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Perfectionism and Academically Gifted Students:

A Systematic Review

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## 1 Abstract

2 Perfectionism has long been recognised as a psychological factor that can enhance or  
3 interfere with the healthy adjustment of young students who are academically gifted.  
4 However, it is apparent from existing research that a wide range of methods have been  
5 adopted to study perfectionism in this population. To identify what is currently known about  
6 perfectionism among these students and what future work needs to be undertaken, a  
7 systematic review of existing research is required. The aim of our study was to provide a first  
8 such review. In doing so, we utilised the two-factor perfectionism model which differentiates  
9 between perfectionistic strivings (PS) and perfectionistic concerns (PC). A systematic  
10 literature search returned 36 studies examining perfectionism in young students identified as  
11 academically gifted that varied in study characteristics, methodological quality, and findings.  
12 Of these studies, 24 adopted a variable-based approach to examining perfectionism (i.e.,  
13 examined PS and PC) and 12 adopted a group-based approach to examining perfectionism  
14 (i.e., examined groups with varying levels of PS and PC). The findings show that the  
15 distinction between PS and PC is extremely important. Specifically, while PC are likely to be  
16 uniformly debilitating for students who are academically gifted, PS are associated with more  
17 mixed outcomes. This is also the case when the two dimensions of perfectionism are  
18 considered in combination, with levels of PC being the key factor in determining the  
19 outcomes associated with perfectionism. Future research needs to build on the existing  
20 evidence base in a systematic fashion and prioritise longitudinal research and intervention  
21 studies.

22 *Keywords:* perfectionistic strivings, perfectionistic concerns, gifted, education

23



1 we aim to review existing research to gain a better understanding of the correlates and  
2 consequences of perfectionism among young students identified as academically gifted.

### 3 **Perfectionism**

4 Perfectionism is a multidimensional personality trait characterised by excessively  
5 high standards and overly critical self-evaluation (Frost et al., 1990). There are several  
6 models and measures that capture different aspects and dimensions of perfectionism (e.g.,  
7 Frost et al., 1990; Hewitt & Flett, 1991). To integrate different models and measures,  
8 perfectionism dimensions can be constituted into a two-factor higher-order model (Stoeber &  
9 Otto, 2006). The first dimension—perfectionistic strivings (PS)—subsumes “aspects of  
10 perfectionism associated with self-oriented striving for perfection and the setting of very high  
11 personal performance standards” (Gotwals et al., 2012, p. 264). By contrast, the second  
12 dimension—perfectionistic concerns (PC)—subsumes “aspects associated with concerns of  
13 making mistakes, fear of negative social evaluation, feelings of discrepancy between one’s  
14 expectations and performance, and negative reactions to imperfection” (Gotwals et al., 2012,  
15 p. 264). This approach is particularly useful when trying to understand and summarise  
16 research that has adopted different models and measures of perfectionism.

17 The two higher-order perfectionism dimensions can be studied by focussing on each  
18 of the two dimensions separately by using a variable-based approach or by focussing on  
19 different combinations of the two dimensions using a group-based approach. There are two  
20 main perfectionism models that consider various combinations or groupings of perfectionism.  
21 The tripartite model of perfectionism focusses on three groups of perfectionists (Parker,  
22 1997): healthy perfectionists (high PS with low PC), unhealthy perfectionists (high PS with  
23 high PC), and non-perfectionists (low PS with low PC). By contrast, the  $2 \times 2$  model of  
24 perfectionism focusses on four combinations of perfectionism dimensions (Gaudreau &  
25 Thompson, 2010): non-perfectionism (low PS with low PC), pure personal standards (high

1 PS with low PC), pure evaluative concerns (low PS with high PC), and mixed perfectionism  
2 (high PS with high PC). Both models offer a way of comparing the consequences of different  
3 groups or combinations of dimensions of perfectionism. They simply differ in relation to the  
4 number of groups or combinations they consider important.

5 Studies examining perfectionism can typically be categorised as adopting either a  
6 variable-based or a group-based approach. The identification and evaluation of perfectionism  
7 research based on this classification can help to provide a clearer understanding of how the  
8 two broad dimensions of perfectionism operate separately and in tandem. For example,  
9 Stoeber and Otto (2006) reviewed perfectionism research adopting variable-based and group-  
10 based approaches to the study of perfectionism. The first key finding of their review was the  
11 importance of distinguishing between PS and PC. This is because while PC showed  
12 consistent positive relationships with a range of maladaptive outcomes such as self-blame,  
13 anxiety, and suicide ideation, PS showed positive relationships with both adaptive (e.g.,  
14 satisfaction with life, conscientiousness, and adaptive coping styles) and maladaptive  
15 outcomes (e.g., depression, self-blame, and perceived criticism). The second key finding  
16 pertained to the group-based studies and the finding that the presence of higher PC typically  
17 coincided with the occurrence of more pronounced difficulties relating to intimacy,  
18 procrastination, and self-esteem problems.

### 19 **Perfectionism and Education**

20 Perfectionism is highly relevant to the domain of education. This is evident in  
21 research pertaining to both the prevalence and implications of perfectionism for students.  
22 Recently, for example, researchers have found evidence that perfectionism in students across  
23 North America and the UK is increasing and has been for nearly three decades (Curran &  
24 Hill, 2019). This is against a backdrop of important consequences for students. In this regard,  
25 and in line with research in other domains, research in education provides evidence regarding

1 the divergent relationships of PS and PC. That is, in students, PC typically show positive  
2 relationships with academic outcomes known to hinder successful learning (e.g., academic  
3 burnout, test anxiety, and procrastination), while PS typically show positive relationships  
4 with academic outcomes known to promote successful learning (e.g., academic adjustment,  
5 academic satisfaction, and academic self-efficacy; Osenk et al., 2020).

6 One area of research that has received considerable attention in the educational  
7 domain is the relationship between perfectionism and academic achievement (Stoeber, 2012).  
8 In this regard, early theoretical accounts suggested a complex relationship between  
9 perfectionism and performance. While some theorists conceptualised perfectionism as factor  
10 likely to impair performance (e.g., Pacht, 1984), others argued that under certain  
11 circumstances perfectionism may facilitate performance (e.g., Burns, 1980). To help provide  
12 some clarity, researchers have attempted to summarise available evidence on this relationship  
13 in education (e.g., Stoeber, 2012). The most comprehensive summary of this research is  
14 provided by Madigan (2019) who meta-analysed the findings from 37 studies ( $N = 8,901$ )  
15 examining perfectionism and academic achievement. Madigan (2019) found that PS showed  
16 a small-to-medium positive relationship with academic achievement, whereas PC showed a  
17 small negative relationship with academic achievement. This evidence is a clear signal of the  
18 relevance of perfectionism in an education context.

### 19 **Perfectionism in Students Identified as Academically Gifted**

20 The study of perfectionism in students identified as academically gifted is important  
21 for several reasons. First, the notion that perfectionism is a feature of such students pervades  
22 the gifted literature. This is evident in case study research (e.g., Schuler, 2000), handbook  
23 guides (e.g., Rice & Ray, 2018), and organisation guidelines (e.g., National Society for the  
24 Gifted and Talented; see Rice & Taber, 2018). Second, students identified as both  
25 academically gifted and highly perfectionistic have reported problematic achievement related

1 attitudes and negative emotional reactions to perceived imperfection in their academic studies  
2 (Speirs Neumeister et al., 2009). Third, many students who are gifted have accumulated a  
3 history of academic success. However, for some, this sustained success may have stifled  
4 opportunities to experience failure and disappointment (Speirs Neumeister, 2004). In this  
5 way, perfectionism has been suggested to explain the differences between those students who  
6 are more resilient and those who are not (Flett & Hewitt, 2014). In all, then, the study of  
7 perfectionism offers a great deal of insight into the unique experiences of students identified  
8 as academically gifted.

9         While perfectionism is often associated with students identified as academically  
10 gifted, the empirical evidence linking perfectionism with academic giftedness is more  
11 ambiguous. For example, while some authors have found evidence for a higher incidence of  
12 perfectionism among gifted versus non-gifted students, others have not (Rice & Ray, 2018).  
13 To help make sense of this issue, Stricker et al. (2020) conducted a meta-analytical review of  
14 ten studies ( $N = 4,340$ ) examining the incidence of perfectionism in students identified as  
15 gifted versus students identified as non-gifted. In line with the conclusions drawn from other  
16 appraisals of this literature (e.g., Rice & Ray, 2018), Stricker et al. (2020) found that students  
17 who were identified as gifted showed equal levels of PC in comparison to students who were  
18 identified as non-gifted. However, Stricker et al. (2020) did find that students identified as  
19 gifted showed elevated levels of PS. These findings provide credence to the notion that  
20 setting and striving for unrealistically high standards is a distinguishing feature of students  
21 who are academically gifted.

22         In addition to examining levels of perfectionism in students identified as academically  
23 gifted, researchers have also focussed on several other important issues pertaining to  
24 perfectionism in this population. This includes research conducted to better understand the  
25 developmental origins (e.g., parental goals; Ablard & Parker, 1997) and likely consequences

1 of perfectionism (e.g., depression; Reyes et al., 2015) in students identified as academically  
2 gifted. However, it is apparent from existing research that a wide range of different methods  
3 have been adopted to study perfectionism when doing so. For instance, how perfectionism  
4 has been measured, how giftedness has been operationalised, the types of research designs  
5 employed, and the outcomes examined vary considerably. Beyond the notion that PS are  
6 higher among students identified as academically gifted, then, the current state of research  
7 means it is difficult to build a coherent understanding of the correlates and consequences of  
8 perfectionism in this population. To identify what is currently known about perfectionism in  
9 students identified as academically gifted and what future work needs to be undertaken, a  
10 systematic review of existing research is required.

### 11 **The Present Study**

12 The aim of the study was to provide the first systematic review of research on  
13 perfectionism in students identified as academically gifted. We hope that in describing,  
14 evaluating, and summarising all available empirical research in this area, we can provide  
15 greater insight into the importance of perfectionism in this population and identify the most  
16 important areas of future research.

## 17 **Method**

### 18 **Literature Search and Inclusion Criteria**

19 To locate relevant research, we conducted a computerised search of published work  
20 using the databases PsycInfo, PsycARTICLES, Educational Administration Abstracts, and  
21 Educational Abstracts (H. W. Wilson). The search terms were perfect\* (for perfectionism,  
22 perfectionist, and perfectionistic) AND gifted. We limited the search to peer-review academic  
23 journals published in English. The span of the search was 1990 (to coincide with the  
24 publication of the first multidimensional measure of perfectionism) to 2019. The search was  
25 conducted in April 2019. In total, the search produced 159 published articles which were

1 initially reviewed in full by a co-author and then subsequently checked by the lead author.

2 While there were no disagreements between the coders, some coding discrepancies (i.e.,

3 mistakenly coded studies) were identified, discussed, and subsequently resolved.

4 In terms of the coding process, the overall aim was to identify studies that included an  
5 empirical examination of perfectionism in young students identified as academically gifted.

6 The first step in achieving this aim involved each coder reviewing the records for duplicate

7 studies to be removed ( $n = 10$ ). The next step involved screening abstracts and removing

8 studies that were unrelated to the study of perfectionism in gifted student populations ( $n =$

9 36). The remaining full-text articles were then further assessed for eligibility. Specifically,

10 studies that did not include an empirical examination of perfectionism in students identified

11 as gifted within an educational context were removed ( $n = 60$ ). For example, opinion articles,

12 review papers, and editor's notes were all removed at this stage. The last step involved

13 removing articles that focussed on perfectionism in students who were identified as

14 academically gifted but were over 18 years of age (e.g., university students;  $n = 11$ ), articles

15 that employed a qualitative research design ( $n = 3$ ), and articles that included perfectionism

16 but no criterion variables or group comparisons ( $n = 3$ ). In total, 36 eligible studies were

17 included in the systematic review. See Fig. 1 for PRISMA flow diagram (Moher et al., 2009).

## 18 **Data Extraction**

19 The identified studies were reviewed in full. To summarise these studies, the

20 following data were extracted: (a) publication information, (b) participant characteristics, (c)

21 gifted identification method, (d) study design, (e) instrument and subscales used to measure

22 perfectionism, (f) criterion variables examined, and (g) a summary of the main findings. In

23 relation to the results, we provide a brief description of the methods of gifted identification,

24 perfectionism measures used, and research designs adopted across the 36 identified studies.

25 We then provide an evaluation of the methodological quality of the identified studies and

1 evaluative summary of the main findings across studies employing variable-based and group-  
2 based approaches.

3         In line with previous reviews on perfectionism in education, we categorised  
4 perfectionism subscales as indicative of PS or PC (e.g., Madigan, 2019). We adopted an  
5 inclusive approach in which the personal standards and organisation subscales of the  
6 Multidimensional Perfectionism Scale (F-MPS; Frost et al, 1990), self-oriented perfectionism  
7 subscales of the Multidimensional Perfectionism Scale (HF-MPS; Hewitt & Flett, 1991) and  
8 Child and Adolescent Perfectionism Scale (CAPS; Flett et al., 2001), high standards and  
9 order subscales of the revised Almost Perfect Scale (APS-R; Slaney et al., 2001), and positive  
10 perfectionism subscale of the Positive and Negative Perfectionism (PNPS; Chan, 2007) were  
11 regarded as indicators of PS. By contrast, we regarded the concern over mistakes, doubts  
12 about actions, perceived parental expectations, and perceived parental criticism subscales of  
13 the F-MPS, socially prescribed perfectionism subscales of the HF-MPS and CAPS,  
14 discrepancy subscale of the APS-R, and negative perfectionism subscale of the PNPS as  
15 indicators of PC.

16         This inclusive approach to the higher-order conceptualisation of perfectionism  
17 provided a heuristic that was useful for integrating and summarising the identified research.  
18 However, it is important to highlight that while most of the identified indicators are  
19 considered core facets of the two higher-order dimensions, some indicators are regarded as  
20 peripheral facets. For example, although organisation (F-MPS) and order (APS-R) are aspects  
21 of perfectionism closely associated with PS, there is evidence that these dimensions load on a  
22 third factor independent of both PS and PC (see Kim et al., 2015; Rice et al., 2005). We  
23 include both core and peripheral facets here so to provide a comprehensive account of the  
24 available research. In addition, specific facets and measures used in each study are identified  
25 with this issue in mind.

## 1 **Methodological Quality Appraisal**

2           In line with our aim to evaluate the identified studies, we appraised the  
3 methodological quality of each study. This is an important process that provides information  
4 regarding the methodological adequacy of each study (Petticrew & Roberts, 2008). In line  
5 with previous research (e.g., Goodson et al., 2006; Lu et al., 2014; Zhang & Goodson, 2011)  
6 we evaluated several methodological characteristics and assigned an overall methodological  
7 quality score (MQS) to each study. The characteristics we selected were based on an  
8 established methodological quality instrument that was tailored for the current review (see  
9 Goodson et al., 2006). Specifically, we focussed on the following methodological  
10 characteristics: (1) operational definition of primary variable, (2) construct validity data for  
11 measure of primary variable, (3) internal reliability data for measure of primary variable, (4)  
12 internal reliability and/or construct validity data for other relevant measures, (5) theoretical  
13 framework evident in research, (6) research paradigm adopted, (7) research design adopted,  
14 (8) sample size, (9) sample design, (10) data analysis, and (11) inferences of causality (see  
15 Table 1 for full details of scoring options). We focussed on perfectionism as our primary  
16 variable and gifted students as the participants of interest.

17           In line with common recommendations (e.g., Higgins & Douglas, 2008), we  
18 conducted a pilot testing phase in which the lead author and two co-authors independently  
19 evaluated the methodological quality of a random subsample of five studies. The rates of  
20 agreement between the lead author and each of the co-authors were on average 96% and 95%  
21 per study, respectively. Importantly, all instances of coding discrepancy were revisited and  
22 discussed until a consensus was reached and the authors were satisfied that the criteria could  
23 be applied consistently. Thereafter, the lead-author used the identified scoring system to  
24 evaluate and assign an overall MQS to each study.

25

## **Results**

1           The results of the review are organised around the characteristics, methodological  
2 quality, and findings of the studies. For study characteristics, we report on the methods of  
3 gifted identification, perfectionism measures used, and research designs of the studies. For  
4 methodological quality, we report the MQS of the studies and describe what constitutes  
5 higher versus lower methodological quality among the review studies. Finally, we report on  
6 and evaluate the main findings from the studies employing both variable-based and group-  
7 based approaches to the study perfectionism in students identified as gifted.

## 8 **Study Characteristics**

9           **Gifted Identification.** The method employed to identify relevant students across the  
10 36 studies included in the review varied considerably. Here, we used the system identified by  
11 Carman (2013) to classify the different methods of gifted identification. This process  
12 identified that eight studies categorised giftedness based on school recommendation, five  
13 studies used achievement test scores, and two studies used achievement test scores in  
14 combination with previous academic achievement. The remaining 21 studies all recruited  
15 students from advanced programs or schools. The specific requirements for entry on to such  
16 programs or enrolment into such schools varied between studies. Ten studies reported that  
17 entry was based on multiple sources of gifted identification (e.g., interview, intelligence  
18 measure, and school recommendation), four studies reported that entry was based on  
19 achievement test scores, one study reported that entry was based on school recommendation,  
20 and one study reported that entry was based on previous academic achievement. Five studies  
21 did not report any identification method for entry or enrolment.

22           Some differences in gifted classification reflected the country in which the study took  
23 place. Studies in the USA typically recruited students enrolled in advanced programs and  
24 schools (14 out of 22 studies), whereas studies in China typically recruited students based on  
25 school recommendations (6 out of 7 studies). In the studies conducted outside of the USA and

1 China, which included Czech Republic ( $n = 2$ ), Australia ( $n = 2$ ), Canada ( $n = 1$ ), and  
2 Philippines ( $n = 1$ ), students were recruited from advanced programs or schools. The only  
3 cross-national study (Japan and USA) used achievement test scores and academic  
4 achievement to classify students as academically gifted.

5 **Measures of Perfectionism.** The review includes 17 studies adopting the original F–  
6 MPS and five studies adopting the Goals and Work Habits Survey (GWHS; Schuler, 2000)  
7 which is a modified version of the F–MPS. One study adopted the original HF–MPS and two  
8 studies adopted the CAPS. The review also includes six studies adopting the APS–R and two  
9 studies adopting the PNPS. The remaining three studies adopted unidimensional measures of  
10 perfectionism. Specifically, the perfectionism subscale of the Student Adjustment Problems  
11 Inventory (SAPI; Chan, 2003a) was used by Chan (2003b), the Perfectionism Questionnaire  
12 (PQ) was used by White (2007), and an unnamed perfectionism measure was used by Kline  
13 & Short (1991). We considered these measures to be indicative of overall perfectionism as  
14 opposed to either PS or PC.

15 **Study Designs.** Most studies in the review adopted a non-experimental cross-  
16 sectional research design and focused on examining relationships ( $n = 33$ ). Two of the studies  
17 adopted pre-experimental research designs. The first of which examined math performance in  
18 timed versus untimed maths tests using a within-subject randomised cross-over design. This  
19 study was relevant in the present review as it also examined whether perfectionism was  
20 related to the discrepancy in test scores between the two conditions (Tsui & Mazzocco,  
21 2007). The second study adopting a pre-experimental design examined differences between  
22 pre- and post-test emotions following experimentally induced failure on an anagram task.  
23 This study was relevant in the current review as it also examined perfectionism differences  
24 between gifted and non-gifted learners (Roberts & Lovett, 1994). The remaining study  
25 adopted a quasi-experimental research design to examine the efficacy of an affective-

1 curriculum intervention in reducing levels of PC in students identified as academically gifted  
2 (Mofield & Chakraborti-Ghosh, 2010).

### 3 **Methodological Quality of Studies**

4       The values of overall methodological quality across the identified studies were  
5 provided as a percentage of the maximum possible score per study (with higher percentages  
6 reflecting studies scoring higher methodological quality; see Table 2 and Table 3). The MQS  
7 for each study ranged from 29 to 76%. ( $M = 65%$ ,  $SD = 11%$ ). There were three studies that  
8 received the highest MQS of 76%. These studies focussed on perfectionism in relation to  
9 academic achievement (Fong & Yuen, 2009), occupational amotivation (Jung, 2013), and  
10 emotional intelligence (Chan, 2009). In these cases, the higher MQS was reflected by various  
11 methodological characteristics. For example, perfectionism was operationally defined using a  
12 validated multidimensional perfectionism scale, good internal reliability scores were provided  
13 based on the collected data for all measures, and the sample size included a large number of  
14 students identified as academically gifted.<sup>1</sup>

15       The two lowest scoring studies received an MQS of 29% and 35%. These studies  
16 focussed on perfectionism in relation to potential grade level differences (Kline & Short,  
17 1991) and overexcitability (White, 2007). In these cases, the lower MQS was also reflected  
18 by various methodological characteristics. For example, perfectionism was operationally  
19 defined using a unidimensional perfectionism measure with questionable validity evidence,  
20 good internal reliability scores were not reported based on the collected data for all measures,  
21 and the sample size included a small number of students identified as academically gifted. In  
22 the following sections, we used the MQS of each study to help evaluate the overall state of  
23 evidence in each area of research.

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<sup>1</sup> For more information on the breakdown of each MQS based on the specific methodological characteristics evaluated, please see the supplemental material (Table S1).

## 1 **Findings of Studies Employing a Variable-based Approach**

2 In the review 24 studies employed a variable-based approach to the study of  
3 perfectionism (see Table 2). To help integrate the findings across these studies, and where  
4 possible, we reported findings pertaining to PS and PC. In studies where this was not  
5 possible, we referred to perfectionism more broadly when reporting the main findings. In  
6 general, studies employing a variable-based approach assessed perfectionism in relation to at  
7 least one criterion variable. We considered the identified criterion variables as broadly  
8 reflecting domains relating to academic achievement, personality, motivation, emotion and  
9 well-being, and interpersonal relationships. However, there were a handful of studies  
10 examining variables that could not be classified into these broad domain areas. We identified  
11 these studies as focussing on perfectionism differences between specific participant groups.

12 **Academic Achievement.** Seven studies ( $n = 1773$  gifted students) examined  
13 outcomes that are relevant to academic achievement (Chan, 2003b; Fong & Yuen, 2009;  
14 Maksić & Iwasaki, 2009; Stornelli et al., 2009; Tsui & Mazzocco, 2007; Vandiver & Worrell,  
15 2002; Wang et al., 2012). This included studies examining common measures of academic  
16 achievement such as grade point average (GPA), individual test performance, and overall  
17 academic achievement based on multiple assessment scores. In addition, as various  
18 intelligence factors (e.g., general intelligence and non-verbal intelligence) have been shown  
19 to be highly correlated with academic achievement (Roth et al., 2015), studies examining the  
20 relationship between perfectionism and intelligence test scores were also included. In this  
21 category, the study by Fong and Yuen (2009) which examined the relationships between  
22 perfectionism and academic achievement received the highest MQS (76%), whereas the study  
23 by Chan (2003b) which examined the relationships between perfectionism and non-verbal  
24 intelligence received the lowest MQS (53%).

25 In terms of the main findings, the two studies examining overall perfectionism found

1 no significant relationships with the objective markers examined (Chan, 2003b; Tsui &  
2 Mazzocco, 2007). However, the studies examining PS and PC identified a divergent pattern  
3 of findings. Specifically, PC were typically unrelated or negatively related to objective  
4 achievement. By contrast, PS were typically positively related or unrelated to objective  
5 achievement. This pattern of relationships was based on bivariate correlations. One study  
6 controlled for the overlap between PS and PC when examining academic achievement. In this  
7 analysis, Fong and Yuen (2009) found that PS and PC shared stronger relationships with  
8 academic achievement once their overlap had been statistically controlled (see Table 2).  
9 Overall, based on the consistency of findings among the identified studies, there is strong  
10 evidence that perfectionism is associated with academic achievement.

11 **Personality.** Six studies ( $n = 2182$  gifted students) examined outcomes relevant to  
12 personality (Chan, 2003b; Gallucci et al., 2000; Mofield & Parker Peters, 2018; Mofield &  
13 Parker Peters, 2015a; Parker & Stumpf, 1995; White, 2007). These studies examined  
14 perfectionism in relation to outcomes including the five-factor model of personality, mindset  
15 beliefs, creative strivings, and overexcitabilities. In this category, the studies by Mofield and  
16 Parker Peters (2018, 2015a) which examined the relationships between perfectionism,  
17 mindset beliefs, and overexcitability received the highest MQS (71%), whereas the study by  
18 White (2007) which examined the relationship between perfectionism and overexcitability  
19 received the lowest MQS (35%).

20 In the studies examining multidimensional perfectionism, the findings for PC show a  
21 maladaptive profile that includes positive relationships with fixed mindset beliefs,  
22 neuroticism, and emotional overexcitabilities, as well as negative relationships with creative  
23 characteristics. By contrast, PS show a more positive profile that includes positive  
24 relationships with growth mindset beliefs, conscientiousness, creative characteristics, and  
25 intellectual overexcitabilities. The only study not differentiating between PS and PC found

1 that perfectionism was unrelated to divergent thinking but positively related to perceived  
2 interpersonal intelligence (Chan, 2003b). Overall, in this category, there is emerging evidence  
3 that perfectionism is associated with a range of personality factors in students identified as  
4 gifted.

5 **Motivation.** Seven studies ( $n = 2246$  gifted students) examined motivational  
6 outcomes. Of these studies, two included broad motivational outcomes (goal orientations and  
7 extrinsic motivation; Chan, 2008; Lyman & Luthar, 2014), four included motivational  
8 outcomes specific to education (attribution style, school achievement attitudes, academic goal  
9 orientations, and school workbook organisation; Maksić & Iwasaki, 2009; Mofield & Parker  
10 Peters, 2018; Vandiver & Worrell, 2002; Wang et al., 2012), and three included motivational  
11 outcomes focussed on the future (occupational amotivation, academic aspirations, career  
12 plans, and perceived life chances; Jung, 2013; Maksić & Iwasaki, 2009; Vandiver & Worrell,  
13 2002). In this category, the study by Jung (2013) which examined the relationship between  
14 perfectionism and occupational amotivation received the highest MQS (76%), whereas the  
15 study by Maksić and Iwasaki (2009) which examined the relationships between perfectionism  
16 and various motivational outcomes relevant to education received the lowest MQS (59%).

17 In this area of research, the findings show that PC were typically related to a more  
18 negative pattern of motivational outcomes which includes avoidance goal orientations, lower  
19 school motivation, and occupational amotivation. However, in other cases, PC were unrelated  
20 to motivational outcomes such as extrinsic motivation, school workbook organisation, and  
21 academic aspirations. By contrast, PS were consistently related to more positive motivational  
22 outcomes including learning goal orientations, favourable school achievement attitudes, and  
23 academic aspirations. One exception to this was the finding that PS was related to both  
24 performance approach and performance avoidance goal orientations (Wang et al., 2012).  
25 Overall, in this category, there is emerging evidence that perfectionism is associated with a

1 complex pattern of motivational factors in students identified as academically gifted.

2       **Emotion and Well-being.** Nine studies ( $n = 2220$  gifted students) examined  
3 outcomes relevant to emotion and well-being. Of these studies, six included a broad indicator  
4 of well-being or emotion. This included satisfaction with life, positive and negative affect,  
5 general self-efficacy, substance use, body dissatisfaction, envy, self-esteem, and depression  
6 (Chan, 2007; Lyman & Luthar, 2014; Maksić & Iwasaki, 2009; Reyes et al., 2015; Stornelli  
7 et al., 2009; Wang et al., 2012). Six of the studies also included a well-being or emotional  
8 outcome specific to education. This included academic self-concept, math anxiety, academic  
9 self-efficacy, perceived intelligence, perceived academic competence, and contingent self-  
10 worth on academics (Chan, 2003b; Fong & Yuen, 2009; Maksić & Iwasaki, 2009; Stornelli et  
11 al., 2009; Tsui & Mazzocco, 2007; Wang et al., 2012). In this category, the study by Fong  
12 and Yuen (2009) which examined the relationships between perfectionism and academic self-  
13 concept received the highest MQS (76%), whereas the study by Chan (2003b) which  
14 examined the relationships between perfectionism and perceived intelligence received the  
15 lowest MQS (53%).

16       In this area of research, the profile of findings for PC includes negative relationships  
17 with indicators of subjective well-being and self-efficacy (e.g., positive affect and academic  
18 efficacy) and positive relationships with negative emotions such as depression. By contrast,  
19 the profile of findings for PS across these studies includes positive relationships with  
20 indicators of subjective well-being and self-efficacy (e.g., life satisfaction, positive affect, and  
21 academic competence). In the only study to control for the overlap between PS and PC, Chan  
22 (2007) found further evidence for the divergent relationships between PS and PC in relation  
23 to life satisfaction, negative affect, and general self-efficacy (see Table 2). Overall, in this  
24 category, there is emerging evidence that perfectionism is associated with well-being and  
25 emotional factors in students identified as academically gifted.

1           **Interpersonal Relationships.** One study ( $n = 299$  gifted students) examined the  
2 relationships between perfectionism and a series of interpersonally relevant outcomes  
3 including alienation from parents, social interactions with others, parental depression, and  
4 sexual harassment (Lyman & Luthar, 2014). Specifically, Lyman and Luthar (2014)  
5 examined the relationships between perfectionism and these variables by gender and groups  
6 differing in socio-economic status. The most consistent finding across each subgroup analysis  
7 was that PC were positively related to alienation from mothers and fathers. In terms of  
8 methodological quality, this study received an MQS of 71%.

9           **Perfectionism Differences.** Nine studies ( $n = 1693$  gifted students) examined  
10 whether perfectionism differs between specific groups (Kline & Short, 1991; LoCicero &  
11 Ashby, 2000; Maksić & Iwasaki, 2009; Margot & Rinn, 2016; Mofield & Chakraborti-  
12 Ghosh, 2010; Mofield & Parker Peters, 2018; Roberts & Lovett, 1994; Siegle & Schuler,  
13 2000; Sondergeld et al., 2007). This included eight studies focussing on differences across  
14 gifted status, gender, grade-level, age, birth order, or nationality. The other study focussed on  
15 perfectionism change in relation to an experimental intervention (Mofield & Chakraborti-  
16 Ghosh, 2010). In this category, the studies by Mofield and Chakraborti-Ghosh (2010), Siegle  
17 and Schuler (2000), and Sondergeld et al. (2007) received the highest MQS (75%), whereas  
18 the study by Kline and Short (1991) which examined perfectionism differences by grade-  
19 level received the lowest MQS (29%).

20           In this area of research, the findings show potential perfectionism differences in  
21 relation to all the identified grouping variables. However, some differences were observed  
22 across multiple studies (e.g., studies examining gifted status; LoCicero & Ashby, 2000;  
23 Mofield & Parker Peters, 2018; Roberts & Lovett, 1994), whereas others were observed in  
24 only one study (e.g., nationality-based differences; Maksić & Iwasaki, 2009). In their  
25 experimental intervention, Mofield and Chakraborti-Ghosh (2010) found evidence to support

1 the efficacy of an affective curriculum programme in reducing levels of PC in students  
2 identified as academically gifted. Overall, in this category, there is initial evidence of  
3 potentially important perfectionism differences across specific groups and support for a  
4 specific educational intervention in reducing levels of PC in students identified as  
5 academically gifted.

### 6 **Findings of Studies Employing a Group-Based Approach**

7 In the review 12 studies employed a group-based approach to the study of  
8 perfectionism (see Table 3). In addition to the data extracted for studies employing a  
9 variable-based approach, with studies adopting a group-based approach we also documented  
10 the number, composition, and label of each perfectionism group identified. In line with  
11 previous perfectionism reviews, we reported the main differences found between each of the  
12 identified perfectionism groups (Stoeber & Otto, 2006). The main findings of these studies  
13 were classified using the same system outlined for research adopting a variable-based  
14 approach.

15 **Academic Achievement.** One study ( $n = 320$  gifted students) examined an outcome  
16 relevant to academic achievement. Specifically, Chan (2011) examined perfectionism in  
17 relation to perceived intelligence. The findings show that the healthy perfectionist and  
18 unhealthy perfectionist groups scored significantly higher than the non-perfectionist group on  
19 all perceived intelligence domains (e.g., verbal-linguistic, logical-mathematical, and  
20 naturalist intelligences). Moreover, some significant group differences were also identified  
21 between the healthy perfectionist and unhealthy perfectionist groups. Specifically, the healthy  
22 perfectionist group scored significantly higher on musical, intrapersonal, and interpersonal  
23 intelligence. In terms of methodological quality, this study received an MQS of 71%.

24 **Personality:** Three studies ( $n = 1263$  gifted students) examined perfectionism in  
25 relation to the five-factor model of personality (Parker, 1997; Portešová & Urbánek, 2013)

1 and mindset beliefs (Chan, 2012). In this category, the studies by Chan (2012) and Parker  
2 (1997) received the highest MQS (71%), whereas the study by Portešová & Urbánek (2013)  
3 received the lowest MQS (59%). In terms of the main findings, the results show that  
4 unhealthy perfectionist groups are more likely to endorse fixed mindset beliefs and report  
5 higher levels of neuroticism in comparison to other perfectionist groups. By contrast, healthy  
6 perfectionist groups are more likely to endorse growth mindset beliefs and report higher  
7 levels of extraversion, agreeableness, and conscientiousness. Overall, in this category, there is  
8 initial evidence of differences in the personality factors associated with different perfectionist  
9 groups.

10 **Emotion and Well-being:** Seven studies ( $n = 2088$  gifted students) included a  
11 criterion variable that was relevant to emotion or well-being. These studies examined how  
12 perfectionism groups differed in relation to emotional intelligence (Chan, 2009), satisfaction  
13 with life and happiness (Chan, 2012), psychological symptomology, positive adjustment,  
14 self-esteem, and coping (Dixon et al., 2004), coping strategies (Mofield & Parker Peters,  
15 2015b), maladjustment and self-esteem (Parker, 1997), health issues and maladjustment  
16 (Parker et al., 2001), and self-efficacy (Portešová & Urbánek, 2013). In this category, the  
17 study by Chan (2009) which examined differences in emotional intelligence based on  
18 perfectionism group membership received the highest MQS (76%), whereas the study by  
19 Portešová & Urbánek (2013) which examined differences in self-efficacy based on  
20 perfectionism group membership received the lowest MQS (59%).

21 In this area of research, the findings show that the healthy perfectionist groups  
22 reported more positive outcomes (e.g., increased happiness, positive adjustment, and self-  
23 esteem) and less negative outcomes (e.g., maladaptive psychological symptoms and  
24 dysfunctional coping strategies) than unhealthy perfectionist groups. The differences between  
25 unhealthy perfectionist and non-perfectionist groups varied between studies and specific

1 outcomes. For instance, the findings show that unhealthy perfectionists fared better (e.g.,  
2 reported increased levels of emotional intelligence), worse (e.g., reported decreased levels of  
3 self-esteem), or the same as non-perfectionists (e.g., reported comparative levels of  
4 happiness) depending on the specific outcome examined. Overall, in this category, there is  
5 initial evidence of differences in the emotional well-being of different perfectionist groups.

6 **Interpersonal Relationships:** Two studies ( $n = 947$  gifted students) included a  
7 criterion variable that is relevant to interpersonal relationships. One study focussed on  
8 parents' academic goals of their gifted child (Ablard & Parker, 1997) whereas the other  
9 focussed on parents' perceptions of their gifted child's adjustment, behaviours, and goals in  
10 school (Parker, 1997). In this category, the study by Parker (1997) received a higher MQS  
11 (71%), whereas the study by Ablard and Parker (1997) received a lower MQS (59%).

12 The main finding in the study by Ablard and Parker (1997) was that children of  
13 parents who endorsed performance goals were more likely to be in the unhealthy perfectionist  
14 group than children of parents who endorsed learning goals. A similar finding was also  
15 identified by Parker (1997) who found that the unhealthy perfectionist group reported higher  
16 perceptions of their parents emphasising the importance of academic and career success in  
17 comparison to other perfectionist groups. Overall, in this category, there is initial evidence of  
18 differences in the interpersonal relationships of different perfectionist groups.

19 **Perfectionism Differences:** Four studies ( $n = 1944$  gifted students) examined  
20 perfectionism group membership across demographic variables. Specifically, the studies  
21 examined whether gifted status, grade-level, gender, socio-economic status of parents, birth-  
22 order, or family size had any bearing on perfectionism group membership (Kornblum &  
23 Ainley, 2005; Parker & Mills, 1996; Parker, 1998; Parker et al., 2001). In this category, the  
24 study by Kornblum and Ainley (2005) which examined perfectionism group membership in  
25 relation to grade-level, gender, and gifted status received the highest MQS (75%), whereas

1 the study by Parker et al. (2001) which examined perfectionism group membership in relation  
2 to gifted status received the lowest MQS (63%).

3 In this area of research, the findings show potential perfectionism grouping  
4 differences in relation to all the identified demographic variables. However, some differences  
5 were examined in multiple studies and received mixed support (e.g., gifted status; Kornblum  
6 & Ainley, 2005; Parker & Mills, 1996; Parker, 1998; Parker et al., 2001), whereas others  
7 were only examined in one study (e.g., family size; Parker, 1998). Overall, in this category,  
8 there is emerging evidence of differences in perfectionism group membership corresponding  
9 to other variables.

## 10 **Discussion**

11 The aim of our study was to provide the first systematic review of research on  
12 perfectionism in students identified as academically gifted. By describing, evaluating, and  
13 summarising the available empirical research in this area, we hope to provide insight into the  
14 importance of perfectionism in this population. Based on the findings of the systematic  
15 review, below we provide a discussion of some of the key findings and critical considerations  
16 to emerge.

17 One of the most striking findings from the review was the volume of empirical  
18 research examining perfectionism in gifted learners. We identified a total of 36 studies ( $N =$   
19 10737 students) published over 24 years (1994–2018). This long and sustained examination  
20 of perfectionism in students identified as gifted is consistent with the enduring notion that  
21 perfectionism is highly relevant in this population (Rice & Taber, 2018). The most  
22 contemporary accounts of perfectionism in this area recognise perfectionism as an important  
23 psychological factor that may underpin many of the achievements and challenges  
24 encountered by students identified as academically gifted (Neihart & See Yeo, 2018; Rice &  
25 Ray, 2018; Speirs Neumeister, 2018). In this regard, the findings of the review are especially

1 noteworthy as they showcase the various achievement, personality, motivation, emotional,  
2 and interpersonal outcomes related to perfectionism in this population.

3 Another important finding of the systematic review is that the distinction between PS  
4 and PC is critical to understanding perfectionism in students identified as academically  
5 gifted. This was firstly evident in the studies employing a variable-based approach. In line  
6 with previous reviews, PC were consistently related to maladaptive outcomes in students  
7 identified as academically gifted (Stoeber & Otto, 2006). This included positive relationships  
8 with neuroticism, depression, and alienation from parents, as well as negative relationships  
9 with achievement motivation, self-esteem, and creative strivings. By contrast, PS were  
10 related to both adaptive and maladaptive outcomes. This included positive relationships with  
11 objective performance markers such GPA, positive motivational orientations such as  
12 performance approach goals, and subjective well-being such as life satisfaction. However, PS  
13 was also negatively related to happiness and motivation to function creatively. In general,  
14 these findings suggest that aspects of perfectionism indicative of PC are likely to interfere  
15 with the healthy adjustment and performance of gifted learners, whereas aspects indicative of  
16 PS are more mixed.

17 The studies employing a group-based approach provided further evidence regarding  
18 the importance of distinguishing between PS and PC. Specifically, in line with previous  
19 reviews focussing on the tripartite model, the presence of higher PC contributed to more  
20 debilitating emotional and well-being related outcomes (Stoeber & Otto, 2006). This was  
21 demonstrated in significant group differences identified between unhealthy perfectionists and  
22 healthy perfectionists on outcomes including happiness, adjustment issues, and self-esteem.  
23 In relation to the other group comparisons specific to the tripartite model, the findings were  
24 more ambiguous. In line with Stoeber and Otto's (2006) review, healthy perfectionists fared  
25 better than non-perfectionists on outcomes such as problem solving, agreeableness, and self-

1 esteem. However, in other cases, these groups were also found to share comparative levels of  
2 depression, adjustment issues, and dysfunctional coping mechanisms. The group comparisons  
3 between unhealthy perfectionists and non-perfectionists were similarly mixed. Unhealthy  
4 perfectionists fared worse than non-perfectionists on outcomes such as self-esteem,  
5 depression, and neuroticism, but better than non-perfectionists on outcomes such as  
6 emotional intelligence, perceived intelligence, and problem solving. Despite these mixed  
7 findings, the group-based studies show that the presence of higher PC typically coincides  
8 with the occurrence of more pronounced difficulties in students identified as academically  
9 gifted.

#### 10 **Critical Considerations and Future Research**

11       The first critical consideration relates to the identification of students identified as  
12 academically gifted. In keeping with previous reviews, our findings show considerable  
13 heterogeneity in the methods used to identify and operationalise giftedness (Carman, 2013).  
14 The most common method of recruitment across the studies identified was via advanced  
15 programs or schools. However, as identified in previous gifted literature, there were salient  
16 study-to-study differences in the methods of identification used to grant enrolment or entry  
17 into such programs (see Hertzog, 2009). This diversity means that there may be substantial  
18 differences in the key characteristics or strengths used to identify these students as gifted. On  
19 this basis, some caution is required when comparing and aggregating findings across the  
20 studies. The most basic step researchers could follow to help alleviate some of these issues in  
21 future work is to follow common reporting guidelines. In this regard, we believe that the  
22 recruitment and identification considerations and methods laid forth by Carman (2013)  
23 provide the foundations for a common approach.

24       The second critical consideration relates to the measurement of perfectionism in  
25 research among students identified as academically gifted. In line with previous observations,

1 we identified a range of self-report measures used to assess perfectionism in this population  
2 (Rice & Ray, 2018). Most of the identified studies adopted valid and reliable measures  
3 commonly used to assess multidimensional perfectionism. However, this was not always the  
4 case with many studies also employing measures with more questionable validity (e.g.,  
5 PNPS; Chan, 2007) and/or measures of unidimensional perfectionism (e.g., PQ; White, 2007)  
6 that are typically discouraged (see Flett & Hewitt, 2020). In line with the scoring options  
7 assigned in our assessment of methodological quality, we advocate that researchers adopt  
8 valid and reliable multidimensional scales that can be integrated into commonly adopted  
9 perfectionism frameworks such as the higher-order model of perfectionism. This will ensure  
10 best measurement practices and provide further scope for organising and integrating findings  
11 across this expanding area of research. In line with the recommendation of Rice and Ray  
12 (2018), researchers should also consider using alternative methodological approaches such as  
13 informant reports from parents or teachers to supplement the information provided by self-  
14 report scales.

15         The third critical consideration relates to the requirement for researchers to build on  
16 existing research in a more systematic manner. In the review, it is evident that a systematic  
17 approach is evident in areas focussing on perfectionism and objective academic achievement,  
18 perfectionism and self-esteem, and perfectionism and personality. It is also evident that some  
19 researchers have sustained an interest in and pursued important issues relating to  
20 perfectionism in this population over several years (Ablard & Parker, 1997; Parker & Mills,  
21 1996; Parker & Stumpf, 1995; Parker 1997, 1998; Parker et al., 2001). However, there are  
22 also areas and research questions identified in the current review that warrant further  
23 sustained scrutiny and examination. This is evident in the current review with multiple  
24 criterion variables that have only been examined in one study (e.g., depression, contingent  
25 self-worth, and alienation from parents). The importance of developing systematic lines of

1 inquiry of key issues relating to perfectionism is critical in developing a coherent body of  
2 work with potential to influence gifted practices and policy.

3         The fourth critical consideration relates to the research designs that have been adopted  
4 to study perfectionism in students identified as academically gifted. Our main observation  
5 was that most studies identified in the current review adopted a non-experimental cross-  
6 sectional design. This is a common feature of perfectionism research that has been noted in  
7 reviews beyond gifted education (Stoeber & Otto, 2006). Specifically, in line with the scoring  
8 options assigned in our evaluation of methodological quality, we recommend that researchers  
9 adopt longitudinal research designs to examine perfectionism in students identified as  
10 academically gifted. Such designs are needed to provide further clarity regarding the likely  
11 antecedents, consequences, and reciprocal effects of perfectionism which are currently  
12 difficult to disentangle using existing research. In educational psychology, the importance of  
13 longitudinal research is exemplified in two recent studies showing that academic  
14 achievement, academic efficacy, and school satisfaction are potentially important antecedents  
15 of perfectionism (Damian et al., 2017; Stricker et al, 2019b). These findings are noteworthy  
16 as previous cross-sectional research has considered such variables as outcomes rather than  
17 antecedents of perfectionism.

18         The final critical consideration relates to the requirement for researchers in this field  
19 to develop and examine intervention strategies aimed at reducing levels of perfectionism in  
20 students identified as academically gifted. Based on this review and previous appraisals of  
21 research, there is compelling evidence that elevated levels of PC are likely to undermine the  
22 healthy adjustment of students who are academically gifted (Rice & Ray, 2018). However,  
23 despite the accumulating evidence base, only one intervention study was identified in the  
24 review (Mofield & Chakraborti-Ghosh, 2010). This study found evidence to support the  
25 efficacy of an affective curriculum intervention in reducing levels of PC. Given the

1 prominence of PC in determining the consequences of being perfectionistic for students  
2 identified as academically gifted, this is a standout study that practitioners and researchers in  
3 this area need to be aware of. It provides an important touchstone for future intervention work  
4 and other curriculum-based programmes aimed at reducing PC. Developing and examining  
5 such primary prevention strategies for perfectionism is the most important area for future  
6 research in the gifted.

### 7 **Limitations**

8         There are several limitations of the present review which should be considered when  
9 interpreting the findings. One limitation is that we were unable to statistically evaluate the  
10 strength of effect sizes between perfectionism and the specified criterion variables using a  
11 meta-analytical technique. This was not possible as most identified variables were examined  
12 in less than three studies (Borenstein et al., 2009). Similarly, it was also difficult to comment  
13 on whether the major findings identified differed depending upon which indicators of PS or  
14 PC were examined. While evidence of functional homogeneity exists among the various  
15 subdimensions of the two-factor perfectionism model (Gaudreau and Verner-Filion, 2012), it  
16 is important to note that different indicators represent different aspects of perfectionism and  
17 that some dimensions are not necessarily interchangeable (see Stricker et al., 2019a). This is  
18 particularly important to mention in context of the inclusive approach we adopted to  
19 identifying indicators of PS and PC. A further issue relates to our evaluation of  
20 methodological quality. While the information we generated helped us to evaluate the state of  
21 evidence when examining a specific body of research, it is important to note that the overall  
22 MQS assigned to each study provides only a simplistic overview of methodological quality.  
23 The final limitation is that the review does not include information and findings from  
24 unpublished dissertations or other forms of grey literatures. This is an important issue due to  
25 evidence of publication bias in educational psychology (Chow & Ekholm, 2018).

## 1 **Conclusion**

2           Perfectionism has long been recognised as a psychological factor that can enhance or  
3 interfere with the healthy adjustment of students identified as academically gifted (Neihart &  
4 See Yeo, 2018). The findings of our review support this notion and provide important  
5 insights regarding the divergent roles of PS and PC. Specifically, while PC are likely to be  
6 uniformly debilitating for students identified as academically gifted, PS are more mixed and  
7 may under some circumstances coincide with some benefits such as increased academic  
8 achievement. This is the case when dimensions of perfectionism are considered separately  
9 and in combination. Future research needs to build on this existing evidence base in a  
10 systematic fashion and prioritise longitudinal research and intervention studies.

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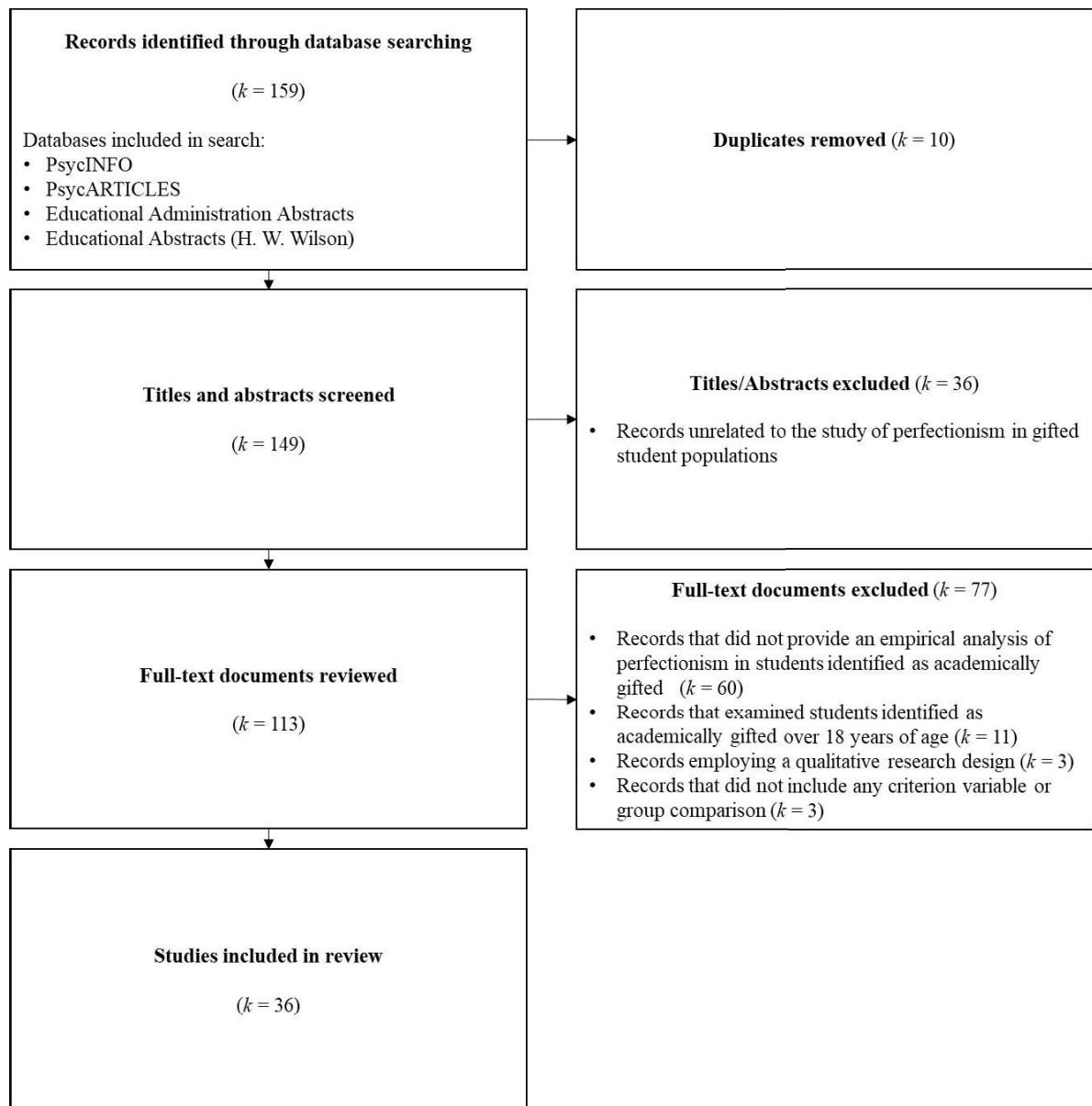
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Fig. 1 PRISMA Flow Diagram.



**Table 1. Criteria for assessment of methodological quality and frequency distributions for each characteristic among the 36 reviewed studies**

Methodological characteristics	Scoring Options (Maximum total score = 17 points)	Distribution of characteristics	
		Frequency (k)	Percent (%)
(1) Operational definition of primary variable	<ul style="list-style-type: none"> <li>• Unidimensional definition = 1 point</li> <li>• Multidimensional definition = 2 points</li> </ul>	<ul style="list-style-type: none"> <li>• 3</li> <li>• 33</li> </ul>	<ul style="list-style-type: none"> <li>• 8%</li> <li>• 92%</li> </ul>
(2) Construct validity data for measure of primary variable	<ul style="list-style-type: none"> <li>• Measure has not been found (based on own or previous data) to demonstrate meaningful relationships with other established measures of target variable = 0 points</li> <li>• Measure has been found (based on own or previous data) to demonstrate meaningful relationships with other established measures of target variable = 1 point</li> </ul>	<ul style="list-style-type: none"> <li>• 5</li> <li>• 31</li> </ul>	<ul style="list-style-type: none"> <li>• 14%</li> <li>• 86%</li> </ul>
(3) Internal reliability data for measure of primary variable	<ul style="list-style-type: none"> <li>• No evidence reported (based on own data) to support reasonable internal reliability of measure(s) = 0 points</li> <li>• Evidence reported (based on own data) to support reasonable internal reliability of measure(s) = 1 point</li> </ul>	<ul style="list-style-type: none"> <li>• 13</li> <li>• 23</li> </ul>	<ul style="list-style-type: none"> <li>• 36%</li> <li>• 64%</li> </ul>
(4) Internal reliability and/or construct validity data for other relevant measures	<ul style="list-style-type: none"> <li>• No evidence reported (based on own data) to support reasonable internal reliability and/or construct validity of measure(s) (as described above) = 0 points</li> <li>• Evidence reported (based on own data) to support reasonable internal reliability and/or construct validity of measure(s) (as described above) = 1 point</li> <li>• Not applicable to study = NA</li> </ul>	<ul style="list-style-type: none"> <li>• 13</li> <li>• 13</li> <li>• 10</li> </ul>	<ul style="list-style-type: none"> <li>• 36%</li> <li>• 36%</li> <li>• 28%</li> </ul>
(5) Theoretical framework evident in research	<ul style="list-style-type: none"> <li>• Authors do not provide rationale for studying perfectionism = 0 points</li> <li>• Authors provide rationale for studying perfectionism based on theory and/or empirical research = 1 point</li> </ul>	<ul style="list-style-type: none"> <li>• 2</li> <li>• 34</li> </ul>	<ul style="list-style-type: none"> <li>• 6%</li> <li>• 94%</li> </ul>
(6) Research paradigm adopted	<ul style="list-style-type: none"> <li>• Quantitative paradigm = 1 point</li> <li>• Mixed methods paradigm = 2 points</li> </ul>	<ul style="list-style-type: none"> <li>• 36</li> <li>• 0</li> </ul>	<ul style="list-style-type: none"> <li>• 100%</li> <li>• 0%</li> </ul>
(7) Research design adopted	<ul style="list-style-type: none"> <li>• Cross-sectional/Non-experimental = 1 point</li> <li>• Longitudinal/Experimental = 2 points</li> </ul>	<ul style="list-style-type: none"> <li>• 33</li> <li>• 3</li> </ul>	<ul style="list-style-type: none"> <li>• 92%</li> <li>• 8%</li> </ul>
(8) Sample size	<ul style="list-style-type: none"> <li>• Gifted students in sample &lt; 100 = 1 point</li> <li>• 100 &lt; Gifted students in sample &lt; 300 = 2 points</li> <li>• Gifted students in sample &gt; 300 = 3 points</li> </ul>	<ul style="list-style-type: none"> <li>• 9</li> <li>• 12</li> <li>• 15</li> </ul>	<ul style="list-style-type: none"> <li>• 25%</li> <li>• 33%</li> <li>• 42%</li> </ul>
(9) Sample design	<ul style="list-style-type: none"> <li>• Convenience/nonprobability = 0 points</li> <li>• Random/probability but not nationally representative = 1 point</li> <li>• Random/probability and nationally representative = 2 points</li> </ul>	<ul style="list-style-type: none"> <li>• 36</li> <li>• 0</li> <li>• 0</li> </ul>	<ul style="list-style-type: none"> <li>• 100%</li> <li>• 0%</li> <li>• 0%</li> </ul>
(10) Data analysis	<ul style="list-style-type: none"> <li>• Inappropriate analytical strategy = 0 points</li> <li>• Appropriate analytical strategy = 1 point</li> </ul>	<ul style="list-style-type: none"> <li>• 0</li> <li>• 36</li> </ul>	<ul style="list-style-type: none"> <li>• 0%</li> <li>• 100%</li> </ul>
(11) Inferences of causality	<ul style="list-style-type: none"> <li>• Causal language is inconsistent with methodological design = 0 points</li> <li>• Causal language is consistent with methodological design = 1 point</li> </ul>	<ul style="list-style-type: none"> <li>• 2</li> <li>• 34</li> </ul>	<ul style="list-style-type: none"> <li>• 6%</li> <li>• 94%</li> </ul>

**Table 2.** *Research adopting a variable-based approach to the study of perfectionism in gifted students.*

Study	Sample(s)	Gifted Status	Design	Instru.	PS	PC	Criterion Variables	Main Findings	MQS
Chan (2003b)	639 Gifted Students (50.23% females; $M_{age} = 13.16$ , $SD = 1.77$ ; China)	Enrolled in advanced program/school (based on school recommendation)	Non-experimental / Cross-sectional	SAPI	-	-	Divergent thinking; Non-verbal intelligence; Multiple (perceived) intelligences	Perfectionism significantly predicted by interpersonal intelligence ( $r = 2.33^*$ ); No significant perfectionism differences were found between non-verbal intelligence (high versus low) and divergent thinking (high versus low) subgroups.	9 (53%)
Chan (2007)	317 Gifted Students (40.38% females; $M_{age} = 11.62$ , $SD = 2.42$ ; China)	School recommendation	Non-experimental / Cross-sectional	PNPS	PP	NP	Satisfaction with life; Positive and negative affect; General self-efficacy	PS significantly associated with life satisfaction ( $r = .29^{***}$ ), positive affect ( $r = .49^{***}$ ), negative affect ( $r = -.16^{**}$ ), and general self-efficacy ( $r = .58^{***}$ ); PC was significantly associated with positive affect ( $r = .10^*$ ), negative affect ( $r = .34^{***}$ ) and general self-efficacy ( $r = .14^*$ ); When controlling for overlap between the two perfectionism dimensions, PS significantly predicted life satisfaction ( $r = .5.47^{***}$ ), positive affect ( $r = 10.15^{***}$ ), negative affect	12 (71%)

Chan (2008)	315 Gifted Students (40.63% females; $M_{age} = 11.63$ , $SD = 2.42$ ; China)	School recommendation	Non-experimental / Cross-sectional	PNPS	PP	NP	Goal orientation (learning, performance, social, and avoidance)	PS significantly predicted by learning goals ( $t = 5.72^{***}$ ) and social goals ( $t = 5.88^{***}$ ); PC significantly predicted by performance goals ( $t = 7.98^{***}$ ) and avoidance goals ( $t = 4.56^{***}$ )	12 (71%)
Fong & Yuen (2009)	331 Gifted Students (51.40% females; Age = 9–13 years; China)	Enrolled in advanced program/school	Non-experimental / Cross-sectional	APS-R	HS;	DIS	Self-concept (reading and math); Academic achievement	PS positively associated with academic achievement ( $r = .31^{***}$ & $.14^*$ ); PC was negatively associated with academic achievement ( $r = -.32^{***}$ ); When controlling for overlap between the three perfectionism dimensions, PS (HS only) positively predicted academic achievement ( $\beta = .40^{***}$ ) and PC negatively predicted academic	13 (76%)

Gallucci et al. (2000)	44 Gifted Students (40.91% females; Age = 12–16 years; USA)	Enrolled in advanced program/school (entry based on achievement test scores)	Non-experimental / Cross-sectional	F-MPS	PS; O	COM ; DAA ; PE; PCrit	Creative strivings	achievement ( $\beta = -.38^{***}$ ) PS (O), PC (DAA & PCrit), and overall perfectionism significantly associated with motivation to function creatively ( $r = -.43^{**}$ , $-.51^{**}$ , $-.42^{**}$ , and $-.33^{**}$ ); PS (PStan) significantly associated with proxy measure of creative behaviour ( $r = .31^{**}$ )	9 (53%)
Jung (2013)	687 Gifted Students (48% females; $M_{\text{Age}} = 15.22$ , $SD = .91$ ; AUS)	Enrolled in advanced program/school (entry based on multiple forms of gifted identification)	Non-experimental / Cross-sectional	F-MPS	-	CMD	Occupational amotivation	PC significantly predicted occupational amotivation ( $\beta = .34$ )	13 (76%)
Kline & Short (1991)	89 Gifted Students (100% female; 6 <sup>th</sup> –12 <sup>th</sup> Grade; USA)	Enrolled in advanced program/school (entry based on school recommendation)	Non-experimental / Cross-sectional	-	-	-	Grade Level	Older students had higher levels of perfectionism in comparison to younger students	5 (29%)

	195 students (42.56% Gifted Students; 58.97% females; $M_{age} = 13.90$ ; USA)	Enrolled in advanced program/school (entry based on multiple forms of gifted identification)	Non-experimental / Cross-sectional	APS-R HS	DIS	Gifted Status	Gifted Students had higher PS and lower PC in comparison to non-gifted students	10 (63%)
LoCicero & Ashby (2000)								
Lyman & Luthar (2014)	<b>Sample A:</b> 158 students (low- SES high school)	Enrolled in advanced program/school	Non-experimental / Cross-sectional	F-MPS -	PE; PCrit	Internalizing and externalizing domains; Substance use; Mastery and relatedness; Alienation from parents; Parent depression; Social interactions; Sexual harassment; Envy; Body dissatisfaction; Goal orientation	PC significantly associated with various criterion variables in low-SES and high-SES students (e.g., alienation from parents, $r =$ .29* to .65***)	12 (71%)
Maksić &	<b>Overall Sample:</b> 299 students (63% females; 11 <sup>th</sup> –12 <sup>th</sup> Grade; USA)	Achievement test	Non-experimental	F-MPS PStan;	COM	Self-esteem; Perceived	PC (COM, DAA, & PE) and overall	10 (59%)





	gifted identification)							
Parker & Stumpf (1995)	855 Gifted Students (37.50% females; 6 <sup>th</sup> Grade; USA)	Achievement test scores	Non-experimental / Cross-sectional	F-MPS O	PStan; COM ; DAA ; PE; PCrit	Personality (Five-factor model)	Evidence for the hierarchical structure of the F-MPS; Two higher-order factors were identified (PS and PC); PS significantly associated with various five-factor personality traits (e.g., conscientiousness, $r = .36^{***}$ to $.56^{***}$ ); PC significantly associated with various five-factor personality traits (e.g., neuroticism, $r = .09$ to $.43^{***}$ )	12 (71%)
Reyes et al. (2015)	173 gifted students (38.15% females; $M_{age} = 15.09$ ; $SD = 1.29$ ; PHL)	Enrolled in advanced program/school	Non-experimental / Cross-sectional	CAPS SOP	SPP	Depression	PC significantly associated with depression in both males ( $r = .25^*$ ) and females ( $r = .26^{**}$ )	10 (59%)
Roberts & Lovett (1994)	60 students (33.33% Gifted Students, 7 <sup>th</sup> –8 <sup>th</sup> Grade; USA)	Enrolled in advanced program/school	Quasi-experimental	HF-MPS	-	Gifted status; Gender	Gifted students had significantly higher levels of PS in comparison to academic high achievers and nongifted students	10 (63%)

Siegle & Schuler (2000)	391 Gifted students (57.03% females, 6 <sup>th</sup> –8 <sup>th</sup> Grade; USA)	Enrolled in advanced program/school (entry based on academic achievement)	Non-experimental / Cross-sectional	GWHS	PStan; O	COM ; PE; PCrit	Grade level; Birth order; Gender	Evidence for a five-factor GWHS; Females had significantly higher levels of PS (O) in comparison to males; Males had significantly higher levels of PC (PE) in comparison to females; First born students had significantly higher levels of PC (PE & PCr) in comparison to students with older siblings	12 (75%)
Sondergel d et al. (2007)	402 gifted students (55.47% females, 6 <sup>th</sup> –8 <sup>th</sup> Grade; USA)	School recommendation	Non-experimental / Cross-sectional	F-MPS	PStan; O	COM ; DAA PEC	Grade level; Birth order; Gender	Evidence for a five-factor F-MPS; Females had significantly higher levels of PS (O) in comparison to males; Middle children had significantly higher levels of PC (DAA) in comparison to oldest and youngest born children	12 (75%)
Stormelli et al. (2009)	281 students (30.60% gifted students; 56.23% females, 4 <sup>th</sup> & 7 <sup>th</sup> Grade; CAN)	Enrolled in advanced program/school	Non-experimental / Cross-sectional	CAPS	SOP	SPP	Perceived academic competence; Positive and negative affect; Academic achievement	Gifted students: PS and PC significantly associated with elevated maths scores ( $r = .26^* \& .33^*$ ) and reduced levels of happiness ( $r = -.23^* \& -.25^*$ ); PS positively associated with self-reported academic competence ( $r = .22^*$ ); PC significantly associated with	10 (59%)

												elevated levels of sadness ( $r = .26^{**}$ ) and fear ( $r = .24^{**}$ )
Tsui & Mazzocco (2007)	36 Gifted Students (44% females, $M_{age} = 11.70$ years; $SD = .38$ ; USA)	Enrolled in advanced program/school (entry based on achievement test scores)	Quasi-experimental	F-MPS O	PStan; DAA	COM ;	Math performance; Math anxiety	PS was unrelated to math anxiety; PC (COM, DAA, & PCrit) and overall perfectionism positively associated with math anxiety ( $r = .59^{***}$ , $.49^{**}$ , $.50^{**}$ , & $.50^{**}$ ); The discrepancy between timed versus untimed maths test performance was smaller in students with higher levels of overall perfectionism (compared to students with lower levels of overall perfectionism)	10 (59%)			
Vandiver & Worrell (2002)	342 Gifted Students (52% females; $M_{age} = 13.19$ ; $SD = .77$ ; USA)	Enrolled in advanced program/school (entry based on multiple forms of gifted identification)	Non-experimental / Cross-sectional	APS-R ORD	HS; DIS	Perceived life chances; GPA; Organisation	Evidence for the psychometric properties of the APS-R; PS and PC shared divergent relationships with GPA (PS & GPA, $r = .11$ to $.33^{***}$ ; PC & GPA, $r = -.19^*$ to $-.26^{**}$ ) organisation (PS & organisation, $r = .29^{***}$ to $.57^{***}$ ; PC & organisation, $r = -.08$ to $-.13$ ), and future goal completion (PS & future goal completion, $r = .22^{**}$ to $.51^{***}$ ; PC &	12 (71%)				

Wang et al. (2012)	144 Gifted Students (60.42% females; 6 <sup>th</sup> –12 <sup>th</sup> Grade; USA)	Enrolled in advanced program/school (entry based on multiple forms of gifted identification)	Non-experimental / Cross-sectional	APS-R	HS	DIS	Academic goal orientation; Academic self-efficacy; Contingent self-worth on academics; Satisfaction with life	PS and PC significantly associated with mastery ( $r = .50^{***}$ & $-.14$ ), performance approach ( $r = .29^{**}$ & $.24^{**}$ ), performance avoidance ( $r = .22^*$ & $.35^{***}$ ), academic efficacy ( $r = .59^{***}$ & $-.27$ ), contingent self-worth on academics ( $r = .45^{***}$ & $.10$ ), satisfaction with life ( $r = .27^{***}$ & $-.40^{***}$ ), and GPA ( $r = .38^{***}$ & $r = -.24$ )	12 (71%)
White (2007)	98 students (72.45% Gifted Students; 51.02% females; Age = 12–18 years; USA)	Achievement test scores / Academic achievement	Non-experimental / Cross-sectional	PQ			Overexcitability	Perfectionism significantly associated with sensual ( $r = .34^{**}$ ), intellectual ( $r = .41^{***}$ ), imaginal ( $r = .30^{**}$ ), and emotional ( $r = .65^{***}$ ) overexcitabilities	6 (35%)

Note. Instru. = Instrument, PS = perfectionistic strivings, PC = perfectionistic concerns; SAPI = Student Adjustment Problems Inventory (Chan, 2003a), PNPS = Positive and Negative

Perfectionism Scale (Chan, 2007), APS-R = Almost Perfect Scale–Revised (Slaney et al., 2001), F-MPS = Multidimensional Perfectionism Scale (Frost et al., 1990), GWHS = Goals and Work

Habits Survey (Schuler, 2000), CAPS = Child and Adolescent Perfectionism Scale (Flett et al., 1997), HF-MPS = Multidimensional Perfectionism Scale (Hewitt & Flett, 1991), PQ =

Perfectionism Questionnaire (White, 2007); PP = Positive perfectionism, NP = Negative perfectionism, HS = High standards, ORD = Order; DIS = Discrepancy; PStan = Personal standards, O

= Organisation; COM = Concern over mistakes; DAA = Doubts about actions; CMD = Concern over mistakes and doubts; PE = Parental expectations, PCrit = Parental criticism, PEC = Parental expectations and criticism, SOP = Self-oriented perfectionism, SPP = Socially prescribed perfectionism; GPA = grade point average; MQS = Methodological Quality Score; The MQS is provided as a total score and percentage of maximum possible score per study (in parentheses); \*  $p < .05$ ; \*\*  $p < .01$ ; \*\*\*  $p < .001$

**Table 3.** *Research adopting a group-based approach to the study of perfectionism in gifted students.*

Study	Sample(s)	Gifted Status	Design	Instru	Groups	Main Criterion Variables	Main Findings	MQS
Ablard & Parker (1997)	127 Gifted Students (44% females; 6 <sup>th</sup> Grade; USA)	Achievement test scores	Non-experimental / Cross-sectional	F-MPS	• HP • DP • NP	Parents academic goals for child (Performance/Learning goals; Dweck, 1986)	(a) Children of performance goal parents more likely to be in the DP group <i>versus</i> children of learning goal parents	10 (59%)
Chan (2009)	380 Gifted Students (40.79% females; $M_{age} = 12.19$ , $SD = 2.18$ ; China)	School recommendation	Non-experimental / Cross-sectional	F-MPS	• HP (↑PStan, ↑O, ↓CMD, ↓PCrit) • UP (↑PS, ↑CMD, ↑PE, emotions) • NP (↓PStan, ↓CMD, ↓PE, ↓PCrit, ↓O)	Emotional intelligence (social skills, self-management of emotions, empathy, and utilisation of emotions)	(a) HP > UP > NP (emotional intelligence)	13 (76%)
Chan (2011)	Sample A: 882 students (45.69%	School recommendation	Non-experimental / Cross-sectional	APS-R	• HP (↑HS, ↑ORD, ↓DIS)	Perceived Intelligences (verbal-linguistic, musical, logical-mathematical, visual-	(a) HP > UP > NP (musical, intrapersonal, & interpersonal) (b) HP, UP > NP (verbal-linguistic,	12 (71%)



Dixon et al. (2004)	142 Gifted Students (60.09% females; $M_{age}$ = 15.97, $SD$ = .41; USA)	Enrolled in advanced program/school (entry based on multiple forms of gifted identification)	Non- experimental / Cross-sectional	F-MPS	• Mx-Ad ( $\uparrow$ PStan, $\uparrow$ PE, $\uparrow$ O, $\downarrow$ COM, $\downarrow$ DAA, $\downarrow$ PCrit)	Psychological symptomology; Positive adjustment; Self-esteem (Academic competence; Personal security); Coping (problem-focussed/emotion- focussed/dysfunctional)	(a) PP, Mx-Mal > Mx-Ad, NP (negative psychological symptoms, adjustment issues, & dysfunctional coping mechanisms)	12 (71%)
					• Mx-Mal ( $\uparrow$ COM, $\uparrow$ DAA, $\uparrow$ PE, $\uparrow$ PCrit, $\rightarrow$ PStan, $\downarrow$ O)			
					• PP ( $\uparrow$ PStan, $\uparrow$ COM, $\uparrow$ DAA, $\uparrow$ PE, $\uparrow$ PCrit, $\uparrow$ O)			
					• NP ( $\downarrow$ PStan, $\downarrow$ COM, $\downarrow$ DAA, $\downarrow$ PE, $\downarrow$ PCrit, $\downarrow$ O)			

Komblum & Ainley (2005)	612 students (59.80% Gifted)	Enrolled in advanced program/school (entry based on multiple forms of gifted identification)	Non-experimental / Cross-sectional	F-MPS	HP (↑PStan, ↑O, ↓CMD, ↓PEC)	Gifted status; Grade level; Gender	(a) HP, DP, & NP groups identified	12 (75%)
	Students; 28.27% females; $M_{age}$ = 13.90; AUS)			•	DP (↑PStan, ↑CMD, ↑PEC, ↑O)			
				•	NP (↓PStan, ↓CMD, ↓PEC, ↓O)			
Mofield & Parker Peters (2015b)	153 Gifted Students (54% females; 6 <sup>th</sup> –8 <sup>th</sup> Grade; USA)	Enrolled in advanced program/school (entry based on multiple forms of gifted identification)	Non-experimental / Cross-sectional	GWHS	FP (→PStan, →COM, →DAA, →PE, →PCrit, →O)	Coping strategies	(a) UP > FP > NP (internalising coping) (b) UP, FP > NP (problem solving)	12 (71%)
				•	UP (↑COM, ↑DAA, ↑PE, ↑PCrit; →PStan, →O)			

- NP ( $\downarrow$ pStan,  $\downarrow$ COM,  $\downarrow$ DAA,  $\downarrow$ PE,  $\downarrow$ PCrit,  $\downarrow$ O)

Parker & Mills (1996)	Sample A: 600 Gifted Students (33.50% females; $M_{age} = 11.98$ ; $SD = .40$ ; USA)	Achievement test scores	Non-experimental / Cross-sectional	F-MPS	• HP • DP • NP	Socioeconomic status of parents; Gender; Gifted status	(a) Females more likely to be in the HP group <i>versus</i> males (b) Males more likely to be in the NP group <i>versus</i> females (c) No group differences evident between gifted and non-gifted groups	11 (69%)
Parker (1997)	Sample B: 418 students (43.30% females; $M_{age} = 11.97$ ; $SD = .38$ ; USA)	Achievement test scores	Non-experimental /	F-MPS	• HP ( $\uparrow$ O, $\rightarrow$ pStan, $\rightarrow$ PE,	Self-evaluation (adjective check list), Personality (five-	(a) HP > NP > DP (self-esteem & parental perceptions of social-	12 (71%)

(37.40% females; 6 <sup>th</sup> Grade; USA)	Cross-sectional	→TP, ↓COM, ↓DAA, ↓PCrit)	factor model); Self-esteem; Maladjustment; Parental perceptions of child adjustment, behaviours, and goals	emotional adjustment) (b) HP > NP, DP (extroversion, agreeableness, & conscientiousness)				
		• DP (↑PStan, ↑COM, ↑DAA, ↑PE, ↑PCrit, ↑TP)		(c) HP > DP > NP (parental perception of academic development)				
		• NP (↓PStan, ↓PE, ↓O, ↓TP)		(d) DP > HP [> NP] (depression [& parental success orientation])				
				(e) DP > NP > HP (neuroticism)				
Parker (1998)	828 Gifted Students (37.90% females; 6 <sup>th</sup> Grade; USA)	Achievement test scores	Non-experimental / Cross-sectional	F-MPS	HP	Birth order; Family size	(a) Youngest children more likely to be in the NP group and less likely to be in the DP group	11 (69%)
					• DP		(b) Only children more likely to be in the HP group and less likely to be in the NP group	
					• NP			
Parker et al. (2001)	219 students (64.84% advanced)	Enrolled in advanced	Non-experimental /	F-MPS	FP (↑PStan, ↑COM, ↑O,	Gifted Status; Health Issues; Maladjustment	(a) Gifted students most likely to be in the NP group and least likely	10 (63%)

Gifted Students;	program/school (entry based on achievement test)	Cross-sectional	→DAA, →PE, ↓PCrit	to be in the UP group.
29.22% females; $M_{age}$ = 15.80; $SD$ = 1.30; CZE)	• UP (↑COM, ↑DAA, ↑PE, ↑PCrit, →PStan, ↓O)			(b) Typical students most likely to be in the UP group and least likely to be in the NP group.
	• NP (↓PStan, ↓COM, ↓DAA, ↓PE, ↓PCrit, ↓O)			(c) No significant group differences relating to health issues or maladjustment
Portešová & Urbánek (2013)	2005 Sample: 97 Gifted Students (22.70% females; CZE) 2010 Sample: 95 Gifted Students	Enrolled in advanced program/school (entry based on achievement test scores)	• FP (↑O, →PStan, ↓COM, ↓PE, ↓PCrit)	(a) FP, Mx-Mal/Mx-Ad > DP (conscientiousness, emotional stability, self-efficacy, & openness/intellect)
		Non-experimental / Cross-sectional	• F-MPS (Personality (five-factor model); Self-efficacy)	
			• DP (↑PE, ↑PCrit; →COM, ↓PStan, ↓O)	

(30.50%	• Mx-
females;	Mal/Mx-Ad
CZE)	(→/↑PStan,
	→/↑COM,
	→/↑PE, →
	/↑PCrit, →
	/↑O)

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Note. Instru. = Instrument, PS = perfectionistic strivings, PC = perfectionistic concerns; F-MPS = Multidimensional Perfectionism Scale (Frost et al, 1990), APS-R = Almost Perfect Scale–

Revised (Slaney et al., 2001), GWHS = Goals and Work Habits Survey (Schuler, 2000); HP = Healthy perfectionists, DP = Dysfunctional perfectionists, NP = Non-perfectionists, UH =

Unhealthy perfectionists, Mx-Ad = Mixed adaptive perfectionists, Mx-Mal = Mixed maladaptive perfectionists, PP = Pervasive perfectionists, FP = Functional perfectionists; PStan = Personal

standards, O = Organisation; COM = Concern over mistakes, DAA = Doubts about actions, CMD = Concern over mistakes and doubts, PE = Parental expectations, PCrit = Parental criticism,

PEC = Parental expectations and criticism, HS = High standards, ORD = Order; DIS = Discrepancy; ↑ = High levels; → = Moderate levels; ↓ = Low levels; →/↑ = Moderate-to-high levels;

MQS = Methodological Quality Score; The MQS is provided as a total score and percentage of maximum possible score per study (in parentheses).