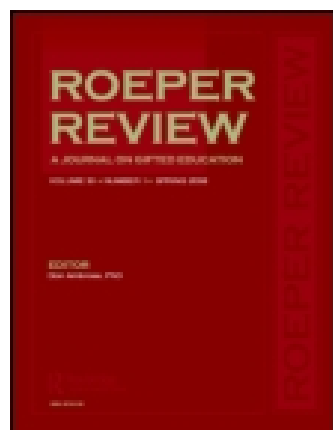


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David W. Chan <sup>a</sup>

<sup>a</sup> Department of Educational Psychology, Faculty of Education , The Chinese University of Hong Kong , Shatin , NT , Hong Kong

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# Life Satisfaction, Happiness, and the Growth Mindset of Healthy and Unhealthy Perfectionists Among Hong Kong Chinese Gifted Students

David W. Chan

This study used clustering to classify Chinese gifted students based on their scores on the High Standards and Discrepancy subscales of the Almost Perfect Scale–Revised (APS-R). The interpretation of the three clusters as nonperfectionists, unhealthy perfectionists, and healthy perfectionists was supported by results comparing these groups on their responses to measures of mindset and well-being. Healthy perfectionists were the happiest and the most satisfied with life. Unhealthy perfectionists scored significantly higher than healthy perfectionists and nonperfectionists on the measure of the fixed mindset, suggesting that targeting mindset change could be an effective intervention for unhealthy perfectionists. Finally, a simple method with suggested cutoff scores on the two APS-R subscales was developed for practitioners to identify unhealthy perfectionists for intervention.

Keywords: Chinese, fixed mindset, gifted students, growth mindset, happiness, Hong Kong, life satisfaction, perfectionism

Evolving conceptions of perfectionism suggest that perfectionism commonly viewed from the traditional pathological perspective (see Shafran & Mansell, 2001) could be distinguished in its positive as well as negative aspects (see Stoeber & Otto, 2006). Adler (1956), for example, pioneered the view that perfectionism could be healthy when the striving for perfection includes social concern along with the maximizing of one's potential. More explicitly, Hamachek (1978) suggested two forms of perfectionism, the positive *normal perfectionism* and the negative *neurotic perfectionism*. Normal perfectionism is characterized by conscientious efforts to strive for excellence in completing tasks, whereas neurotic perfectionism is characterized by neurotic and obsessive–compulsive behaviors in the pursuit. Consequently, normal perfectionists can derive pleasure from accomplishments and allow themselves to fail and to be imperfect, but neurotic perfectionists are preoccupied with avoiding mistakes and never feel that their efforts are good enough. In summary, it seems that both normal and neurotic perfectionists strive to meet the high standards they set for themselves, but only normal perfectionists

are willing to accept limitations or imperfections in their striving for excellence. Thus, negative or pathological aspects of perfectionism such as compulsive behaviors (Burns, 1983) and the fear of failure and procrastination (Adderholdt-Elliott, 1989) could be characteristics of neurotic or unhealthy perfectionists.

Empirical support for these conjectures started to converge in the 1990s when two groups of researchers independently demonstrated the multidimensional nature of perfectionism using assessment instruments they developed to capture constructs or facets encompassed by perfectionism. Hewitt and Flett (1989, 1991) emphasized the interpersonal aspects of perfectionism and developed the 45-item Multidimensional Perfectionism Scale (MPS) that assesses self-oriented, other-oriented, and socially prescribed perfectionism. Self-oriented perfectionism focuses on excessively high standards, other-oriented perfectionism examines an individual's expectations of others, and socially prescribed perfectionism addresses the perceptions of standards set by others. Frost and his colleagues also developed a 35-item multidimensional questionnaire, the Frost Multidimensional Perfectionism Scale (FMPS), which examines the intrapersonal nature of perfectionism (Frost, Martin, Lahart, & Rosenblate, 1990). The FMPS assesses six major aspects: concern over making mistakes, high personal standards, the perception of high parental criticism,

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Address correspondence to David W. Chan, Department of Educational Psychology, Faculty of Education, The Chinese University of Hong Kong, Shatin, NT, Hong Kong. E-mail: davidchan@cuhk.edu.hk

the doubting of the quality of one's actions, the perception of high parental expectations, and a high preference for order and organization. Although there are obvious differences between the two multidimensional measures in terms of the number and nature of constructs assessed, they were shown to have common underlying dimensions. Indeed, Frost, Heimberg, Holt, Mattia, and Neubauer (1993), in their factor analysis of constructs of the two measures, found that two substantial factors or dimensions emerged; one being defined by personal standards, organization, self-oriented perfectionism, and other-oriented perfectionism and the other being defined by concern over mistakes, doubts about actions, socially prescribed perfectionism, parental expectations, and parental criticism. In addition, when responses on subscales under the two factors were separately aggregated to form measures of positive striving and maladaptive evaluation concerns, the measure of positive striving was related to measures of positive characteristics (positive affect) and unrelated to measures of negative characteristics (negative affect and depression), and the measure of maladaptive evaluation concerns was related to negative characteristics and unrelated to positive characteristics. Thus, this study did provide evidence that positive and negative aspects of perfectionism can be distinguished, although subsequent replication studies have yielded generally less clear-cut results (e.g., Bieling, Israeli, & Antony, 2004).

Despite the increasing recognition that positive and negative perfectionism can be distinguished, some researchers still have serious doubts that perfectionism can be positive, healthy, or functional (e.g., Flett & Hewitt, 2002, 2005; Greenspon, 2000). Stoeber and Otto (2006), in their review, have suggested conceptual and methodological reasons for this lack of a consensus view. Conceptually, the related research literature appears confusing in that different researchers have used different constructs or facets to arrive at their specific conceptualizations of the two forms of perfectionism. Methodologically, researchers have used either a dimensional approach (distinguishing two dimensions of perfectionism) or a group-based categorical approach (distinguishing two types of perfectionists) in studying positive and negative aspects of perfectionism.

Regarding the conceptual issues, it is understandable that most of the extant perfectionism scales, including the MPS and the FMPS, were originally developed to tap the negative rather than the positive aspects of perfectionism. It is also contentious that some scales assess constructs that could be regarded as developmental antecedents of perfectionism (e.g., parental criticism) or consequents of perfectionism (e.g., anxiety and procrastination) rather than core aspects of perfectionism per se (see Slaney, Rice, & Ashby, 2002). Thus, the use of more recently developed scales that aim to assess both positive and negative aspects as well as core constructs of perfectionism could help bring some order to the conceptual confusion. Against this background, the 23-item Almost Perfect Scale-Revised (APS-R) was developed

with the specific focus of assessing both the positive and the negative aspects of perfectionism based on a small number of core constructs (Slaney, Rice, Mobley, Trippi, & Ashby, 2001), although various studies have also suggested that there are similarities among the FMPS, MPS, and APS-R (Slaney et al., 2001; Suddarth & Slaney, 2001). The APS-R scale assesses the personal standards that respondents set for themselves, their need for order and organization, and their perception of the discrepancy between standards and performance. It also assumes that, though the setting of high standards distinguishes perfectionists from nonperfectionists, it is the perception of discrepancy between high standards and best performance that distinguishes the adaptation or maladaptation of perfectionists. This notion is largely consistent with the descriptions of normal and neurotic perfectionists by Hamachek (1978). The construct of order or organization, originally thought to be an important facet that could distinguish perfectionists from nonperfectionists, was found to add little to the contribution of high standards in classification procedures (Rice & Ashby, 2007; Suddarth & Slaney, 2001), echoing the suggestion to leave out order or organization in scoring perfectionism in the use of the FMPS (Frost et al., 1990). In summary, the APS-R construct of high standards can be used to distinguish between perfectionists and nonperfectionists, and the APS-R construct of discrepancy can be used to distinguish between healthy and unhealthy perfectionists.

Although the use of a small number of commonly recognized core constructs in studies of perfectionism could bring about greater conceptual clarity and reduce conceptual confusion, the lingering doubts about whether perfectionism has aspects that could be regarded as positive, adaptive, or functional still needs to be addressed and dispelled. Thus, the imbalance in overemphasizing the use of variables related to psychopathology (e.g., anxiety and depression), adjustment, or self-esteem as external variables to validate positive aspects of perfectionism in past studies (see Stoeber & Otto, 2006) also needs to be redressed with the use of positive constructs as external variables in future studies. Whether healthy perfectionists as a group are more positive in terms of, for example, life satisfaction and happiness than unhealthy perfectionists should warrant future investigations.

Regarding methodological issues, it is understood that the dimensional approach and the categorical approach might yield different results, but these results are often consistent and the approaches could be regarded as complementary (Chan, 2009a). For example, Stoeber and Otto (2006) suggested a conceptual framework that includes a two-dimensional space defined by two independent dimensions of perfectionistic striving and perfectionistic concerns, with nonperfectionists and healthy and unhealthy perfectionists located as points in the four quadrants of the two-dimensional space. Though the dimensional approach has the advantage of viewing individuals as having quantitative

differences in their amount of striving and concerns without assigning them to either-or categories, the categorical or classification approach has the advantage of assigning individuals to clearly defined categories to alert practitioners for appropriate interventions.

With these views, the present study was designed to expand previous findings on classifying Chinese gifted students into nonperfectionists and perfectionists (healthy and unhealthy) using APS-R constructs and examine the differences among these groups on positive outcome measures of life satisfaction and happiness. Because setting high standards and striving for excellence are often considered common and desirable among gifted and highly able students, and positive and negative perfectionism were associated with learning and performance goal orientations, respectively, in past studies with gifted students (e.g., Chan, 2009b), it was deemed appropriate to include measures on students' views on the relationships between ability and effort as an outcome variable for evaluation. Of particular relevance is Dweck's (1999) notion of self-theories, suggesting that students may hold implicit theories about intellectual ability as either fixed (entity theory) or malleable (incremental theory). Many research studies have found that these self-theories influence students' motivation and achievement (e.g., Ahmavaara & Houston, 2007; Blackwell, Trzesniewski, & Dweck, 2007; Ziegler, Fiedman, Reutlinger, Vialle, & Stoeger, 2010). Subsequently, Dweck (2006) has broadened the notion of self-theories as mindsets to cover domains beyond intellectual ability. Specifically, an individual may take on a growth mindset that values new ideas, effort, and learning or a fixed mindset that focuses on avoiding changes and challenges. Thus, it would be of great interest to compare healthy perfectionists with unhealthy perfectionists on their adoption of the two different mindsets. Finally, this study also aimed to examine whether the findings could suggest to practitioners an efficient way of identifying unhealthy perfectionists for positive intervention.

## METHOD

### Participants

A total of 251 Chinese students participated voluntarily in this study. Forty-five percent (113) of the students were from primary schools (Grades 5 to 6), and 55% (138) were from secondary schools (Grades 7 to 12). These students (141 boys and 110 girls), aged 9 to 18 ( $M = 12.68$ ,  $SD = 2.42$ ), were nominated by their schools to participate in different enrichment courses provided at the Chinese University of Hong Kong. In nominating students, schools were requested to recommend students who were judged to be gifted either intellectually (e.g., with a high IQ score) or academically (e.g., with outstanding performances in school subjects) or who had demonstrated talents in other specific

nonacademic areas. In general, this sample of participants represented students with gifts or talents in different domains and students from a broad age range. Specifically, 92% of the students were between the ages of 10 and 16.

### Measures

#### *The Almost Perfect Scale Revised*

The 23-item APS-R was used in this study. The scale can be scored into three subscales: Discrepancy (12 items), High Standards (7 items), and Order (4 items). Slaney and his colleagues (2001) reported good reliability of the APS-R subscales (Cronbach's  $\alpha = .82$  to  $.93$ ) and good concurrent validity with other perfectionism scales as well as good construct validity in relation to measures of adjustment or well-being. Specifically, the High Standards subscale correlated significantly ( $p < .05$ ) with MPS Self-Oriented Perfectionism ( $r = .55$  to  $.64$ ), with FMPS Personal Standards subscale ( $r = .64$ ), and with grade point average ( $r = .34$  to  $.42$ ). The Order subscale correlated significantly ( $p < .05$ ) with FMPS Organization subscale ( $r = .88$ ). The Discrepancy subscale correlated significantly ( $p < .05$ ) with MPS Self-Oriented Perfectionism ( $r = .23$  to  $.31$ ) and Socially Prescribed Perfectionism ( $r = .43$  to  $.45$ ), with FMPS Concerns Over Mistakes subscale ( $r = .55$ ) and Doubts About Actions subscale ( $r = .62$ ), and with Rosenberg's (1979) self-esteem measure ( $r = -.35$  to  $-.44$ ) and the Beck Depression Inventory (Beck, 1978;  $r = .49$ ).

The Chinese version employed in this study has been used in studies with Chinese elementary- or primary-school students in Hong Kong (see Chan, 2010a, 2010b). The items are in simple Chinese language readily understood by students of varying ages, including primary students. In completing the Chinese APS-R, participants responded by indicating their agreement to each of the 23 statements using a 5-point scale ranging from 1 (*least like me*) to 5 (*most like me*). The 5-point rating scale was used instead of the original 7-point scale in the English version because young students seemed to find it easier to use the 5-point scale in past studies (Chan, 2010a, 2010b).

#### *Satisfaction With Life Scale*

The 5-item Satisfaction With Life Scale (SWLS; Diener, Emmons, Larsen, & Griffin, 1985) assesses general life satisfaction as the cognitive aspect of subjective well-being. It reveals the individual's own judgment of his or her quality of life. The scale has demonstrated high internal consistency (Cronbach's  $\alpha = .87$ ), excellent 2-month test-retest reliability ( $r = .82$ ), and convergent and discriminant validity with other measures of subjective well-being, independent ratings of life satisfaction, self-esteem, clinical symptoms, neuroticism, and emotionality (Diener et al., 1985; Lucas, Diener, & Suh, 1996; Pavot & Diener, 1993). In completing the scale,



participants were requested to indicate their judgment as to whether each of the five statements was descriptive of them using a 5-point scale ranging from 1 (*least like me*) to 5 (*most like me*). A total score can be obtained by summing the five item responses, with higher scores reflecting greater life satisfaction. The SWLS has been reported to be a valid and reliable scale with Chinese adolescents (Shek, Chan, & Lee, 1997).

### *The Oxford Happiness Questionnaire*

The Chinese 8-item Oxford Happiness Questionnaire (OHQ; short-form version) was used in this study. The English version of the scale (Hills & Argyle, 2002) was first translated into Chinese and back-translated into English by two language teachers. Any discrepancies between the two English versions would suggest that the Chinese version needed to be improved, and differences were resolved through discussion to arrive at a final Chinese version. Throughout the procedure, special care was taken to ensure that the language was simple and could be readily understood by students of varying ages. Pilot-testing of the draft version with young primary-school students lent support to its use. Hills and Argyle (2002) described the development of the short form from the 29-item full version using discriminant analysis and reported high internal consistency of the full version (Cronbach's  $\alpha = .91$ ). The full version also correlated substantially and significantly ( $p < .001$ ) with life satisfaction ( $r = .77$ ), self-esteem ( $r = .81$ ), life orientation test ( $r = .79$ ), Life Regard Index ( $r = .77$ ), and Depression–Happiness Scale ( $r = .90$ ). The correlation between short and full versions was above .90 ( $r = .92$  for positive items and  $r = .94$  for negative items). In completing the Chinese scale, participants were requested to indicate their judgment as to whether each of the eight statements was descriptive of them using a 5-point scale ranging from 1 (*least like me*) to 5 (*most like me*). A total score can be obtained by summing the eight item responses (including three reverse-scored items), with higher scores reflecting greater happiness.

### *The Mindset Rating Form*

The 12-item Mindset Rating Form (MRF) comprises six statements describing the growth mindset and six statements describing the fixed mindset. The rating form was developed specifically for this study to assess Dweck's (2006) conceptualization of mindset. First, six statements in Chinese were written to reflect the growth mindset, which is characterized by openness to new ideas and challenges and the emphasis on learning and effort to effect changes. Next, six parallel statements in Chinese were written to reflect the fixed mindset, which is characterized by resistance or avoidance to change and the emphasis on ability rather than effort. Finally, the statements were scrutinized by a language teacher to ensure that all items were in simple language and readily comprehended by children and adolescents, and the rating form was

pilot-tested with children before being finalized for use in this study. In completing the rating form, participants were requested to indicate their judgment as to whether each of the 12 statements was descriptive of them using a 5-point scale ranging from 1 (*least like me*) to 5 (*most like me*). A total score on growth mindset and another one on fixed mindset can be obtained by summing the relevant item responses.

### Procedure

Students who volunteered to participate were requested to come to the university campus for assessment. Their parents had signed a consent form for their participation and were assured that the data would be kept confidential and would be used for research purposes only. All students in groups of 30 to 50 were administered a Chinese questionnaire that included the APS-R, the SWLS, the OHQ, and the MRF. Research assistants of the project were present in the testing sessions to verbally explain any items about which young students might have questions.

## RESULTS

### Perfectionism, Life Satisfaction, Happiness, and Mindset

The item responses of the 251 participants to assessment measures were first aggregated to yield scores. The APS-R, SWLS, OHQ, and MRF yielded three scores on perfectionism (Discrepancy, High Standards, and Order), one score on life satisfaction, one score on happiness, and two scores on mindset (Growth Mindset and Fixed Mindset), respectively. Table 1 shows the means and standard deviations, internal consistency, and correlation matrix of these measures. It can be seen that the coefficient alphas as indices of internal consistency of these scales were of moderate to high values, ranging from .69 to .91, suggesting that these variables were all reliably assessed. Life satisfaction and happiness correlated significantly with the perfectionism measures, positively with High Standards and Order, and negatively with Discrepancy. High Standards and Order were observed to correlate substantially and significantly with Growth Mindset and Discrepancy with Fixed Mindset. Thus, it appeared that High Standards and Order were more highly associated with the positive aspects of perfectionism, whereas Discrepancy was more highly associated with the negative aspects.

Table 1 also includes gender (as a dummy variable) and age in the correlation matrix. The pattern of significant correlations suggested that girls could be more orderly, happier, and less inclined to hold the fixed mindset. In addition, older students seemed to perceive greater discrepancy between standards and performance, were less orderly and less satisfied with life, but were less inclined to hold the fixed mindset.

TABLE 1  
Means, Standard Deviations, Internal Consistency, and Correlation Matrix of Measures on Perfectionism, Life Satisfaction, Happiness, and Mindset ( $N = 251$ )

Measure	Score range	<i>M</i>	<i>SD</i>	Coefficient alpha	1	2	3	4	5	6	7	8	9
1. Discrepancy	12–60	29.61	10.45	.91	—								
2. High Standards	7–35	24.91	6.14	.86	.31***	—							
3. Order	4–20	14.76	4.00	.89	-.02	.43***	—						
4. Life Satisfaction	5–25	16.80	4.64	.82	-.22***	.13*	.44***	—					
5. Happiness	8–40	30.13	4.93	.69	-.31***	.23***	.39***	.58***	—				
6. Growth Mindset	6–30	23.07	4.47	.76	-.10	.33***	.44***	.32***	.53***	—			
7. Fixed Mindset	6–30	13.44	4.65	.71	.41***	.17**	-.01	.07	-.22***	-.12*	—		
8. Gender	—	—	—	—	-.00	.07	.13*	.10	.13*	-.01	-.14*	—	
9. Age	—	12.68	2.42	—	.14*	-.04	-.19**	-.34***	-.09	-.07	-.13*	.12	—

Note. Discrepancy, High Standards, and Order are subscales of the Almost Perfect Scale-Revised (Slaney et al., 2001).

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

### Classifying Students into Nonperfectionist and Perfectionist Types

The empirical approach using clustering procedures was used in this study to classify students into nonperfectionists and perfectionists. Past studies have suggested that the APS-R Order subscale or the construct of order or organization was not necessary in the classification and might even lessen classification precision (see Rice & Ashby, 2007; Stoeber & Otto, 2006), and Order was found to correlate substantially and significantly with High Standards and to correlate significantly with age and gender in this study. Therefore, only the APS-R High Standards subscale and Discrepancy subscale were used in clustering, where the mean scores across items of the two subscales were used to provide a common metric and to give equal importance to the two constructs. Specifically, the  $k$ -means iterative partitioning method that applied the parallel threshold method to select the initial seed point randomly from all observations was employed to yield relative homogeneous clusters of students. The number of clusters was specified to be three to reflect the general past findings of three perfectionist types (nonperfectionists, healthy perfectionists, and unhealthy perfectionists).

The resulting three-cluster solution was interpretable as three clusters representing nonperfectionists, unhealthy perfectionists, and healthy perfectionists. Cluster 1 students ( $n = 91$ ; 36%) were characterized by relatively low scores on both High Standards ( $M = 18.52$ ) and Discrepancy ( $M = 24.04$ ), suggesting that these students could be nonperfectionists. Cluster 2 students ( $n = 74$ ; 29%) scored relatively high on both High Standards ( $M = 28.16$ ) and Discrepancy ( $M = 42.20$ ), suggesting that they could be labeled unhealthy perfectionists. Cluster 3 students ( $n = 86$ ; 34%) scored equally high on High Standards ( $M = 28.88$ ) as

Cluster 2 students but scored equally low on Discrepancy ( $M = 24.65$ ) as Cluster 1 students, suggesting that these students could be interpreted as healthy perfectionists.

Support for the distinctness of these three types based on the two APS-R constructs could be gleaned from the discriminant analysis conducted to determine whether High Standards and Discrepancy could predict membership in perfectionist types. The overall effect of the first discriminant function was significant, Wilks'  $\Lambda = .16$ ,  $\chi^2(4, N = 251) = 450.45$ ,  $p < .001$ , as was the effect of the second function after partialing out the effect of the first function, Wilks'  $\Lambda = .52$ ,  $\chi^2(1, N = 251) = 162.32$ ,  $p < .001$ . To predict perfectionist types, the correct classification rate was 98.4% for this sample of participants. The computed kappa coefficient ( $\kappa = .976$ ) also indicated high agreement. The leave-one-out procedure was also used to assess how well the classification procedure would predict in a new sample, and the correct classification rate was estimated to be 98.0%. As a further check, this set of analyses was repeated with the addition of the APS-R construct of Order as a predictor variable in the discriminant analysis. The results were virtually the same, suggesting that Order did not add to this classification.

### Differentiating Perfectionist Types on Life Satisfaction, Happiness, and Mindset

To examine whether the identified perfectionist types were associated with gender or age, the three clusters of students were cross-tabulated with gender and with grade level (primary vs. secondary). Grade level was used because it correlated highly with age ( $r = .82$ ,  $p < .001$ ). The non-significant ( $p > .05$ ) association indices, Pearson's  $\chi^2(2, N = 251) = 0.54$  and Cramer's  $V = .047$  (for gender by perfectionist type), and Pearson's  $\chi^2(2, N = 251) = 2.34$  and

Cramer's  $V = .097$  (for grade level by perfectionist type) suggested that none of the identified perfectionist types was overrepresented by boys or girls or by primary or secondary students.

To assist in and to provide support to the interpretation of the three-cluster solution as clusters for nonperfectionist, unhealthy perfectionists, and healthy perfectionists, a multivariate analyses of variance (MANOVA) was performed on the three APS-R scores as dependent variables using cluster memberships as the grouping variable. The MANOVA results indicated that the overall cluster type main effect was significant, Wilks'  $\Lambda = .16$ ,  $F(6, 492) = 121.92$ ,  $p < .001$ , partial  $\eta^2 = .598$ . Subsequent univariate analysis of variance (ANOVA) on each of the three APS-R scores was conducted as a follow-up test to the significant MANOVA overall cluster main effect. Using the Bonferroni procedure to adjust for multiple tests, each ANOVA was evaluated at the alpha value of .05/3 or .0167. The results indicated significant differences among the three cluster types on all three APS-R constructs:  $F(2, 248) = 194.78$ ,  $p < .001$ , partial  $\eta^2 = .611$  (for Discrepancy);  $F(2, 248) = 204.15$ ,  $p < .001$ , partial  $\eta^2 = .622$  (for High Standards); and  $F(2, 248) = 18.29$ ,  $p < .001$ , partial  $\eta^2 = .129$  (for Order). Post hoc paired comparisons indicated that the cluster types differed significantly from each other on these constructs. Specifically, both healthy and unhealthy perfectionists scored significantly higher on High Standards and on Order than nonperfectionists. Unhealthy perfectionists scored significantly higher on Discrepancy than healthy perfectionists and nonperfectionists. Thus, the results provide support for the idea that setting high standards did not distinguish healthy and unhealthy perfectionists but the perception of discrepancy between standards and performance did. The significant group differences are summarized in Table 2.

To explore how the perfectionist types differed from each other with respect to positive measures of life satisfaction, happiness, and mindset, two separate MANOVAs were performed using cluster memberships as the grouping variable on the SWLS and the OHQ scores as one set of dependent variables in one analysis and on the two mindset scores as another set of dependent variables in another analysis. Regarding life satisfaction and happiness, the MANOVA results indicated that the overall cluster type main effect was significant, Wilks'  $\Lambda = .95$ ,  $F(4, 494) = 2.99$ ,  $p < .05$ , partial  $\eta^2 = .024$ . Subsequent follow-up univariate ANOVAs were then conducted separately on life satisfaction and happiness, using the Bonferroni procedure to adjust for multiple tests, and each ANOVA was evaluated at the alpha value of .05/2 or .025. The results indicated that the between-group difference was significant for OHQ,  $F(2, 248) = 5.04$ ,  $p < .01$ , partial  $\eta^2 = .039$ , but not for SWLS,  $F(2, 248) = 1.28$ ,  $p = .280$ , partial  $\eta^2 = .010$ . Post hoc paired comparison indicated that healthy perfectionists scored significantly higher on OHQ than unhealthy perfectionists, suggesting

that healthy perfectionists were happiest as a group, followed by nonperfectionists, and unhealthy perfectionists were least happy. These results are also summarized in Table 2.

Regarding the two mindset variables, the MANOVA results indicated that the overall cluster type main effect was significant, Wilks'  $\Lambda = .88$ ,  $F(4, 494) = 8.24$ ,  $p < .001$ , partial  $\eta^2 = .063$ . Separate univariate ANOVAs were conducted on each of the two mindset scores as a follow-up test to the significant MANOVA overall cluster main effect. Using the Bonferroni procedure to adjust for multiple tests, each ANOVA was evaluated at the alpha value of .05/2 or .025. The results indicated significant differences among the three cluster types on both mindset scores:  $F(2, 248) = 5.25$ ,  $p < .01$ , partial  $\eta^2 = .041$  (for Growth Mindset); and  $F(2, 248) = 10.59$ ,  $p < .001$ , partial  $\eta^2 = .079$  (for Fixed Mindset). Post hoc paired comparisons indicated that the healthy perfectionists scored significantly higher on Growth Mindset than the nonperfectionists, and the unhealthy perfectionists scored significantly higher on Fixed Mindset than the healthy perfectionists and the nonperfectionists. These significant group differences are also summarized in Table 2.

### Using High Standards and Discrepancy Scores to Identify Healthy and Unhealthy Perfectionists

Because the APS-R High Standards subscale was crucial in identifying perfectionists, and the APS-R Discrepancy subscale was crucial in distinguishing unhealthy perfectionists from healthy perfectionists, a simple two-step procedure could be developed to screen for unhealthy perfectionists based on the two scores. Specifically, based on the present classification findings, students could be considered perfectionists if they scored on or above a certain cutoff score on High Standards, and perfectionists could be considered unhealthy if they scored on or above a certain cutoff score on Discrepancy. To choose optimal cutoff scores on the two APS-R subscales, receiver operating characteristic (ROC) curves of the sensitivity and specificity of various cutoff scores were examined, using the present clustering group membership results as a basis for identifying perfectionists from nonperfectionists by their High Standards scores, and for identifying unhealthy perfectionists from healthy perfectionists by their Discrepancy scores.

The first ROC analysis focused on the High Standards score to differentiate perfectionists from nonperfectionists. The score range was 7 to 35, and estimates of sensitivity and specificity were computed for scores between 7 and 36 or one point beyond the observed scores at both ends. The area under the ROC curve revealed a probability of .985 that a randomly chosen positive case would exceed the results of a randomly chosen negative case; the 95% asymptotic confidence interval was .974 to .997. Table 3 presents the sensitivity and specificity from the ROC analysis for perfectionists on the basis of High Standards cutoff

TABLE 2  
Differences on Measures of Perfectionism, Life Satisfaction, Happiness, and Mindset by Perfectionist Types

Measure	Significant Group Difference	Cluster 1 (n = 91)		Cluster 2 (n = 74)		Cluster 3 (n = 86)	
		Nonperfectionists		Unhealthy Perfectionists		Healthy Perfectionists	
		M	SD	M	SD	M	SD
Discrepancy	C2 > C1, C3	24.04	7.25	42.20	6.48	24.65	5.75
High Standards	C2, C3 > C1	18.52	3.85	28.16	4.05	28.88	3.48
Order	C2, C3 > C1	13.00	4.14	15.03	3.97	16.38	3.05
Life Satisfaction	—	17.00	4.10	16.09	4.70	17.21	5.08
Happiness	C3 > C2	29.68	4.71	29.15	4.94	31.44	4.94
Growth Mindset	C3 > C1	21.99	4.51	23.16	4.92	24.13	3.77
Fixed Mindset	C2 > C1, C3	12.38	3.84	15.43	5.31	12.85	4.32

Note. Significant group difference is based on the results from univariate analysis of variance as a follow-up of the multivariate analysis and evaluated with adjustments using Bonferroni procedures.

TABLE 3  
Sensitivity and Specificity of Almost Perfect Scale–Revised Cutoff Criteria for Perfectionists and Unhealthy Perfectionists

High Standards (To Identify Perfectionists)				Discrepancy (To Identify Unhealthy Perfectionists)			
Cutoff score	Sensitivity (True-Positive rate)	1 – Specificity (False-Positive rate)	Specificity (True-Negative rate)	Cutoff score	Sensitivity (True-Positive rate)	1 – Specificity (False-Positive rate)	Specificity (True-Negative rate)
7.00	1.000	1.000	0.000	11.00	1.000	1.000	0.000
9.00	1.000	0.978	0.022	12.50	1.000	0.977	0.023
10.50	1.000	0.967	0.033	13.50	1.000	0.965	0.035
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
22.50	0.963	0.176	0.824	32.50	1.000	0.058	0.942
23.50	0.944	0.000	1.000	33.50	1.000	0.000	1.000
24.50	0.856	0.000	1.000	34.50	0.932	0.000	1.000
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
33.50	0.138	0.000	1.000	54.50	0.081	0.000	1.000
34.50	0.081	0.000	1.000	56.50	0.027	0.000	1.000
36.00	0.000	0.000	1.000	58.00	0.000	0.000	1.000

Note. Only the bottom and top end of scoring range together with the optimal cutoff areas are shown.

score. It can be seen that a cutoff score of 23 or above to identify perfectionists would result in 94% sensitivity and 100% specificity rates (0% false-positive rate).

A second ROC analysis was similarly conducted focusing on the Discrepancy score to differentiate unhealthy perfectionists from healthy perfectionists. Estimates of sensitivity and specificity were computed between scores of 11 to 58 or one point beyond the observed score range. The area under the ROC curve revealed a probability of 1.00 that a randomly chosen positive case would exceed the result of a randomly chosen negative case. Table 3 also presents the sensitivity and specificity from the ROC analysis for unhealthy perfectionists on the basis of Discrepancy cutoff score. It can be seen that a cutoff score of 33 or above to identify unhealthy

perfectionists would result in 100% sensitivity and 100% specificity rates (0% false-positive rate).

This simple two-step classification procedure yielded 81 nonperfectionists, 74 unhealthy perfectionists, and 96 healthy perfectionists. As a further check on this two-step classification procedure against the results of the present clustering results (which yielded 91 nonperfectionists, 74 unhealthy perfectionists, and 86 healthy perfectionists), cross-tabulation was performed. The significant ( $p < .001$ ) association indices, Pearson's  $\chi^2$  (4,  $N = 251$ ) = 360.96 and Cramer's  $V = .848$ , and the kappa agreement index,  $\kappa = .838$ , with concordance rate of 89.2%, suggested that this simple procedure is an efficient procedure and a viable alternative to the clustering approach.



## DISCUSSION

This study expanded and added to the results of past studies that supported the distinction between positive and negative perfectionism in different populations (e.g., Bieling et al., 2004; Cox, Enns, & Clara, 2002; Fedewa, Burns, & Gomez, 2005; Terry-Short, Owens, Slade, & Dewey, 1995), provided further evidence for the tripartite typology of perfectionists (nonperfectionists, adaptive/healthy/normal perfectionists, and maladaptive/unhealthy/neurotic perfectionists) uncovered in different student samples (e.g., Dixon, Lapsley, & Hanchon, 2004; Hawkins, Watt, & Sinclair, 2006; Parker, 1997; Parker & Mills, 1996; Parker, Portesova, & Stumpf, 2001; Rice & Dellwo, 2002; Rice & Lapsley, 2001; Rice & Mirzadeh, 2000; Schuler, 2000), and extended the classification results to gifted students of a broad age range in the Chinese cultural setting. Specifically, this study employed the empirical clustering approach to classify Chinese gifted students based on the APS-R constructs of High Standards and Discrepancy. The resulting three clusters as three perfectionist types were found to differ from each other on positive measures of life satisfaction and happiness, lending support to the interpretation of the three types as nonperfectionists, unhealthy perfectionists, and healthy perfectionists. Although not all of these differences were statistically different, they were all in the expected direction. For example, healthy perfectionists were found to be the happiest and the most satisfied with life, and unhealthy perfectionists the least happy and the least satisfied with life, with nonperfectionists lying in between the two groups. In addition, healthy perfectionists seemed to hold more strongly the growth mindset and unhealthy perfectionists the fixed mindset, although both groups were reported to score highly on the growth mindset and all three groups reported comparatively low scores on the fixed mindset.

In summary, the present clustering approach has been useful in classifying this sample of gifted students into nonperfectionists, unhealthy perfectionists, and healthy perfectionists, and these identified groups could be differentiated by their scores on the positive outcome variables of life satisfaction, happiness, and mindset. However, this empirical approach could be regarded as sample dependent and would not serve well for practitioners who would like to screen for perfectionists and especially unhealthy perfectionists for intervention based on the administration of the APS-R. To this end, a simple user-friendly classification procedure based on the APS-R High Standards and Discrepancy scores was developed. Based on the present findings of cluster membership, a cutoff score on High Standards to screen for perfectionists and another cutoff score on Discrepancy to screen for unhealthy perfectionists were suggested. This simple sequential classification procedure yielded a relatively high concordance rate of 89% with the clustering procedure, using the suggested cutoff of 23 on High Standards and 33 on Discrepancy (with the use of a 5-point rating

scale). The equivalent cutoff scores on 7-point rating scales could be 32 and 46, suggesting that the cutoff scores for this sample of pre-university gifted students might be somewhat lower on High Standards and slightly higher on Discrepancy compared to a similar procedure developed for college students by Rice and Ashby (2007). Thus, the need for cross-replication studies with a larger and more representative sample in future studies should be emphasized.

It has to be noted that the choice of optimal cutoff scores generally depends on the purpose for classification or categorization and could be different for different purposes, different settings, and different populations. Regardless of the choice, the simple user-friendly classification procedure suggested in this study could be practically useful for practitioners who aim to identify unhealthy perfectionists and provide them with appropriate interventions to help them enhance their well-being.

The present findings also suggest that effective intervention strategies can be developed to help unhealthy perfectionist students based on understanding the relationships between perfectionism and mindsets. With a positive view on perfectionism, teachers and parents should encourage setting high standards and striving for excellence in students, because it is not this perfectionistic striving that makes perfectionists unhealthy. It is the perception of discrepancy between standards and performance driving perfectionistic concerns that make perfectionists at risk for unhappiness and dissatisfaction and turn them into unhealthy perfectionists. Unlike nonperfectionists who could lower their exceedingly high standards to a more realistic level to narrow the discrepancy, perfectionists with a fixed mindset might view changes on both standards and performance as impossible, thus reinforcing or even magnifying the discrepancy perception. Conceivably, the perfectionist who takes on a growth mindset might find discrepancy less problematic or threatening because changes in performance are possible with efforts and learning even though lowering standards is not considered the option. Thus, intervention efforts to help unhealthy perfectionists could focus on changing mindset from the relatively fixed orientation to a more growth orientation, recognizing that it is natural to have limitations and that one can still derive satisfaction from having performed one's best despite the fact that there could still be a discrepancy between desired standards and performance.

Although it is convenient to talk about taking on the growth mindset or the fixed mindset as if they are mutually exclusive, they do not have to be viewed as polar opposites of the same dimension because they only correlated moderately and negatively but significantly in the present study ( $r = -.14, p < .05$ ). In addition, this study considered global mindsets that might not be the best target for intervention. It is conceivable that a perfectionist might have a global growth mindset but a domain-specific fixed mindset such as the belief that one either has or does not have specific gifts or talents. Nonetheless, the effectiveness of

targeting mindset change, globally or domain-specifically, in intervention for unhealthy perfectionists has to await further investigation. Future studies with longitudinal data could also focus on the developmental trajectories of different perfectionist types, including the development of mindsets and related issues that could not be properly addressed in the present cross-sectional study.

In addition to the cross-sectional nature of the study, this study certainly had other limitations. An obvious one was related to the use of a sample of teacher-nominated gifted students. Thus, cross-replication with samples not restricted to teacher-nominated gifted students should be helpful in establishing the generalizability of the present findings. Another major limitation of the present study is the complete reliance on self-report data in classifying perfectionists and in validating perfectionist types. In this connection, one may also raise the question regarding the use of scales and their construct validities in cultural and language settings different from the settings in which these scales were originally developed. Nonetheless, future investigations that include the use of different perfectionism scales and interviews and anecdotal materials from teachers, parents, and peers in addition to student self-report data from multiple sites and settings could certainly help provide further insight into the nature of perfectionist types and the viable options for intervention across different cultural settings.

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### AUTHOR BIO



**David W. Chan** is Honorary Program Director of the Program for the Gifted and Talented at the Chinese University of Hong Kong. He has published in different research areas that include stress and coping, psychopathology and health, creativity and intelligence, and gifted education and talent development. E-mail: davidchan@cuhk.edu.hk