premedical status may serve to explain the lack of significant results in this study. Lastly, although this study used valid and reliable self-report measures of perfectionism, depression, and anxiety, future research may benefit from the incorporation of structured interviews or observations as an adjunct to self-report scales. These additional methods may reveal more drastic differences between premedical and non-premedical students that were not demonstrated in the current study.

Despite considerable of research on medical students, research on premedical students has been sparse. It is unknown whether psychological distress endured by medical students is present during undergraduate education. This study seems to suggest that it is not; perhaps something about the selection process into medical school or the experience of medical school brings about mental health changes in medical students. However, further longitudinal research is necessary to test this claim and evaluate the changes from premedical to medical training, as well as the differences between premedical students and non-premedical students.

Figure 1. High Standards (PS) Perfectionism by Premedical Student Status Predicting Grade Point Average.
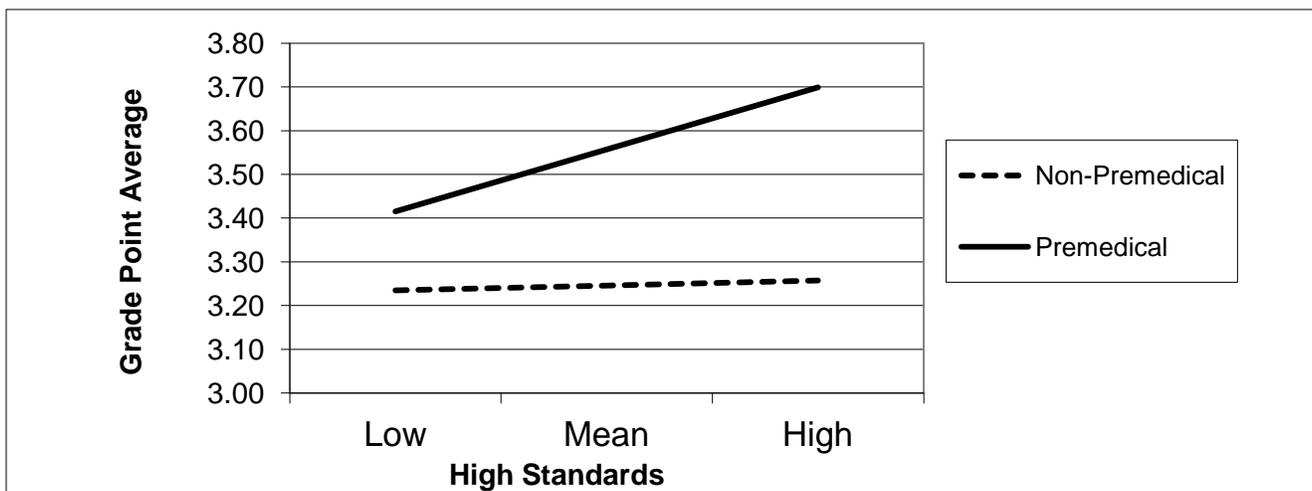
Table 1. Descriptive Statistics and Score Reliabilities for Premedical Students and Non-premedical Students

	Premedical Students (*n* = 104)		Non-Premedical Students (*n* = 76)		Total (*n* = 180)	
Measure	M(SD)	α	M(SD)	α	M(SD)	α
Discrepancy	44.25(15.20)	0.93	40.92(15.56)	0.93	42.84(15.40)	0.93
High Standards	43.60(5.58)	0.88	42.76(5.64)	0.86	43.24(5.61)	0.87
CES-D	15.26(9.48)	0.89	13.61(10.86)	0.93	14.56(10.09)	0.91
SAS	33.39(7.63)	0.82	31.79(7.65)	0.83	32.72(7.66)	0.82
GPA	3.57(0.41)	--	3.25(0.57)	--	3.43(0.51)	--

Note: CES-D = Center for Epidemiological Studies Depression Scale; SAS = Self-rating Anxiety Scale.

Table 2. Correlations between Perfectionism, Depression, Anxiety, and GPA for Premedical and Non-premedical Students

Non-Premedical Students, *n*=75 (Lower Triangle Correlations)	Premedical Students, *n* = 100 (Upper Triangle Correlations)				
	Discrepancy	High Standards	CES-D	SAS	GPA
Discrepancy	1.0	-.15	.56[**]	.54[**]	-.22[*]
High Standards	-.23[*]	1.0	-.21[*]	-.10	.34[**]
CES-D	.55[**]	-.25[*]	1.0	.68[**]	-.004
SAS	.53[**]	-.07	.74[**]	1.0	-.11
GPA	-.07	.02	-.17	-.01	1.0

Note: CES-D= Center for Epidemiological Studies Depression Scale; SAS = Self-rating Anxiety Scale; GPA = Grade Point Average. [*]*p* < .05; [**]*p* < .01; based on one-tailed tests.

References

1. Arnetz B, Hörte L, Hedberg A, Theorell T. Suicide patterns among physicians related to other academics as well as to the general population: Results from a national long-term prospective study and a retrospective study. *Acta Psych Scand.* 1987;75:139-143.

2. Dahlin M, Joneborg N, Runeson B. Stress and depression among medical students: a cross-sectional study. *Med Educ.* 2005;39:594-604.

3. Hawton K, Clements A, Sakarovitch C, Simkin S, Deeks J. Suicide in doctors: a study of risk according to gender, seniority and specialty in medical practitioners in England and Wales, 1979-1995. *J Epidemiol Comm Health.* 2001;55:296-300.

4. Aherns E, Akin C. Report to alumni council. *Harvard Medical School Alumni Bulletin.* 1987;55:21-26.

5. Hamachek D. Psychodynamics of normal and neurotic perfectionism. *Psychol: J Hum Behav.* 1978;15:27-33.

6. Stoeber J, Otto K. Positive conceptions of perfectionism: approaches, evidence, challenges. *Pers Soc Psychol Rev.* 2006:10:295-319.

7. Blatt S. The destructiveness of perfectionism: Implications for the treatment of depression. *Am Psychol.* 1995; 50:1003-1020.

8. Flett G, Hewitt P. Perfectionism and maladjustment: An overview of theoretical, definitional, and treatment issues. Perfectionism: Theory, research, and treatment. Washington, DC US: American Psychological Association; 2002:5-31.

9. Dunkley D, Blankstein K. Self-critical perfectionism, coping, hassles, and current distress: a structural equation modeling approach. *Cognit Ther Res.* 2002;24:713-718.

10. Dunkley D, Zuroff D, Blankstein K. Self-critical perfectionism and daily affect: Dispositional and situational influences on stress and coping. *J Pers Soc Psychol.* 2003;84:234-252.

11. Frost R, Marten P, Lahart C, Rosenblate R. The dimensions of perfectionism. *Cognit Ther Res.* 1990;14:449-468.

12. Frost R, Heimberg R, Holt C, Mattia J, Neubauer A. A comparison of two measures of perfectionism. *Pers Individ Dif.* 1993;14:119-126.

13. Rice K, Mirzadeh S. Perfectionism, attachment, and adjustment. *J Couns Psychol.* 2000;47:238-250.

14. Tyssen R, Dolatowski F, Rovik J, Thorkildsen R, Ekeberg O, Hem E, et al. Personality traits and types predict medical school stress: a six-year longitudinal and nationwide study. *Med Ed.* 2007;41:781-787.

15. Enns M, Cox B, Sareen J, Freeman P. Adaptive and maladaptive perfectionism in medical students: a longitudinal investigation. *Med Ed.* 2001;35:1034-1042.

16. Enns M, Cox B. The nature and assessment of perfectionism: A critical analysis. Perfectionism: Theory, research, and treatment. Washington, DC US: American Psychological Association; 2002:33-62.

17. Henning K, Sydney E, Shaw S. Perfectionism, the impostor phenomenon and psychological adjustment in medical, dental, nursing and pharmacy students. *Med Ed.* 1998; 32:456-464.

18. Slaney R, Mobley M, Trippi J, Ashby J, Johnson D. The Almost Perfect Scale–Revised 1996: Unpublished manuscript, the Pennsylvania State University.

19. Rice K, Ashby J. An efficient method for classifying perfectionists. *J Couns Psychol.* 2007;54:72-85.

20. Slaney R, Rice K, Mobley M, Trippi J. The Revised Almost Perfect Scale. *Meas Eval Couns Dev.* 2001;34:130-145.

21. Suddarth, B. H., & Slaney, R. B. An investigation of the dimensions of perfectionism in college students. *Meas Eval Couns De.* 2001;34:157-166.

22. Radloff L. The CES-D Scale: A self-report depression scale for research in the general population. *Appl Psychol Meas.* 1977;1:385-401.

23. Zung W. A rating instrument for anxiety disorders. *Psychosomatics.* 1971;21:371-379.

24. Dean P, Range L. The escape theory of suicide and perfectionism in college students. *Death Stud.* 2001;20:415-425.

25. Cohen J, Cohen P, West S, Aiken L. *Applied multiple regression/correlation analysis for the behavioral sciences (3rd ed.)* Mahwah, NJ US: Lawrence Erlbaum Associates Publishers; 2003.

26. Kawamura K, Hunt S, Frost R, DiBartolo P. Perfectionism, anxiety, and depression: are the relationships independent? *Cognit Ther Res.* 2001;25:291-302.

27. Nounopoulos A, Asbhy J, Gilman R. Coping resources, perfectionism, and academic performance among adolescents, *Psychol Sch.* 2006;43:613-622.

28. Rice K, Dellwo J. Perfectionism and self-development: Implications for college adjustment. *J Couns Dev.* 2002; 80:188-196.

29. Castro J, Rice K. Perfectionism and ethnicity: Implications for depressive symptoms and self-reported academic achievement. *Cultur Divers Ethnic Minor Psychol.* 2003; 9:64-78.