Intellectual Giftedness and Multidimensional Perfectionism: a Meta-Analytic Review

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Abstract

There are different views on whether perfectionism is a characteristic of intellectually gifted students. Over the last decades, comparative studies of intellectually gifted and non-gifted students have produced inconsistent results. This heterogeneity in findings might be explained by underpowered studies and the multidimensional nature of perfectionism, comprising two broader dimensions: perfectionistic concerns and perfectionistic strivings. Whereas perfectionistic concerns are clearly maladaptive, perfectionistic strivings frequently positively relate to academic and psychological adjustment. We meta-analytically aggregated 32 effect sizes from 10 comparative studies ($N = 4340$) to investigate to what extent intellectually gifted and non-gifted students differ in perfectionistic concerns and perfectionistic strivings. Intellectually gifted students displayed equal levels of perfectionistic concerns compared to non-gifted students ($g = -0.117$, 95% CI $[-0.337, 0.103]$, $p = .252$) but displayed elevated levels of perfectionistic strivings ($g = 0.332$, 95% CI $[0.092, 0.572]$, $p = .012$). The magnitude of the effect sizes indicates that perfectionism is not a core characteristic of giftedness. In particular, giftedness is not related to inherently maladaptive forms of perfectionism.

Keywords Perfectionism · Giftedness · Research synthesis · Meta-analysis

Introduction

There is some disagreement whether intellectual giftedness is associated with increased levels of perfectionism. Perfectionism is a multidimensional personality disposition that is characterized by striving for exceedingly high personal standards combined with overly critical self-

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evaluations (Hewitt and Flett 1991). Guidebooks for parents, counselors, and teachers frequently highlight perfectionism as a core characteristic of intellectually gifted students (e.g., Callard-Szulgit 2012; Henderson 2009; Porter 2005; Silverman 2013; Sisk 2009). Thus, unsurprisingly, perfectionism is described as "one of the most common concerns of parents and teachers of gifted children" (Wilson and Adelson 2018, p. 8). Scientific perspectives are more heterogeneous with some authors describing perfectionism as closely associated with giftedness (e.g., Allen 2017; Blaas 2014; M. Maxwell 2007; Silverman 2007) and others concluding that there is insufficient evidence to assume higher perfectionism in intellectually gifted students (e.g., Mendaglio 2007; Speirs Neumeister 2018). The debate whether giftedness is associated with perfectionism is particularly controversial because associating a group of individuals with potentially maladaptive personality characteristics may evoke stigmatization, negative self-fulfilling expectations (Jussim et al. 1996), and negative stereotypic role behavior (Coleman and Cross 1988). Yet, perfectionism plays a central role in understanding psychological maladjustment in intellectually gifted students (e.g., Chan 2012). Thus, identifying a robust link between giftedness and maladaptive forms of perfectionism may facilitate the development and implementation of prevention and intervention programs for intellectually gifted students.

In addition to the well-known problem of underpowered studies (e.g., Maxwell 2004), the current disagreement regarding the relation of intellectual giftedness and perfectionism might evolve from inconsistencies in the conceptualization of perfectionism (see Rice and Ray 2018). Whereas perfectionism was initially viewed as a unidimensional and entirely dysfunctional construct (Burns 1980; Horney 1950), there is now a growing consensus that perfectionism is a multidimensional construct comprising two broader dimensions: perfectionistic concerns and perfectionistic strivings (e.g., Stoeber and Otto 2006). These dimensions of perfectionism frequently display opposing relations with relevant external criteria (e.g., Hill and Curran 2016; Madigan 2019; Sirois et al. 2017) and broader personality characteristics (Smith et al. 2019; Stricker et al. 2019). Thus, the two-dimensional approach to perfectionism is also essential to understand perfectionism in gifted populations (Speirs Neumeister 2018; Rice and Ray 2018). The aim of the current study was to clarify the relation between giftedness and multidimensional perfectionism by quantitatively synthesizing existing studies comparing mean levels of multidimensional perfectionism between intellectually gifted students and non-gifted students.

Multidimensional Perfectionism

Factor analytic evidence (e.g., Bieling et al. 2004; Frost et al. 1993) suggests that there are two broader dimensions underlying the various existing measures of perfectionism: perfectionistic concerns and perfectionistic strivings. Even in a measure initially designed to capture unidimensional perfectionism, there was evidence for an underlying two-dimensional structure reflecting perfectionistic concerns and perfectionistic strivings (Dickie et al. 2012; Stoeber and Damian 2014). The two-dimensional conceptualization is widely applied when synthesizing research on perfectionism (e.g., Hill and Curran 2016; Hill et al. 2018; Madigan 2019; Sirois et al. 2017; Smith et al. 2019; Stricker et al. 2019).

Perfectionistic concerns (also labeled evaluative concerns perfectionism) comprise worries over making mistakes (Frost et al. 1990; Hill et al. 2004), doubts about one's competencies and actions (Frost et al. 1990), the perception of others as demanding perfection of oneself (Hewitt and Flett 1991), and the perception of a discrepancy between one's standards and actual performance (Slaney et al. 2001). Meta-analytic evidence reveals that perfectionistic concerns

are primarily associated with neuroticism (Smith et al. 2019; Stricker et al. 2019), indicators of academic maladjustment such as procrastination (Sirois et al. 2017) or low academic achievement (Madigan 2019), and indicators of psychological maladjustment such as burnout (Hill and Curran 2016) or suicide attempts (Smith et al. 2018). In gifted students, facets of perfectionistic concerns are negatively related to academic efficacy, grade point average (GPA), life satisfaction (Wang et al. 2012), and happiness (Chan 2012). Additionally, perfectionistic concerns are negatively related to intrinsic motivation, which may lead to underachievement in gifted students (Fletcher and Speirs Neumeister 2012).

Perfectionistic strivings (also labeled personal standards perfectionism) comprise high personal standards and the belief that it is important for oneself to meet these standards (Frost et al. 1990; Hewitt and Flett 1991; Hill et al. 2004; Slaney et al. 2001). Perfectionistic strivings are primarily related to conscientiousness (Smith et al. 2019; Stricker et al. 2019) and indicators of psychological and academic adjustment such as low procrastination (Sirois et al. 2017), low burnout (Hill and Curran 2016), academic achievement (Madigan 2019), positive affect (e.g., Damian et al. 2014), and life satisfaction (e.g., Gilman and Ashby 2003). In gifted students, facets of perfectionistic strivings are positively related to academic efficacy, GPA, and life satisfaction (Wang et al. 2012).

In sum, perfectionistic concerns robustly relate to various indicators of psychological maladjustment inside and outside of educational contexts. In contrast, perfectionistic strivings are associated with different desirable psychological and educational outcomes. Thus, there is common agreement that perfectionistic concerns reflect the more maladaptive aspects of perfectionism compared to perfectionistic strivings (e.g., Frost et al. 1993).

Intellectual Giftedness

Giftedness can be defined as the manifestation of potential and performance that is clearly at the upper end of a distribution in a talent domain (Subotnik et al. 2011). Accordingly, gifted individuals can be defined as those who demonstrate outstanding levels of aptitude (defined as an exceptional ability to reason and learn) or competence (documented performance or achievement in top 10% or rarer) in one or more domains. Domains include any structured area of activity with its own symbol system (e.g., mathematics, music, language) and/or set of sensorimotor skills (e.g., painting, dance, sports; National Association for Gifted Children n.d., para. 5). Intellectual giftedness, in turn, refers to the manifestation of potential and performance in academic-intellectual achievement domains.

The conceptualization of giftedness has evolved continuously during the last 100 years, and currently different paradigms and models of giftedness coexist (for an overview see Dai 2018). The assumption that perfectionism is a characteristic associated with giftedness can be found in different paradigms (e.g., the gifted child paradigm: Silverman 2009; the talent development paradigm: Bloom 1985). In this regard, it has to be taken into account that giftedness is a construct that not only lacks unity in its meanings (Dai 2009) but also is a value-laden construct with many myths and, in part, contradictory assumptions associated to it (Treffinger 2009). For example, there are two contrasting hypotheses about gifted students: the harmony vs. the disharmony hypothesis. The harmony hypothesis suggests that gifted students not only exhibit superior intellectual ability but also are more socially competent, better adjusted, and better at adapting to new circumstances (Persson 1998). The disharmony hypothesis, which dates back to the mad genius stereotype (Becker 1978), states that high intellectual ability comes at a cost for gifted students, resulting in socio-emotional deficiencies and behavioral difficulties (Gallagher 1990).

Empirical findings do not support the disharmony hypotheses (Martin et al. 2010; Wirthwein et al. 2019; for an overview see Neihart et al. 2016). However, the image of the intellectually outstanding yet socially awkward and emotionally unstable individual still prevails in the media (e.g., in movies like "A Beautiful Mind"), laypersons' conceptions (Baudson 2016), and teachers' conceptions of gifted students (Matheis et al. 2018).

Despite the diversity in giftedness paradigms and models, cognitive ability measures, standardized achievement tests, students' academic achievement, and teacher recommendations are the most frequently applied criteria to identify intellectual giftedness in research and applied contexts (Carman 2013; Hodges et al. 2018). The weighting and the precise cut-off criteria of these or other indicators differ between studies and educational contexts (Worrell et al. 2019). Thus, any synthesis of studies with intellectually gifted students likely combines samples of students who have been identified in slightly different ways (Hodges et al. 2018).

Multidimensional Perfectionism and Intellectual Giftedness

To date, there is disagreement whether perfectionism is a characteristic of intellectual giftedness (e.g., Rice and Ray 2018). Several reasons have been proposed why different forms of perfectionism might be elevated or reduced in intellectually gifted students. First, giftedness might generally be associated with perfectionism because, compared to non-gifted students, intellectually gifted students have a greater ability to achieve the highest academic standards (e.g., Mofield and Parker Peters 2018). Second, gifted children receive frequent positive feedback regarding their abilities. This might lead to contingent self-worth based on meeting others' highest expectations (Speirs Neumeister 2018; also see Sowa et al. 1994), thereby promoting perfectionistic concerns. In addition, intellectually gifted students were hypothesized to equate personal worth with personal success (Delisle 1990). The assumption that perfectionistic concerns are elevated in intellectually gifted students is also in line with the finding that gifted students are more likely to react negatively to failure than non-gifted students (Roberts and Lovett 1994) and with the assumption that academic comparisons with peers might be elevated in gifted populations (Wang et al. 2012). Third, little challenge in early educational experiences might produce the expectation to always achieve the highest possible grades (e.g., Speirs Neumeister 2004), thereby promoting perfectionistic strivings. In addition, gifted students might set higher standards for themselves but experience less distress and concerns over failing to meet these standards (e.g., LoCicero and Ashby 2000). Thus, perfectionistic strivings might be elevated and perfectionistic concerns might be reduced in intellectually gifted students. This assumption dovetails with an assumed higher flexibility of intellectually gifted students for accommodating imperfection (LoCicero and Ashby 2000). In sum, to date, there are conflicting assumptions regarding the relation between giftedness and multidimensional perfectionism.

The empirical literature on the relation between multidimensional perfectionism and giftedness is equally inconsistent. Table 1 provides an overview of all studies comparing mean levels of multidimensional perfectionism between intellectually gifted and non-gifted students that were identified in the systematic literature search for this meta-analytic review (details about the literature search process are provided in the "Method" section). Two studies (Bull 1997; Parker and Mills 1996) found elevated levels of facets of perfectionistic concerns in intellectually gifted students compared to non-gifted students. However, three studies identified lower levels of facets of perfectionistic concerns in intellectually gifted students compared to non-gifted students (Chan 2010; LoCicero and Ashby 2000; Parker et al. 2001). Five studies

Table 1 Overview of studies that compared levels of perfectionistic concerns (PC) and/or perfectionistic strivings (PS) between intellectually gifted students and non-gifted students (n = 12)

Study	Intellectually gifted students	Non-gifted students	Perfectionistic concerns	Perfectionistic strivings
Mofield and Parker Peters (2018)	Middle school students from pullout classes for gifted students (n = 264)	Middle school students from non-advanced classes (n = 86)	No significant differences in concern over mistakes and doubts about actions; higher concern over mistakes in gifted students after controlling for mindset beliefs	Higher personal standards in gifted students
Schneider et al. (2012)	High-school students from gifted classes (n = 257 at T1 and n = 289 at T2)	High-school students from regular classes (n = 584 at T1 and n = 630 at T2)	No significant differences in concern over mistakes and doubts about actions at T1. Lower concern over mistakes in gifted students but no significant difference in doubts about actions at T2	No significant difference in personal standards at T1 and T2
Guignard et al. (2012)	Intellectually gifted 6th graders (n = 61)	Sample 1: non-gifted 6th graders (n = 51) Sample 2: non-gifted 5th graders (n = 20)	No significant differences in socially-prescribed perfectionism	Higher self-oriented perfectionism in gifted 6th graders compared to non-gifted 6th graders but not compared to non-gifted 5th graders
Chan (2010)	School students (Grades 2 to 6) from a summer gifted program (n = 320)	Unidentified school students (Grades 2 to 6; n = 882)	lower discrepancy in gifted students	Higher standards in gifted students
Stornelli et al. (2009)	School students from gifted programs (n = 86)	School students from regular programs (n = 162) and fine-arts programs (n = 33)	No significant differences in socially prescribed perfectionism[a]	No significant differences in self-oriented perfectionism[a]
Kornblum and Ainley (2005)	Students that participated in programs for highly-able students (n = 367)	Students that did not participate in in programs for highly-able students (n = 245)	No significant differences in concern over mistakes and doubts (as combined scale)[a]	Higher personal standards in gifted students[a]
Parker et al. (2001)	Male (n = 105) and female (n = 37) secondary school students from a program for the mathematically gifted	Male (n = 50) and female (n = 27) typical secondary school students	Lower concern over mistakes in gifted students, no significant differences in doubts about actions	No significant differences in personal standards
Asher (2000)	Middle school band students from gifted programs (parent report; n = 110)	Middle school band students with no participation in a gifted program (n = 92)	No significant differences in concern over mistakes and doubts about actions	Higher personal standards in gifted students

Table 1 (continued)

Study	Intellectually gifted students	Non-gifted students	Perfectionistic concerns	Perfectionistic strivings
LoCicero and Ashby (2000)	Middle school students in a gifted program ($n = 73$)	Non-gifted middle school students ($n = 99$)	Lower discrepancy in gifted students	Higher standards in gifted students
Bull (1997)	Middle school students with an IQ ≥ 130 ($n = 23$)	Middle school students with an IQ from 85 to 120 and a GPA from 2.0 to 3.0 ($n = 63$)	Higher socially-prescribed perfectionism in gifted students	Higher self-oriented perfectionism in gifted students
Parker and Mills (1996)	Sixth grade students identified as gifted in a national talent search ($n = 600$)	Non-gifted student sample: Unidentified sixth graders ($n = 418$)	Higher doubts about actions in gifted students; no significant differences in concern over mistakes	No significant difference in personal standards
Roberts and Lovett (1994)	Junior high school students from a pull-out program for gifted students ($n = 20$)	Non-gifted junior high school students (excluding honor students; $n = 20$)	No significant differences in socially prescribed perfectionism[a]	Higher self-oriented perfectionism in gifted students

[a] The relevant statistical values were neither reported in the manuscript nor provided via e-mail and could, therefore, not be included in the quantitative meta-analysis

(Asher 2000; Guignard et al. 2012; Kornblum and Ainley 2005; Roberts and Lovett 1994; Stornelli et al. 2009) found no significant differences between intellectually gifted students and non-gifted students in facets of perfectionistic concerns and two studies reported mixed results (Mofield and Parker Peters 2018; Schneider et al. 2012). Regarding facets of perfectionistic strivings, six studies identified elevated levels in intellectually gifted students compared to non-gifted students (Asher 2000; Chan 2010; Kornblum and Ainley 2005; LoCicero and Ashby 2000; Mofield and Parker Peters 2018; Roberts and Lovett 1994). Four studies found no significant differences in facets of perfectionistic strivings (Parker et al. 2001; Parker and Mills 1996; Schneider et al. 2012; Stornelli et al. 2009), and one study reported mixed results (Guignard et al. 2012). Overall, the empirical findings display a large degree of inconsistency. Thus, a qualitative integration is insufficient to conclude whether multidimensional perfectionism is characteristic for intellectually gifted students, highlighting the need for a quantitative synthesis. The procedures for the identification of intellectual giftedness differed between studies (see Table S1), which might add to the heterogeneity in findings.

Of note, differences in perfectionism dimensions between intellectually gifted students and non-gifted students have also been studied based on the frequency distribution of different perfectionism clusters ("typologies"; e.g., non-perfectionists, healthy perfectionists, and dysfunctional perfectionists; Parker and Mills 1996). There are several reasons why cluster solutions are difficult to aggregate. First, the number and the nature of perfectionism clusters differ between studies. Whereas some studies identified three clusters (Parker 1997; Parker and Mills 1996), other studies identified four clusters (Dixon et al. 2004). Second, the boundary scores to determine cluster membership differ between studies (Mofield and Parker Peters 2015). Thus, individuals with identical perfectionism levels might be assigned to different clusters in different studies. Third, the number of perfectionism clusters changes over time (Portešová and Urbánek 2013). Fourth, different classification procedures yield different results regarding the frequency of different perfectionism types (Chan 2010). Thus, in this meta-analysis, we compared mean levels of perfectionistic concerns and perfectionistic strivings instead of patterns of cluster membership.

The Present Study

Despite decades of research, it remains an open question to what extent intellectually gifted students and non-gifted students differ in their perfectionistic concerns and perfectionistic strivings. Findings are inconsistent and a quantitative synthesis of the available empirical evidence is lacking. Therefore, the aim of the present study was to address this open question by meta-analytically aggregating available studies comparing mean levels of perfectionistic concerns and perfectionistic strivings between intellectually gifted students and non-gifted students. Our data and R scripts are available via the Open Science Framework: https://osf.io/47pez/?view_only=68257e602fa748e599f9e7f4eacb66f3

Method

Search Procedure and Inclusion Criteria

We conducted a standardized literature search in PsycINFO and ERIC in November 2018 applying the search string "((gifted* or "high-ability" or talent* or "high achieve*" or "high

potential*") and perfect*)" in abstract and title. No limits regarding study type or date were set. We additionally conducted an exploratory literature search by entering our key words in Google Scholar. Moreover, we requested unpublished data sets from the corresponding authors of all included studies via e-mail.

We applied the following inclusion criteria: (1) The study includes at least one indicator of perfectionistic concerns or perfectionistic strivings. There is no consensus regarding the scales used as indicators of perfectionistic concerns and perfectionistic strivings (e.g., Stoeber 2018). Thus, we confined the inclusion to the best-established and most frequently applied instruments, which are Frost et al.'s (1990) Multidimensional Perfectionism Scale (FMPS), Hewitt and Flett's (1991) Multidimensional Perfectionism Scale (HFMPS), the Almost Perfect Scale-Revised (APS-R, Slaney et al. 2001), and the Perfectionism Inventory (PI, Hill et al. 2004). Indicators of perfectionistic concerns were the concern over mistakes scale and the doubts about actions scale from the FMPS (Frost et al. 1990), the socially prescribed perfectionism scale from the HFMPS (Hewitt and Flett 1991), the discrepancy scale from the APS-R (Slaney et al. 2001), and the concern over mistakes scale from the PI (Hill et al. 2004). Indicators of perfectionistic strivings were the personal standards scale from the FMPS (Frost et al. 1990), the self-oriented perfectionism scale from the HFMPS (Hewitt and Flett 1991), the high standards scale from the APS-R (Slaney et al. 2001), and the striving for excellence scale from the PI (Hill et al. 2004). We also included short forms, translations, combinations, and adaptations of these scales. (2) The study assessed the mean levels of facets of perfectionistic concerns or perfectionistic strivings in at least one sample of students that were identified as intellectually gifted and in at least one sample of non-gifted students (see Table S1 for an overview of the giftedness identification procedures in the included studies). As non-gifted samples, we included student samples that were not assembled based on high academic achievement, high academic ability, or high intelligence. (3) The study reports sufficient statistical information to calculate the standardized mean difference between the intellectually gifted student sample and the non-gifted student sample and the sample sizes.

Study Selection and Coding Procedure

Study eligibility was determined in two steps. In Step 1, the first author and the second author carefully read the titles and abstracts of all articles that were identified in the literature search to assess their relevance for the meta-analysis ($n = 453$). Twenty-one articles were selected for further evaluation. In Step 2, the full texts of these articles were inspected and then coded as either included ($n = 10$) or excluded ($n = 11$). Six studies were excluded because they did not contain a gifted or a non-gifted sample (Fong and Yuen 2009; Miller and Speirs Neumeister 2017; Orange 1997; Shaunessy et al. 2011; Speirs Neumeister and Finch 2006; Stumpf and Parker 2000), one study was excluded because perfectionism was not assessed (Esparza et al. 2014), one study used a self-developed perfectionism scale that could not be classified as an indicator of perfectionistic concerns or perfectionistic strivings (Baker 1996), and one study reporting findings from an Iranian sample could not be obtained in English (Jamshidi et al. 2009). Additionally, two studies (Kornblum and Ainley 2005; Stornelli et al. 2009) had to be excluded from the meta-analytic synthesis because the relevant statistical information were neither reported nor provided via e-mail.

Both raters coded the statistical values required to calculate standardized mean differences between the intellectually gifted and the non-gifted student samples. Both raters further coded the study characteristics (i.e., the measures of multidimensional perfectionism, the country of data collection, the sample size, the percentage of female participants, the mean age, and Cronbach's α). Interrater agreement (number of consistently coded studies / number of all double coded studies) was 99.99% for inclusion in Step 1, 100.00% for inclusion in in Step 2, 96.15% for the relevant statistical values, and 93.46% for other sample characteristics. Disagreements were resolved by consulting the original manuscripts. The final database comprised 10 studies of which eight studies (six journal articles, two dissertations) were identified in the standardized literature search and two studies (journal articles) were identified in the exploratory search. Figure 1 displays the details of the study selection process.
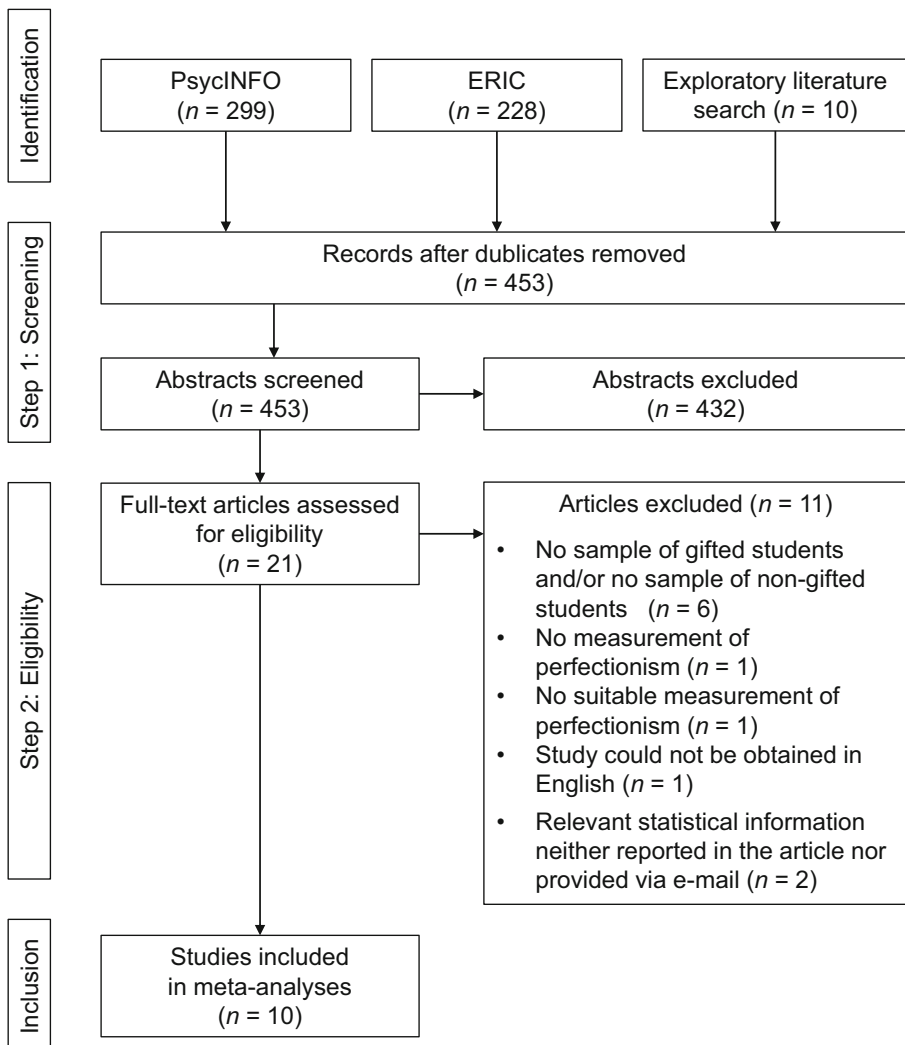
Fig. 1 Flow diagram of the study search and inclusion process

Statistical Analyses

Effect Size Calculation

First, we computed Cohen's d as the standardized mean difference using the following formula: $d = \frac{X_1 - X_2}{S_{within}}$, where X_1 denotes the sample mean in the intellectually gifted student sample and X_2 denotes the sample mean in the non-gifted student sample. S_{within} denotes the within-sample SD pooled across the intellectually gifted student sample and the non-gifted student sample; it was calculated as $S_{within} = \sqrt{\frac{(n_1-1) \times S_1^2 + (n_2-1) \times S_2^2}{n_1 - n_2 - 2}}$, where n_1 is the sample size of the intellectually gifted student sample, n_2 is the sample size of the non-gifted student sample, S_1 is the SD in the intellectually gifted student sample, and S_2 is the SD in the non-gifted student sample. Second, we corrected for small-sample bias by converting Cohen's d to Hedges' g by applying the correction factor J ($g = J \times d$). J is formulized as $J = 1 - \frac{3}{4 \times (n_1 + n_2 - 2) - 1}$, where n_1 is the sample size in the intellectually gifted student sample and n_2 is the sample size in the non-gifted student sample (Borenstein et al. 2009). The variance of Hedges' g is given by $V_g = J^2 \times \left(\frac{n_{trt} + n_{ctrl}}{n_{trt} \times n_{ctrl}} + \frac{d^2}{2(n_{trt} + n_{ctrl})} \right)$, where again n_1 is the sample size in the intellectually gifted student sample and n_2 is the sample size in the non-gifted student sample (Borenstein et al. 2009).

Meta-Analytic Aggregation

We conducted two meta-analyses (one for perfectionistic concerns and one for perfectionistic strivings) using robust variance estimation (RVE) in the *robumeta* package (Fisher et al. 2017) in R (R Core Team 2018). In many cases, multiple effect sizes from the same studies were included in one of the meta-analyses (e.g., when two indicators of perfectionistic concerns were applied in the same study). In these cases, the effect sizes were statistically dependent. RVE accounts for non-independence of effect sizes without knowledge of the effect size covariance structure (Hedges et al. 2010) permitting the inclusion of multiple effect sizes from one study (Tanner-Smith and Tipton 2014; Tanner-Smith et al. 2016). We used random effects models and a weighted least squares approach for the estimation of the mean effect sizes and model parameters (see Hedges et al. 2010; Tanner-Smith and Tipton 2014). Publication bias was assessed with the R packages *metafor* (Viechtbauer 2010) and *robumeta* (Fisher et al. 2017).

Heterogeneity and Publication Bias

Heterogeneity was assessed with τ^2 which represents the magnitude of variation between the study-average effects (between-study variance; Deeks et al. 2008) and with I^2 indicating the proportion of variance due to variability in true effects rather than sampling error (Borenstein et al. 2017; Higgins and Thompson 2002). To assess publication bias, we used contour-enhanced funnel plots (Peters et al. 2008), trim-and-fill analyses (Duval and Tweedie 2000), and an RVE approach to Egger's regression test (Egger et al. 1997). For the contour-enhanced funnel plots and trim-and-fill analyses, we aggregated effect sizes at the study level. Trim-and-fill analyses impute studies if the distribution of included studies is skewed. Inspection of imputed studies from the trim-and-fill analyses in contour-enhanced funnel plots reveals whether their distribution differs from the included studies (e.g., whether most imputed studies

fall into the category of non-significant results, whereas most included studies yield significant results). For Egger's regression tests, we predicted the effect sizes by their standard errors in meta-regression RVE models. In these models, a slope coefficient that significantly differs from zero suggests that the results from studies with low precision differ from studies with high precision, indicating the presence of publication bias.

Results

Study Characteristics

Overall, findings from 10 studies reporting 32 effect sizes from 11 intellectually gifted student samples ($N = 1902$) and 12 non-gifted student samples ($N = 2438$) were meta-analytically aggregated (overall $N = 4340$). Nine studies (describing 19 effect sizes) were included in the meta-analysis of perfectionistic concerns, and 10 studies (describing 13 effect sizes) studies were included in the meta-analysis of perfectionistic strivings. The median sample size was 105 for intellectually gifted students and 74.50 for non-gifted students indicating that the majority of studies had a low statistical power to detect group differences. The sample mean age ranged from 10.25 to 13.50 ($M = 11.71$, SD = 1.33) in the intellectually gifted student samples and from 10.19 to 13.50 ($M = 11.76$, SD = 1.17) in the non-gifted student samples. The mean proportion of females ranged from 0 to 100% ($M = 45.93$, SD = 25.42) in the intellectually gifted student samples and from 0 to 100% ($M = 49.84$, SD = 23.88) in the non-gifted student samples. Six studies were conducted in the USA, three studies were conducted in European countries, and one study was conducted in Hong Kong. In 7 out of the 10 included studies, intellectually gifted students were from special gifted programs. In one study, they were identified in a talent search program. Thus, most intellectually gifted students in the included studies were aware of their giftedness status. Not all studies reported full demographic details of the samples (see Tables 2 and 3). Table 2 displays the study characteristics and Hedge's g of all studies included in the meta-analysis of perfectionistic concerns. Table 3 displays the study characteristics and Hedge's g of all studies included in the meta-analysis of perfectionistic strivings.

Differences in Perfectionism Levels Between Gifted Students and Non-Gifted Students

There was no difference in perfectionistic concerns between intellectually gifted students and non-gifted students, $g = -0.117$, 95% CI [−0.337, 0.103], $p = .252$. Perfectionistic strivings were stronger in intellectually gifted students compared to non-gifted students, $g = 0.332$, 95% CI [0.092, 0.572], $p = .012$. Figure 2 displays the effect sizes and 95% confidence intervals for all studies included in the meta-analysis of perfectionistic concerns. Figure 3 displays the effect sizes and 95% confidence intervals for all studies included in the meta-analysis of perfectionistic strivings. τ^2 was .072 for perfectionistic concerns and .084 for perfectionistic strivings. I^2 was 86.10% for perfectionistic concerns and 86.71% for perfectionistic strivings indicating substantial heterogeneity.

Figures S1 and S2 display the contour-enhanced funnel plots. There was no indication of publication bias. No studies were imputed in the trim-and-fill analyses. Egger's test for funnel plot asymmetry did not reach significance for perfectionistic concerns ($b = 1.15$, 95% CI [−2.85, 5.15], $p = .486$) or perfectionistic strivings ($b = 1.13$, 95% CI [−4.32, 6.57], $p = .605$).

Table 2 Study characteristics and Hedge's g for all studies included in the meta-analysis of perfectionistic concerns

Study	Scale	Subscale	Country	Gifted student samples			Non-gifted student samples			α	g
				N	% female	Age/age group	N	% female	Age/age group		
Mofield and Parker Peters (2018)	GWHS[a]	Concern over mistakes	USA	264	49.00	Grades 6 to 8	86	46.50	Grades 6 to 8	.85	.35
		Doubts about actions	USA	264	49.00	Grades 6 to 8	86	46.50	Grades 6 to 8	.69	.02
Schneider et al. (2012)	FMPS[b]	Concern over mistakes	Germany	256	34.63	10.60	584	44.86	11.01	.84	−.18
		Doubts about actions	Germany	256	34.63	10.60	584	44.86	11.01	.59	−.14
		Concern over mistakes	Germany	289	34.26	11.59	630	42.54	11.99	.84	−.12
		Doubts about actions	Germany	289	34.26	11.59	630	42.54	11.99	.63	−.13
Guignard et al. (2012)	CAPS[c]	Socially prescribed perfectionism	France	61	35.30	10.95	51	59.70	11.59	.84	.28
		Socially prescribed perfectionism	France	61	35.30	10.95	20	34.80	11.03	.84	−.07
Chan (2010)	APS-R[d]	Discrepancy	Hong Kong	320	39.69	10.25	882	45.69	10.19	.88	−.54
Parker et al. (2001)	FMPS[e]	Concern over mistakes	Czech Republic	105	0.00	15.80 (overall)	50	0.00	15.80 (overall)	–	−.35
		Doubts about actions	Czech Republic	105	0.00	15.80 (overall)	50	0.00	15.80 (overall)	–	.02
		Concern over mistakes	Czech Republic	37	100.00	15.80 (overall)	27	100	15.80 (overall)	–	−.80
		Doubts about actions	Czech Republic	37	100.00	15.80 (overall)	27	100	15.80 (overall)	–	−.40
Asher (2000)	FMPS	Concern over mistakes	USA	110	58.18	Grades 6 to 8	92	60.87	Grades 6 to 8	.88	.18
		Doubts about actions	USA	110	58.18	Grades 6 to 8	92	60.87	Grades 6 to 8	.77	−.04
LoCicero and Ashby (2000)	APS-R	Discrepancy	USA	73	59.00	13.00	99	62.50	13.00	.96	−.39
Bull (1997)	HFMPS	Socially prescribed perfectionism	USA	23	–	Grade 7	63	–	Grade 7	.84	.28
Parker and Mills (1996)	FMPS	Concern over mistakes	USA	600	33.50	11.98	418	43.30	11.97	–	.00
		Doubts about actions	USA	600	33.50	11.98	418	43.30	11.97	–	−.15

A positive Hedge's g value indicates increased mean levels for intellectually gifted students compared to non-gifted students

GWHS Goals and Work Habits Survey (Schuler 1994), *FMPS* Frost et al.'s (1990) Multidimensional Perfectionism scale, *CAPS* Child and Adolescent Perfectionism Scale (Flett et al. 2016), *APS-R* Almost Perfect Scale-Revised (Slaney et al. 2001), *HFMPS* Hewitt and Flett's (1991) Multidimensional Perfectionism Scale

[a] An adaptation of the FMPS (Schuler 1994)

[b] German version (Stöber 1995)

[c] An adaptation of the HFMPS (Hewitt & Flett 1991), French version (Guignard et al. 2012)

[d] Chinese version (Chan 2010)

[e] Czech version (Parker et al. 2001)

Table 3 Study characteristics and Hedge's g for all studies included in the meta-analysis of perfectionistic strivings

Study	Scale	Subscale	Country	Gifted student samples			Regular student samples			α	g
				N	% female	Age/age group	N	% female	Age/age group		
Mofield and Parker Peters (2018)	GWHS[a]	Personal standards	USA	264	49.00	Grades 6 to 8	86	46.50	Grades 6 to 8	.76	.66
Schneider et al. (2012)	FMPS[b]	Personal standards	Germany	257	34.63	10.60	584	44.86	11.01	.77	−.02
		Personal standards	Germany	289	34.26	11.59	630	42.54	11.99	.77	.04
Guignard et al. (2012)	CAPS[c]	Self-oriented perfectionism	France	61	35.30	10.95	51	59.70	11.59	.82	.45
		Self-oriented perfectionism	France	61	35.30	10.95	20	34.80	11.03	.82	−.27
Chan (2010)	APS-R[d]	High standards	Hong Kong	320	39.69	10.25	882	45.69	10.19	.86	.58
Parker et al. (2001)	FMPS[e]	Personal standards	Czech Republic	105	0.00	15.80 (overall)	50	0.00	15.80 (overall)		−.15
		Personal standards	Czech Republic	37	100.00	15.80 (overall)	27	100.00	15.80 (overall)		−.25
Asher (2000)	FMPS	Personal standards	USA	110	58.18	Grades 6 to 8	92	60.87	Grades 6 to 8	.83	.41
LoCicero and Ashby (2000)	APSR	High standards	USA	73	59.00	13.00	99	62.50	13.00	.91	.37
Bull (1997)	HFMPS	Self-oriented perfectionism	USA	23	–	Grade 7	63	–	Grade 7	.86	.36
Parker and Mills (1996)	FMPS	Personal standards	USA	600	33.50	11.98	418	43.30	11.97	–	.11
Roberts and Lovett (1994)	HMPS	Self-oriented perfectionism	USA	20	50.00	13.5	20	50.00	13.50	–	1.31

A positive Hedge's g value indicates increased mean levels for intellectually gifted students compared to non-gifted students

GWHS Goals and Work Habits Survey (Schuler 1994), FMPS Frost et al.'s (1990) Multidimensional Perfectionism scale, CAPS Child and Adolescent Perfectionism Scale (Flett et al. 2016), APS-R Almost Perfect Scale-Revised (Slaney et al. 2001), HFMPS Hewitt and Flett's (1991) Multidimensional Perfectionism Scale

[a] An adaptation of the FMPS (Schuler 1994)

[b] German version (Stöber 1995)

[c] An adaptation of the HFMPS (Hewitt & Flett 1991), French version (Guignard et al. 2012)

[d] Chinese version (Chan 2010)

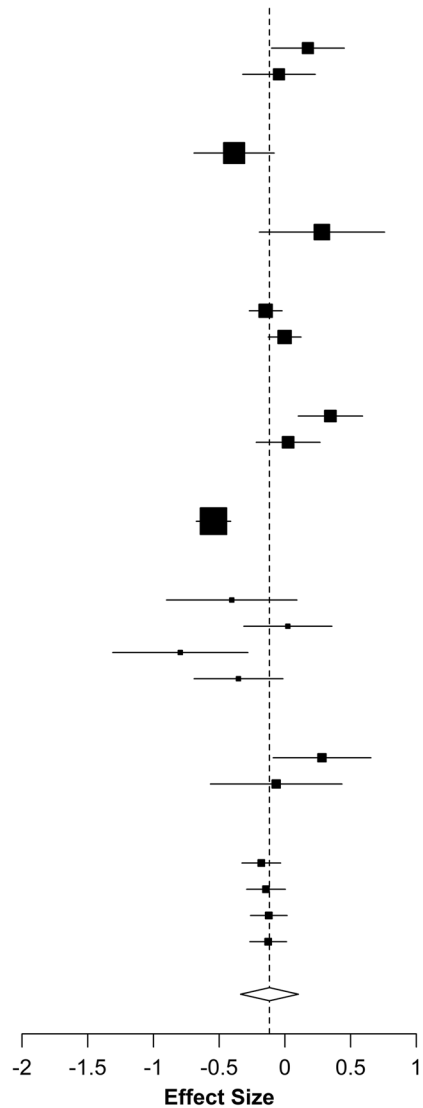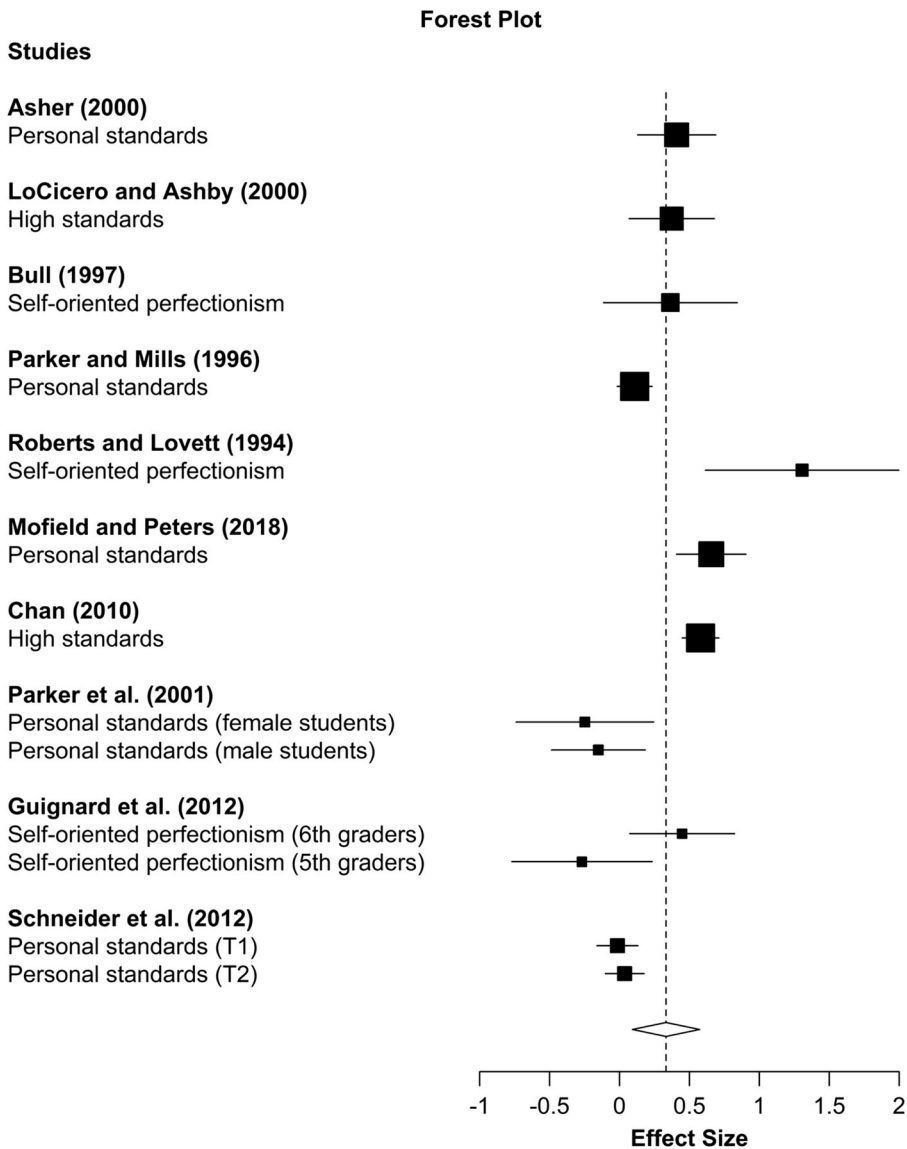[e] Czech version (Parker et al. 2001)

Forest Plot

Fig. 2 Effect sizes (Hedge's *g*) and 95% confidence intervals for all studies included in the meta-analysis of perfectionistic concerns

Discussion

It is often assumed that perfectionism is a core characteristic of intellectually gifted students. To test this assumption, we meta-analytically aggregated the available empirical evidence on differences in perfectionistic concerns and perfectionistic strivings between intellectually gifted students and non-gifted students. Both groups did not differ significantly in perfectionistic concerns. For perfectionistic strivings, there was a significant small to medium group

Fig. 3 Effect sizes (Hedge's *g*) and 95% confidence intervals for all studies included in the meta-analysis of perfectionistic strivings

difference indicating that intellectually gifted students hold stronger perfectionistic strivings than non-gifted students do.

Multidimensional Perfectionism and Giftedness

The investigation of perfectionism in the context of giftedness was initially characterized by a pathological view (e.g., Adderholdt-Elliott 1991). However, the results of the present meta-analysis do not support the view that a pathologic or inherently maladaptive form of

perfectionism characterizes intellectually gifted students. Instead, the results indicate that intellectually gifted students do not differ from non-gifted students in their worries about the consequences of failing to meet the highest standards (i.e., perfectionistic concerns). Giftedness does not seem to predispose students to overly critical self-evaluations of one's performance. This is in line with previous findings indicating that intellectual giftedness is not associated with deficiencies in achievement-related self-perceptions such as academic self-concept (McCoach and Siegle 2003; Preckel et al. 2008; Pyryt and Mendaglio 1994), perceived competence (Vallerand et al. 1994), or school satisfaction (Ash and Huebner 1998).

The meta-analysis of perfectionistic strivings showed that intellectually gifted students have a stronger tendency to set the highest standards for their performance and more strongly endorse the belief that being perfect is important for themselves compared to non-gifted students. There are two potential theoretical explanations for this finding. First, intellectual giftedness might predispose for higher levels of perfectionistic strivings because of an increased ability to achieve the highest academic standards or because of insufficient challenge in early educational experiences (Speirs Neumeister 2004). The finding that academic achievement longitudinally predicts perfectionistic strivings beyond baseline (Damian et al. 2017) supports this assumption. Thus, academic achievement might mediate the relation of intellectual giftedness with perfectionistic strivings: Intellectually gifted students display elevated academic achievement, which might increase their self-imposed standards as a result of a general motivational tendency to surpass one's past performance (cf. social-cognitive theory; Bandura 1977). Second, high perfectionistic strivings might increase the likelihood to be identified as intellectually gifted due to elevated commitment to learning or effort in performance situations, which dovetails with the finding that perfectionistic strivings are related to performance in aptitude tests (Stoeber and Kersting 2007).

Independent of the underlying processes, the mean level difference in perfectionistic strivings between intellectually gifted students and non-gifted students must be interpreted with great caution. According to Cohen's (1988) definition of effect sizes (which also applies to Hedge's g; Ellis 2010), the difference in perfectionistic strivings between intellectually gifted students and regular students is small to medium in size. Cohen's (1988) thresholds were determined with intervention studies in mind, and they may not apply to the identification of subpopulations (Winkler and Voight 2016). The identified effect size of $g = .332$ indicates an overlap of almost 80% between the groups of intellectually gifted students and non-gifted students (Cohen 1988). Hence, the tendency to aim for the highest personal standards and the belief that it is important for oneself to be perfect might be pronounced in some, but not in all intellectually gifted students. The magnitude of the meta-analytic effect size does not sufficiently support the conclusion that perfectionistic strivings are a core characteristic of the entire group of intellectually gifted students.

Limitations and Future Research Directions

First, the number of available studies was too low for reliable moderator analyses. Thus, the robustness of our findings across age groups, genders, countries, and gifted education programs (e.g., pull-out programs or separate gifted classes) is unclear. This problem is aggravated by the lack of studies from various geographic regions (i.e., there was only one included study that was not conducted in the USA or Europe). Second, despite a high similarity in demographic characteristics (see Tables 2 and 3), potentially relevant background variables (e.g., parental education aspirations) may differ between the intellectually gifted samples and non-gifted

samples included in this meta-analysis. Thus, future studies controlling for a wide array of demographic, socio-economic, and psychological background variables are needed to validate our meta-analytic results. Third, the available studies relied exclusively on self-report measures of multidimensional perfectionism. Gifted students might be especially sensitive to social desirability (Gross 1998). For achievement-related constructs, this tendency might be particularly pronounced because academic achievement plays an important role for gifted students' self-concept (e.g., Plucker and Stocking 2001). Hence, an important future research direction is the application of multimethod and multi-rater instruments to overcome the limitations of self-report. Fourth, the measurement invariance of perfectionism scales between gifted and non-gifted students has seldom been tested (Rice and Ray 2018). To our knowledge, there is no study that tested scalar measurement invariance of perfectionism measures between intellectually gifted students and non-gifted students, which is required to compare factor means. Consequently, perfectionism scales might capture different underlying constructs in intellectually gifted students and non-gifted students. However, measurement invariance between intellectually gifted and non-gifted students has been established for various other personality constructs (e.g., Preckel et al. 2017; Van den Broeck et al. 2014). Future qualitative research might contribute to clarifying the questions whether intellectually gifted students and non-gifted students interpret perfectionism measures differently and whether self-presentation distorts quantitative comparisons between these populations. Fifth, we did not compare the percentages of intellectually gifted students and non-gifted students in different perfectionism clusters (e.g., non-perfectionists, healthy perfectionists, and dysfunctional perfectionists; Parker and Mills 1996) because cluster solutions were inconsistent and, therefore, not feasible to aggregate. Yet, cluster analysis provides relevant information regarding the distribution of multidimensional perfectionism beyond sample means and standard deviations. Thus, future research applying statistical techniques that test the robustness and replicability of perfectionism clusters is needed (e.g., confirmatory latent class analysis; Schmiege et al. 2018).

Practical Implications

This meta-analytic review has practical implications for the perception of the label "gifted," the identification of intellectual giftedness, and school intervention programs targeting perfectionism. A considerable number of empirical studies investigated differences in personality and adjustment between intellectually gifted and non-gifted students. In sum, the empirical evidence does not support the assumption that intellectually gifted students show a specific set of maladaptive personality characteristics (Neihart and See Yeo 2018; Zeidner and Shani-Zinovich 2011) or a higher risk for psychological disorders (for a meta-analysis, see Martin et al. 2010) compared to non-gifted students. Nevertheless, in the public and among teachers, there are various stereotypes regarding the personality of gifted individuals (e.g., Baudson 2016; Baudson and Preckel 2013; Preckel et al. 2015). This is problematic for gifted students because teachers' expectations towards specific groups may be self-fulfilling (Jussim et al. 1996; Matheis et al. 2019). Associating gifted students with specific, potentially maladaptive, personality characteristics may also give rise to stigmatization and adaptation of stereotypic role behavior (see Coleman and Cross 1988). To date, gifted students are confronted with unfounded assumptions regarding their allegedly increased perfectionistic concerns. These assumptions may shape both their self-concept and their perception by others. For instance, high aspirations of intellectually gifted students may be misinterpreted as maladaptive perfectionistic tendencies. Thus, it is important for teachers, counselors, and parents to communicate

that intellectual giftedness is not systematically associated with maladaptive forms of perfectionism.

Also in the field of giftedness research, some authors have assumed that intellectual giftedness is associated with a specific set of personality traits ("gifted personality"; e.g., Wellisch and Brown 2013) and personality characteristics such as perfectionism or overexcitabilities (i.e., over-reaction to external and internal stimuli) were proposed as indicators for the identification of intellectual giftedness (Ackerman 1997; Silverman et al. 1986). Our study adds to debunking the myth of a specific maladaptive "gifted personality" by providing reliable meta-analytic evidence demonstrating that perfectionistic concerns are not characteristic for intellectually gifted students and that perfectionistic strivings are only weakly to moderately elevated. Thus, perfectionism measures are by no means suitable for the identification of intellectual giftedness. This is particularly relevant for teachers' recommendations for gifted programs, which can be distorted by irrelevant factors that are not systematically associated with intellectual giftedness (e.g., Rothenbusch et al. 2016; Siegle et al. 2010).

Multidimensional perfectionism is highly relevant for understanding adjustment and maladjustment in intellectually gifted students (for reviews, see Speirs Neumeister 2018; Rice and Ray 2018) as well as in non-gifted students (e.g., Ashby et al. 2011; Madigan 2019; Stoeber and Rambow 2007). This meta-analytic review compared the levels of multidimensional perfectionism in intellectually gifted students and non-gifted students, but did not investigate consequences of multidimensional perfectionism. Hence, the implication of this meta-analytic review is to disapprove that higher levels of perfectionism are a core characteristic of intellectually gifted students, but the implication is not to downplay the role of perfectionism in the context of giftedness research and education. Therefore, findings on interventions to reduce maladaptive forms of perfectionism are also relevant for fostering intellectually gifted students. There are promising results from intervention studies aiming to reduce maladaptive forms of perfectionism (Arana et al. 2017; Chand et al. 2018; James and Rimes 2018). Some interventions are specifically designed to target intellectually gifted students (Mofield and Chakraborti-Ghosh 2010; Zakreski 2016). In the light of our findings, it seems that the effectiveness and efficiency of these interventions can be enhanced by selecting participants based on their initial levels of perfectionistic concerns rather than on the assumption that intellectually gifted students per se display increased levels of perfectionistic concerns.

Conclusion

This meta-analytic review provided preliminary evidence that perfectionistic strivings, but not perfectionistic concerns, are weakly to moderately elevated in intellectually gifted students. Thus, intellectually gifted students as a group have a somewhat stronger tendency to set high personal standards for themselves compared to non-gifted students, but this tendency is not accompanied by increased concerns over failing to meet these standards. In sum, there is no empirical basis for the frequently repeated assumption that maladaptive forms of perfectionism are a core characteristic of intellectually gifted students.

Compliance with Ethical Standards

Conflict of Interest The authors declare that they have no conflict of interest.

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