Article

The Psychological Well-Being of Early Identified Gifted Children

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Evelyn H. Kroesbergen[1], Mare van Hooijdonk[1], Sietske Van Viersen[1,2], Marieke M. N. Middel-Lalleman[1], and Juliët J. W. Reijnders[1]

Abstract

This study examined the psychological well-being of gifted primary school children. From a screening sample of 233 children in Grades 1 and 2 across five schools in the Netherlands, 35 children achieving high scores on two out of three selection criteria (teacher nomination, creativity, and nonverbal reasoning ability) and 34 typically developing children were selected to participate in the study. Combinations of grouping criteria were used to create different subsamples within the gifted sample. In general, the differences in well-being between the gifted and the comparison group were relatively small, although the gifted children experienced lower self-worth and social acceptance. In contrast, within the sample of gifted children, some differences were found between selected subgroups. Highly creative gifted children experienced lower feelings of well-being than less creative gifted children, while the reverse was true for children who were nominated by their teacher. Additionally, high-performing gifted children showed higher psychological well-being than underachievers.

Keywords

gifted, identification, intelligence, creativity, psychological well-being

Much controversy exists, both in the literature and among practitioners, about whether or not gifted children experience a lower level of well-being than their peers. The empirical evidence concerning the psychological well-being of gifted children has shown mixed results (Amini, 2005). Gifted children have been shown to excel in their (academic) achievements if their potential is allowed to flourish in education adapted to their needs (Reis & Renzulli, 2010; Subotnik, Olszewski-Kubilius, & Worrell, 2011). As such, throughout their developmental processes, gifted children need to be supported in order to attain excellent achievements (Horowitz, Subotnik, & Matthews, 2009; Subotnik & Rickoff, 2010; VanTassel-Baska, Bracken, Feng, & Brown, 2009). However, gifted children often seem to fail to achieve their full potential due to a lack of support, causing underachievement and/or boredom, which are possible causes of reduced well-being in gifted children (Neihart, Reis, Robinson, & Moon, 2002; Preckel, Götz, & Frenzel, 2010; Subotnik et al., 2011). The question remains whether *only* gifted children whose potential is not fully addressed develop lower feelings of well-being, or whether such a pattern may be found within the *entire* gifted population. In the current study, the well-being of various subgroups of young gifted children in the first years of formal schooling was examined.

Psychological Well-Being

In a systematic review of the literature on the well-being of children, Pollard and Lee (2003) concluded that the definitions of well-being in children vary so greatly that comparison seems impossible. However, they did find some consensus on the different domains of child well-being. Five distinct domains of well-being were defined: *physical, psychological, cognitive, social*, and *economic*, with the note that psychosocial indicators fall within the psychological domain. The present study focused on psychological well-being as described by Neihart (1999). She included several domains in her definition and defined psychological well-being as the presence of a positive self-concept, the absence of psychological problems, and the presence of peer relationships. While some authors stated that measuring child psychological well-being should merely focus on positive indicators such as positive emotions and mental health, self-concept, social competence, and peer relationships (Lippman, Moore, & McIntosh, 2011; Pollard & Lee, 2003), others, including Neihart (1999), argued that both positive and negative indicators should be included to obtain a complete picture (Pollard & Lee, 2003). These negative indicators of psychological well-being include the presence of psychological problems such as depression, anxiety, deviant behavior, and psychiatric disorders as measures (Neihart, 1999).

[1]Utrecht University, Utrecht, Netherlands
[2]University of Amsterdam, Amsterdam, Netherlands

Corresponding Author:
Evelyn H. Kroesbergen, Utrecht University, Centre for Cognitive and Motor Disabilities, PO Box 80140, 3508 TC Utrecht, Netherlands.
Email: e.h.kroesbergen@uu.nl

In general, schooling has been shown to affect the well-being of all children (Spratt, Shucksmith, Philip, & Watson, 2006). When entering school at age 4 to 5 years, the self-concept of most children is positive (Eccles, Wigfield, Harold, & Blumenfeld, 1993; Wigfield, 1994). As formal learning commences, children begin to receive more achievement-based evaluations, are compared with other children more frequently, and develop the cognitive skills to evaluate their own achievements more realistically (Wigfield & Eccles, 2000). Consequently, self-concept is likely to become more realistic and therefore less positive around the ages of 6 to 8 years. For this reason, it is of interest to measure well-being at this age, especially because of the educational needs of gifted children. Additionally, studies have shown early identification of giftedness is essential in order to fully develop a child's potential and to prevent boredom (Jackson, 2003; Pfeiffer, 2009). Therefore, the present study focused on gifted children in the first years of primary education.

Well-Being of the Gifted

Based on a longitudinal study of gifted individuals, Terman (1922; as cited in Neihart, 1999) argued that gifted individuals are less likely to suffer from psychological problems than their nongifted peers. Vialle, Heaven, and Ciarrochi (2007) found that gifted secondary school–aged children were less satisfied with their social support than nongifted children, indicating they experienced a lower level of well-being, but that teachers rated gifted children as having fewer emotional or behavioral problems than their nongifted peers. Several other studies found that gifted children experienced a higher level of psychological well-being than their comparable peers in multiple domains (e.g., Bain & Bell, 2004; Litster & Roberts, 2011).

However, other studies found that both groups did not differ on measures of psychological well-being (Bain & Bell, 2004; Lee, Olszewski-Kubilius, & Turner Thomson, 2012; Shechtman & Silektor, 2012). Also, Neihart et al. (2002) concluded that gifted children were at least as robust as any other group regarding well-being. If well-being problems arose, this was often due to an out-of-sync environment. A meta-analysis by Litster and Roberts (2011) on self-concept and perceived competencies of gifted and nongifted children showed that gifted children scored significantly higher on measures of academic, behavioral, and global self-concept. In contrast, gifted children rated themselves lower on physical appearance and athletic competence. Based on these studies, there is evidence that the self-concept of gifted children regarding intelligence and reasoning abilities is similar to or higher than that of nongifted children, because of experiences of success and, in general, high achievement. Furthermore, their social self-concept and physical well-being may be comparatively lower because gifted children do not match with their nongifted peers in interests and cognitive level of conversations and play. There is no unidirectional evidence that gifted children are more prone to psychological problems.

Criteria for Identifying Giftedness

Besides educational fit and personal characteristics, the type of giftedness may be related to the psychological well-being of this population (Lee et al., 2012; Litster & Roberts, 2011; Neihart, 1999; Shi, Li, & Zhang, 2008). Although many researchers have attempted to provide a definition, there is still no consensus regarding the definition of giftedness. This may be due to the fact that terms used to define this concept presuppose different meanings and refer to a theoretical as well as a practical concept (Mönks & Katzko, 2005). Two main emphases underlying the definitions of giftedness may be identified. The first defines giftedness as an innate factor that children possess from birth (Heller, 1999), here referred to as potential. The second defines giftedness as tangible behavior expressed in excellent achievements within a certain subject (Sternberg, 2005). These points of view merge in the *differentiated model of giftedness and talent* (Gagné, 1985, 2004). Gagné presented the talent development process as the transformation of outstanding natural abilities—or potential—into outstandingly developed skills that define talent. This developmental process is catalyzed by interpersonal processes, environmental influences, and chance.

David Lohman has extensively studied identification processes for gifted children, especially regarding those who have not had the opportunity to excel. A distinction can be made between a *high-accomplished group*, who displays exceptional achievement within a particular domain, and a *high-potential group*, who does not display exceptional skills (yet) but has the potential to develop them (Lohman, 2005a). Lohman and Gambrell (2012) pleaded for the use of verbal-deductive and quantitative reasoning abilities to identify giftedness. A nonverbal reasoning test may be used as a screening instrument to identify those who are not yet ready for advanced learning programs and have not excelled in a particular domain yet (Lohman, 2005b). Nonverbal tests should always be accompanied by evidence for high accomplishment on a particular domain or relatively high verbal or quantitative reasoning abilities (Lohman, 2005b). According to Lohman and Korb (2006), a child may be identified as gifted on the basis of a single measure of giftedness at one point in time, but may not meet this criterion again a year later. Similarly, employing a teacher rating to assess whether or not a child is academically gifted is biased, since teachers mostly acknowledge the academic results of a child (Lakin & Lohman, 2011). Therefore, it is always important to use multiple selection criteria for giftedness (Lohman, Korb, & Lakin, 2008; Moon & Rosselli, 2000). The use of both formal sources (such as standardized tests) and informal sources (such as a teacher's opinion) are recommended. Since there is a relationship between intelligence and school achievement, indicators of the latter

should be included as well (Curby, Rudasill, Rimm-Kaufman, & Konold, 2008; Pfeiffer, 2009).

Based on these recommendations, gifted children in the present study were selected on the basis of three possible indicators of giftedness, with the purpose of including both the high-achieving and the high-potential—or underachieving—group (Lohman, 2005b). The first indicator was a teacher nomination, for which teachers were asked to consider logical/analytic thinking, abstract thinking, mathematical thinking, scientific/technical thinking, language skills, learning ability, power of deduction/combination, broad knowledge, and special knowledge of a domain in the process of identifying gifted children (Heller, 2004). Despite clear instructions, teachers usually base their nomination of a gifted child on the assumption of innate giftedness by identifying those children who are able to excel with limited support (Lohman, 2005b; Subotnik et al., 2011) or those who are able to have a high level of achievement due to their hard work (Duckworth, Kirby, Tsukayama, Berstein, & Ericsson, 2010; Gagné, 2010). This indicator was therefore assumed to provide an indirect indication of giftedness.

The second indicator is a measure of creativity. Creativity is the ability to constitute and communicate new and useful ideas or procedures and has often been associated with giftedness (Csikszentmihalyi & Wolfe, 2000). It is presupposed that creative achievements are predicted by differences in ability (Robertson, Smeets, Lubinski, & Benbow, 2010; Wai, Lubinski, & Benbow, 2005), but it is still debated whether creativity is a predictor or an expression of giftedness or both (Subotnik et al., 2011). In general, creativity has not been much appreciated nor stimulated in our school systems (Kim, 2011). Highly creative children may thus be disadvantaged, which may have a negative influence on their feelings of well-being in general and their perceived competence in specific. Although it remains unclear whether creativity can be considered a cause or a consequence of giftedness, we followed the recommendations of Kaufman, Plucker, and Russell (2012) and included it in the current study as an indicator for the multidimensional concept of giftedness.

The third indicator used for giftedness is a measure of nonverbal reasoning ability. Some gifted children's abilities have not yet fully developed (Subotnik et al., 2011) and consequently, these children will not be considered high achievers, leading to a lack of teacher identification and nomination. However, these nonnominated children may possess a high level of intelligence and—as multiple researchers propose—creativity (Heller, 1999; Kim, 2005; Sternberg, 2010), and are therefore important to include as part of this criterion. Teachers' recognition and support were shown to be positively related to student well-being (Hughes, Cavell, & Wilson, 2001; Suldo et al., 2009). Within education, teachers might differ in their perceptions of whether a student is gifted or not, which might influence students' feelings of recognition and acceptance, as well as achievement. Therefore, it is especially interesting to study whether children not identified and nominated by their teacher experience lower levels of well-being.

The current study investigated the psychological well-being of young gifted children selected on the basis of different criteria, and thus representing different subgroups of gifted children. By addressing different subgroups, we aimed to extend the existing knowledge on factors that can explain the differences in psychological well-being in gifted children. In general, it was expected that specific combinations of characteristics of giftedness would be related to different levels of psychological well-being in these subgroups of young gifted children.

Objectives and Expectations

The objective of the present study was to compare the psychological well-being of young gifted children with the well-being of their nongifted peers (hereafter, comparison group). In addition, the well-being of different subgroups of gifted children, as based on different selection criteria for giftedness (i.e., teacher nomination, creativity, and nonverbal intelligence), was compared to examine whether specific indicators of giftedness may represent different subtypes of giftedness and as such account for variability in the levels of well-being. For this reason, the relation between school achievement and well-being was also examined. Since we had specific expectations about the directions of the differences between the subgroups based on previous research, informative hypotheses were formulated and evaluated instead of the usual null hypotheses, which do not allow for the inclusion of prior knowledge. The informative hypotheses were evaluated using Bayesian statistics and are explained in more detail in the Method section.

First, we evaluated whether the psychological well-being (measured by positive self-concept and the absence of psychological problems) of the identified gifted children differed positively or negatively from the comparison group. Since the findings of previous studies showed no clear differences generally or in favor of gifted children regarding self-concept of intelligence and reasoning abilities, or the social status of gifted children compared with an average-achieving group, it was not possible to formulate a hypothesis in a specific direction. Therefore, hypotheses in both directions were evaluated to determine whether gifted children showed higher or lower psychological well-being than the comparison group.

Second, we investigated whether there was a difference in well-being between highly creative children and children with average or low creativity. It was expected that highly creative children would experience lower educational fit and would thus show lower psychological well-being than children with average or low creativity. Third, we evaluated whether there was a difference in well-being between gifted children nominated by their teacher and nonnominated gifted children who were only selected based on their intelligence

and creativity. This question provided specific information about the role of the educational fit in children's psychological well-being. It was assumed that educational fit would be better for those children whose teacher was aware of their giftedness and a good educational fit has been shown to enhance well-being (Litster & Roberts, 2011; Neihart, 1999). Therefore, we expected that the psychological well-being of teacher-nominated children would be higher than that of nonnominated children. Finally, the possibility of a difference in well-being between gifted children with high academic achievements and gifted underachievers was investigated. It was expected that gifted children obtaining high math and reading scores would experience higher levels of well-being than underachieving children who did not show high math and reading scores, because the former are better facilitated in translating their potential into high achievement (Lohman, 2005b).

This study provides a unique contribution to research on the psychological well-being of gifted children due to both the unconventional selection method and the sample age. In their review on young gifted children, Walsh, Kemp, Hodge, and Bowes (2012) stressed the need for empirical research in this area using a clear definition of giftedness. To the best of our knowledge, our study is the first to employ a multidimensional identification procedure, using teacher nomination, creativity, and nonverbal intelligence to identify gifted children as young as 6 and 7 years old. Very few studies have examined the well-being of gifted children in this age group; most cited studies have used older samples.

Method

Participants and Procedure

Five regular primary schools in the Netherlands were selected on the basis of willingness to participate. The schools were situated in both rural and urban areas. The selected schools were known for relatively high numbers of above-average performing children. This meant that a sizeable group of gifted children could be found in a relatively small sample. Letters to obtain parental consent for participation were sent to parents of 268 children in Grades 1 and 2 of the selected schools. In the Dutch school system, children attend kindergarten from age 4 onward and are usually 6 years old when starting first grade. Consent was obtained for 233 children (87%), who then took part in the screening. Recent psychological examination, objections with regard to missing lessons, and failure to return the letter of consent were among the reasons for consent not being granted. Further selection took place on the basis of teacher nomination, a test of creativity, and a test of nonverbal intelligence.

A cross-sectional descriptive field study was conducted. Children were selected to participate on the basis of visible high-achievement (teacher nomination), creativity (Test for Creative Thinking–Drawing Production [TCT-DP]; Urban & Jellen, 1996), and above-average nonverbal ability (Raven's Standard Progressive Matrices [SPM]; Raven, Court, & Raven, 1979). The authors administered the TCT-DP and SPM in a classroom setting, during one session that lasted a maximum of 1.5 hours. The authors scored and coded all tests and teacher-provided information.

To select high-achieving gifted children as well as gifted underachievers, children were selected on the basis of meeting at least *two* of the following three criteria: a score on the TCT-DP within or above the 90th percentile, a teacher nomination score of 1 (10% highest scoring pupils, based on observations and marks by teachers), and/or a percentile score on the Raven's SPM of 95 or higher (all children had a percentile score of at least 90). This set of selection criteria resulted in a sample of 35 gifted children, 12 of whom also attained math and reading scores above the 75th percentile (Table 1).

An additional sample of 34 children (the comparison group) was selected from the same schools and matched with the gifted group on the basis of gender, age, and average screening scores to allow comparisons between the gifted group and their peers. In total, 69 children took part in the study. Descriptive statistics of the selected and the comparison group are displayed in Table 2. There were no differences between the groups regarding sex or age, but as expected, the groups differed in IQ score and parental level of education. It should be noted that 19 children out of the 35 gifted children were selected based on the combination of intelligence and teacher nomination, 7 based on intelligence and creativity, and 3 on creativity and teacher nomination. Only five children met all three criteria (see Table 1). Additionally, subgroups of gifted children were created. Within the group of gifted children, 15 children had a high score on creativity (i.e., above the 90th percentile) and were referred to as the high-creative children (the other 20 children were thus referred to as low-creative). Teachers nominated 28 children as gifted, which were referred to as the teacher-nominated children (vs. the 7 nonnominated children). Finally, 12 of the gifted children had high scores on reading and math and were referred to as high performers, the other 23 children were referred to as underachievers, as they performed below the 75th percentile on standardized reading and/or math tests despite their giftedness as indicated by the other criteria.

Instruments

Teacher Nomination. Using the Teacher's Checklist: Intellectual Giftedness (Heller, 2004), teachers were asked to allocate to each child a score on the basis of several criteria indicating intellectual giftedness. These criteria included logical/analytic thinking, abstract thinking, mathematical thinking, scientific/technical thinking, language skills, learning ability, power of deduction/combination, broad knowledge, and special knowledge of a domain. A score of 1

Table 1. The Number of Selected Gifted Children Who Met One or More Selection Criteria.

	Boys		Girls		Total	
Selection criteria	*n*	%	*n*	%	*n*	%
IQ	12	92.3	19	86.4	31	88.6
Teacher nomination	10	76.9	18	81.8	28	80.0
Creativity >90	4	30.8	11	50.0	15	42.9
Math and reading >75	5	38.5	7	31.8	12	34.3
IQ and nomination	10	76.9	15	68.2	25	71.4
IQ and creativity	4	30.8	8	36.4	12	34.3
Creativity and nomination	1	7.7	7	31.8	8	22.9
IQ, nomination, and creativity	1	7.7	4	18.2	5	14.3

Note. IQ is score above the 95th percentile. Teacher nomination is highest 10% children showing intellectual giftedness. Creativity is score above the 90th percentile. Math and reading is score in the highest category (above 75th percentile).

Table 2. Descriptive Statistics of the Gifted and Nongifted Groups in the Sample.

Variable	Selected group (gifted)	Comparison group (nongifted)
n	35	34
Percentage of male	37.1	41.2
M (*SD*) age in years	7.12 (0.60)	7.35 (0.55)
Minimum age, maximum age	6.00, 8.17	6.25, 8.17
Percentage of parents attended higher education	85.7	60.6
Percentage of Dutch nationality	100	100
M (*SD*) IQ score	134.66 (12.68)	109.79 (6.18)

referred to the top 10% of the group; a score of 3 referred to scoring below the top 20% of the group. According to Heller (2004), this is an adequate source of information about possible giftedness.

Creativity. For creativity, the children were asked to complete the TCT-DP (Urban & Jellen, 1996), which was designed to measure a holistic concept of creativity. This test involved children making a drawing on the basis of a few given figural fragments. The drawing was assessed on a number of standardized criteria including completion, unconventionality, and connections to provide a measure of creativity. Scores ranged from 0 to 72 points and were converted to percentile scores based on age. Limited research has been done on the reliability and validity of the test, but initial results were mostly sufficient and encouraging (in various studies, the interrater reliability was found to be above $r = .87$, the parallel test reliability between $r = .62$ and .70; Urban, 2005). Within the present study, the interrater reliability was .91.

Nonverbal Intelligence. For nonverbal intelligence, all children completed the Raven's SPM (Raven et al., 1979), which measures fluid intelligence. This test consists of 60 items with parts of a figure missing. A child has to decide which of the given options fits in the missing part. Scores ranged from 0 to 60 points and were converted into percentile scores. For all children, a standardized IQ score ($M = 100$, $SD = 15$) and percentile score were computed. The internal consistency was good ($\alpha = .88$). Although the authors are aware of the limitations of this measure and the possible inflation of scores due to the Flynn effect, it was mainly chosen for practical reasons (i.e., group administration and availability).

Academic Achievement. The teacher was asked to provide children's scores of a norm-based test for mathematics and reading (Janssen, Scheltens, & Kraemer, 2005). This is a Dutch national test that is commonly used in schools to monitor the progress of primary school children. The psychometric characteristics of these instruments have been studied extensively and are very good (reading: $\alpha = .96$, mathematics: $\alpha = .93$; Janssen et al., 2005). Scores were converted into five percentile ranges, with the highest score (A) representing percentiles 75 to 100. Math and reading scores were used, because these are the most commonly assessed domains at this young age in the Netherlands.

Well-Being. Both positive and negative indicators were used as benchmarks of psychological well-being. Based on the definition of psychological well-being used in this study, criteria to determine psychological well-being included *self-concept* (perception of a child's own behavior) and presence (or absence) of *psychological problems* (parental perception of a child's behavior; Neihart, 1999; Pollard & Lee, 2003).

To measure *self-concept*, all participating children completed a number of scales of the *Competentie Belevingsschaal voor Kinderen* (Veerman, Straathof, Treffers, van den Berg, & Ten Brink, 1997), a Dutch translation of the Self-Perception Profile for Children by Harter (1985). This questionnaire for children measures self-reported overall self-worth and three domain-specific competences: scholastic competence ($\alpha = .74$), social acceptance ($\alpha = .75$), and behavioral conduct ($\alpha = .69$). The maximum score per scale was 24 points, while the

minimum score was 6 points. Each test item consists of two sentences that describe a certain group of children. The children have to choose the sentence that is most applicable to their own situation/perception. The original version of the *Competentie Belevingsschaal voor Kinderen* was examined by Rudasill and Callahan (2008) for reliability and validity with gifted populations. It was found that the reliability was similar to the original reports by the same author, except for the scholastic competence scale, which had a lower reliability. To account for this lower reliability, in the current study, nine items measuring motivation, school enjoyment, and perceived intellectual challenge were added to form the scale "general school enjoyment." The maximum score for this scale was 36 points; the minimum score was 9 points. Cronbach's alpha for this scale was sufficient ($\alpha = .79$).

To measure the presence of *psychological problems*, parents of the selected children were asked to complete the parental version of the Strengths and Difficulties Questionnaire (R. Goodman, 1997). This questionnaire measures psychological problems and skills using 25 attributes about children aged 4 to 16 years, which are rated either "not true" (score 0), "somewhat true" (score 1), or "certainly true" (score 2). The attributes represent several scales including emotional problems, conduct problems, hyperactivity and inattention, peer relationship problems, and prosocial behavior. Item scores were added to obtain three subscale scores (cf. Muris, Meesters, & van den Berg, 2003): internalizing problems (emotional and peer symptoms), externalizing problems (conduct and hyperactivity symptoms), and prosocial skills (A. Goodman, Lamping, & Ploubidis, 2010). Construct validity and reliability of this instrument were evaluated as satisfactory (Evers, Braak, Frima, & Van Vliet-Mulder, 2009-2011; αs ranged from .71 to .82).

Analysis

Instead of using traditional frequentist analyses, Bayesian statistics were used to examine the differences in psychological well-being between gifted and nongifted children and between different subgroups of gifted children (for a detailed introduction, see Hoijtink, 2012; Klugkist, Laudy, & Hoijtink, 2005; Van de Schoot et al., 2011). Bayesian model selection, using the BIEMS software package, offers the possibility of using prior knowledge to formulate and evaluate informative hypotheses using equality and inequality constraints between groups and to compare competing hypotheses (Mulder et al., 2009; Mulder, Hoijtink, & de Leeuw, 2012; Mulder, Hoijtink, & Klugkist, 2010). In addition, this type of analysis enables the testing of multiple hypotheses (as is the case in this study) without the loss of power (due to, e.g., Bonferroni-type corrections, as elaborated in Hoijtink, Klugkist, & Boelen, 2008; Van de Schoot et al., 2011), and is especially suitable for small sample sizes, as it is not based on normality or asymptotic assumptions (Gill, 2008).

Prior to the Bayesian analyses, the expectations that we formulated based on the literature were translated into informative hypotheses with (in)equality constrained parameters (Klugkist et al., 2005). Here, the parameters in the analyses were the (sub)group means on the different components of psychological well-being. For the first research question about the psychological well-being of gifted children in general versus the nongifted comparison group, the first hypothesis stated that the psychological well-being of the gifted children would be higher than the comparison group, that is, $\mu_G > \mu_{NG}$ (Model 1). The second hypothesis stated that the psychological well-being of the gifted children would be lower than of the comparison group, that is, $\mu_G < \mu_{NG}$ (Model 2). Both of these informative hypotheses were compared with the alternative hypothesis, or unconstrained model, to protect against incorrectly choosing a wrong or poorly formulated hypothesis, that is, μ_G, μ_{NG} (Model 0; Van de Schoot et al., 2011).

For the comparisons of the different subgroups, which were based on the specific expectations formulated under "objectives and expectations," only one informative hypothesis was compared with the alternative hypothesis per research question. For the second research question concerning the psychological well-being of the high- versus average- or low-creative children, the informative hypothesis stated that the psychological well-being of high-creative children would be lower than that of low-creative children, that is, $\mu_{HC} < \mu_{LC}$ (Model 1) and μ_{HC}, μ_{LC} (Model 0) for the alternative hypothesis. For the third research question about the psychological well-being of gifted children who were nominated or not by their teacher, the informative hypothesis stated that the psychological well-being of teacher-nominated children would be higher than the nonnominated children, that is, $\mu_{TN} > \mu_{NN}$ (Model 1) and μ_{TN}, μ_{NN} (Model 0) for the alternative hypothesis. For the fourth research question about the psychological well-being of high-performing versus underachieving gifted children, the informative hypothesis stated that the psychological well-being of the high-performers would be higher than the underachievers, that is, $\mu_{HP} > \mu_{UA}$ (Model 1) and μ_{HP}, μ_{UA} (Model 0) for the alternative hypothesis.

Subsequently, the first step of the Bayesian analyses involves the calculation of the Bayes factor (or $BF_{i,u}$) of an informative hypothesis (H_i) versus the alternative hypothesis (H_u). The BF represents the amount of support from the data in favor of one hypothesis compared with another hypothesis. In addition to the BF, posterior model probabilities (PMPs) can be computed, representing the relative support for a specific hypothesis within a set of hypotheses (Klugkist, van Wesel, & Bullens, 2011). Here, prior probabilities were assumed to be equal for all models. Calculating the PMPs is especially interesting when comparing competing hypotheses, and is done by dividing the $BF_{i,u}$ of each model by the sum of BFs of the other models of interest. It should be kept in mind that, in a Bayesian framework, the definition of

Table 3. Model Comparisons of the Psychological Well-Being of Gifted Versus Nongifted Children.

	Model 0 (G, NG)		Model 1 (G > NG)		Model 2 (G < NG)	
Component	BF	PMP	BF	PMP	BF	PMP
Psychological well-being	1.00	0.13	0.02	0.00	6.58	**0.87**
Self-worth	1.00	0.33	0.03	0.01	1.96	**0.66**
Scholastic competence	1.00	0.33	0.81	0.27	1.18	**0.39**
Social acceptance	1.00	0.33	0.36	0.12	1.65	**0.55**
Behavioral conduct	1.00	0.33	1.05	**0.35**	0.96	0.32
School enjoyment	1.00	0.33	0.79	0.26	1.23	**0.41**
Internalizing problems	1.00	0.33	0.11	0.04	1.88	**0.63**
Externalizing problems	1.00	0.33	0.69	0.23	1.31	**0.44**
Prosocial skills	1.00	0.33	0.86	0.23	1.13	**0.38**

Note. G = gifted children; NG = nongifted children; BF = Bayes factor; PMP = posterior model probability. PMPs in bold indicate the model that received most relative support from the data.

"probability" is defined as a degree of belief, or the probability that a hypothesis is true. Moreover, in this type of analysis, it is not necessary to provide additional estimates of effect size. The effect size is incorporated into the BF in the sense that a larger effect size results in a larger BF (Kluytmans, Van de Schoot, Mulder, & Hoijtink, 2012). Kass and Raftery (1995) provided more information about cutoffs that help when interpreting generated BFs. A BF below 1 indicates that there is more support for the alternative hypothesis, a BF between 1 and 3 represents a small effect in favor of the informative hypothesis, between 3 and 10 means that there is substantial evidence supporting the informative hypothesis, and above 10 indicates strong evidence. Both multivariate (psychological well-being overall) and univariate results (individual components) on the group comparisons were reported.

Results

Giftedness

Table 3 shows the BFs and PMPs for all three models in the analysis on the gifted versus comparison children, presenting the results for psychological well-being overall and each component separately. Recall that in this part of the analyses Model 0 represented the alternative hypothesis (μ_G, μ_{NG}), Model 1 stated that gifted children show higher psychological well-being than the comparison group ($\mu_G > \mu_{NG}$), and Model 2 stated that gifted children show lower psychological well-being than comparison children ($\mu_G < \mu_{NG}$). The multivariate results showed that, taking all components of psychological well-being together, Model 2 received about 6.5 times more support from the data than Model 0, which is considered substantial (PMP = 0.87). The univariate results showed that Model 2 received the most support from the data for almost all components, although not all BFs were equally convincing. The probabilities that the hypothesis under Model 2 was true varied between 0.38 and 0.66. For the behavioral conduct component, Model 1 received most support from the data (PMP = 0.35). When taking into account the means on the different components displayed in Table 4 and the relatively low BFs and PMPs, it can be stated that, overall, gifted children did not differ from their comparison peers in their reported feelings about scholastic competence, behavioral conduct, and school enjoyment and in how many externalizing problems and prosocial skills they showed. In contrast, they indeed experienced lower self-worth and social acceptance than comparison children. However, the gifted children also showed fewer internalizing problems than their nongifted peers.

Creativity

In Table 5, the BFs and PMPs are displayed for both models in the analysis on the high-creative children versus low-creative children. Again, the results are also displayed for each component of psychological well-being separately. Recall that in this approach, Model 0 was the alternative hypothesis (μ_{HC}, μ_{LC}) and Model 1 stated that the high-creative children show lower psychological well-being than the low-creative children ($\mu_{HC} < \mu_{LC}$). For psychological well-being, overall, Model 1 received about 30 times more support from the data (PMP = 0.97), which is considered convincing. For all individual components, Model 1 received most support from the data, on average about 1.85 times more than the alternative hypothesis. The PMPs of Model 1 varied between 0.60 and 0.67. The means in Table 6 indicated that the high-creative children had lower scores on self-worth, scholastic competence, social acceptance, behavioral conduct, and school enjoyment, and had higher scores on internalizing and externalizing problems and lower scores on prosocial skills.

Teacher Nomination

Table 7 displays the model comparisons on the psychological well-being of the teacher-nominated children and the non-nominated children. In this part of the analyses, Model 1

Table 4. Maximum Likelihood Estimations of the Means and Standard Deviations for the Psychological Well-Being Components of the Gifted and Nongifted Children.

	Gifted children (n = 35)				Nongifted children (n = 34)			
Component	*M*	*SD*	Minimum	Maximum	*M*	*SD*	Minimum	Maximum
Self-worth	19.57	4.13	9	24	21.65	3.09	10	24
Scholastic competence	18.43	3.99	10	24	18.68	4.00	11	24
Social acceptance	17.26	3.58	8	24	18.15	3.79	11	24
Behavioral conduct	19.69	3.35	12	24	19.65	3.31	10	24
School enjoyment	26.54	4.69	18	36	26.91	5.64	15	36
Internalizing problems	1.69	1.91	0	7	2.79	3.27	0	12
Externalizing problems	3.71	3.05	0	15	4.06	3.67	0	13
Prosocial skills	8.51	1.77	2	10	8.59	1.50	5	10

Table 5. Model Comparisons of the Psychological Well-Being of High-Creative Versus Low-Creative Children.

	Model 0 (HC, LC)		Model 1 (HC < LC)	
Component	BF	PMP	BF	PMP
Psychological well-being	1.00	0.03	29.67	**0.97**
Self-worth	1.00	0.34	1.97	**0.66**
Scholastic competence	1.00	0.33	1.99	**0.67**
Social acceptance	1.00	0.34	1.96	**0.66**
Behavioral conduct	1.00	0.40	1.48	**0.60**
School enjoyment	1.00	0.35	1.84	**0.65**
Prosocial skills	1.00	0.36	1.80	**0.64**
	Model 0 (HC, LC)		Model 1 (HC > LC)	
Component	BF	PMP	BF	PMP
Internalizing problems	1.00	0.34	1.98	**0.66**
Externalizing problems	1.00	0.36	1.80	**0.64**

Note. HC = high-creative children; LC = low-creative children; BF = Bayes factor; PMP = posterior model probability. PMPs in bold indicate the model that received most relative support from the data.

Table 6. Maximum Likelihood Estimations of the Means and Standard Deviations for the Psychological Well-Being Components of the High-Creative and Low-Creative Children.

	High-creative children (n = 15)				Low-creative children (n = 20)			
Component	*M*	*SD*	Minimum	Maximum	*M*	*SD*	Minimum	Maximum
Self-worth	17.73	3.92	9	24	20.95	3.80	10	24
Scholastic competence	16.53	4.19	10	24	19.85	3.25	14	24
Social acceptance	15.60	3.31	8	19	18.50	3.32	12	24
Behavioral conduct	19.20	2.54	16	24	20.05	3.87	12	24
School enjoyment	25.00	5.14	19	34	27.70	4.61	18	36
Internalizing problems	2.60	2.29	0	7	1.00	1.21	0	4
Externalizing problems	4.60	3.16	1	15	3.05	2.87	0	9
Prosocial skills	8.00	2.30	2	10	8.90	1.17	6	10

stated that the teacher-nominated children show higher psychological well-being than the nonnominated children ($\mu_{TN} > \mu_{NN}$). Again, Model 0 represented the alternative hypothesis (μ_{TN}, μ_{NN}). Taking all components of psychological well-being together, Model 1 received 10.55 times more support from the data than Model 0, which is considered substantial

Table 7. Model Comparisons of the Psychological Well-Being of Teacher-Nominated Versus Nonnominated children.

	Model 0 (TN, NN)		Model 1 (TN > NN)	
Component	BF	PMP	BF	PMP
Psychological well-being	1.00	0.09	10.55	**0.91**
Self-worth	1.00	0.34	1.96	**0.66**
Scholastic competence	1.00	0.35	1.84	**0.65**
Social acceptance	1.00	0.37	1.68	**0.63**
Behavioral conduct	1.00	0.41	1.45	**0.59**
School enjoyment	1.00	0.37	1.69	**0.63**
Prosocial skills	1.00	0.34	1.98	**0.66**
	Model 0 (TN, NN)		Model 1 (TN < NN)	
Component	BF	PMP	BF	PMP
Internalizing problems	1.00	0.34	1.97	**0.66**
Externalizing problems	1.00	0.36	1.55	**0.61**

Note. TN = teacher-nominated children; NN = nonnominated children; BF = Bayes factor; PMP = posterior model probability. PMPs in bold indicate the model that received most relative support from the data.

Table 8. Maximum Likelihood Estimations of the Means and Standard Deviations for the Psychological Well-Being Components of the Teacher-Nominated and Nonnominated Children.

	Teacher-nominated children (*n* = 28)				Nonnominated children (*n* = 7)			
Component	*M*	*SD*	Minimum	Maximum	*M*	*SD*	Minimum	Maximum
Self-worth	20.39	3.89	11	24	16.29	3.55	9	20
Scholastic competence	18.96	4.08	10	24	16.29	2.93	13	22
Social acceptance	17.61	3.44	11	24	15.86	4.06	8	19
Behavioral conduct	19.89	3.53	12	24	18.86	2.55	17	24
School enjoyment	27.04	4.93	18	36	24.57	4.96	19	31
Internalizing problems	1.25	1.58	0	6	3.43	2.23	1	7
Externalizing problems	3.46	2.55	0	9	4.71	4.72	1	15
Prosocial skills	8.89	1.13	6	10	7.00	2.94	2	10

(PMP = 0.91). The results showed that for all individual components, Model 1 received the most support from the data, on average about 1.75 times more than the alternative hypothesis. The probabilities that the hypothesis under Model 1 was true varied between 0.59 and 0.66. As displayed in Table 8, the means indicated that the teacher-nominated children had higher feelings of self-worth, scholastic competence, social acceptance, behavioral conduct, and school enjoyment than their nonnominated peers. Also, they were reported to show fewer internalizing and externalizing problems and more prosocial skills.

Achievement

Finally, Table 9 shows the model comparisons for the analysis on the psychological well-being of high-performing children versus underachieving children. Here, Model 1 stated that the high-performing children show higher psychological well-being than the underachieving children ($\mu_{HP} > \mu_{UA}$) and Model 0 was the alternative hypothesis (μ_{HP}, μ_{UA}). For psychological well-being overall, Model 1 received about 10 times more support from the data (PMP = 0.91), considered substantial. The univariate results showed that for all components except social acceptance, Model 1 received the most support from the data, on average about 1.75 times more than the alternative hypothesis. The PMPs varied between 0.61 and 0.67. The means displayed in Table 10 revealed that the high-performing children showed higher self-worth, scholastic competence, behavioral conduct, and school enjoyment, showed more prosocial skills, and had fewer internalizing and externalizing problems than underachieving children. There seems to be no difference between these two groups of children in their feelings of social acceptance.

Table 9. Model Comparisons of the Psychological Well-Being of High-Performing Versus Underachieving Children.

	Model 0 (HP, UA)		Model 1 (HP > UA)	
Component	BF	PMP	BF	PMP
Psychological well-being	1.00	0.09	9.70	**0.91**
Self-worth	1.00	0.33	2.00	**0.67**
Scholastic competence	1.00	0.35	1.87	**0.65**
Social acceptance	1.00	0.49	1.06	**0.51**
Behavioral conduct	1.00	0.38	1.64	**0.62**
School enjoyment	1.00	0.37	1.74	**0.63**
Prosocial skills	1.00	0.39	1.59	**0.61**
	Model 0 (HP, UA)		Model 1 (HP < UA)	
Component	BF	PMP	BF	PMP
Internalizing problems	1.00	0.39	1.59	**0.61**
Externalizing problems	1.00	0.36	1.79	**0.64**

Note. HP = high-performing children; UA = underachieving children; BF = Bayes factor; PMP = posterior model probability. PMPs in bold indicate the model that received most relative support from the data.

Table 10. Maximum Likelihood Estimations of the Means and Standard Deviations for the Psychological Well-Being Components of the High-Performing and Underachieving Children.

	High-performing children (n = 12)				Underachieving children (n = 23)			
Component	*M*	*SD*	Minimum	Maximum	*M*	*SD*	Minimum	Maximum
Self-worth	22.50	2.54	15	24	18.04	3.99	9	24
Scholastic competence	20.00	3.16	15	24	17.61	4.19	10	24
Social acceptance	17.33	3.00	12	21	17.22	3.91	8	24
Behavioral conduct	20.50	3.53	12	24	19.26	3.25	14	24
School enjoyment	28.00	4.97	19	36	25.78	4.89	18	34
Internalizing problems	1.25	1.29	0	4	1.91	2.15	0	7
Externalizing problems	2.67	2.67	0	6	4.26	3.15	0	15
Prosocial skills	8.92	1.31	6	10	8.30	1.96	2	10

Discussion

In view of the controversy regarding the well-being of gifted children and the lack of research on this subject, this study aimed to contribute to empirical data regarding the well-being of young gifted children. The objective of this study was to compare the psychological well-being of young gifted children with the well-being of their peers and across groups of gifted children selected using several combinations of criteria. The overall hypothesis stating that the psychological well-being of gifted children would be different from that of the comparison group was partially accepted. In general, the gifted children did not differ from the comparison group at age 6 to 8 years on perceived scholastic competence, behavioral conduct, and school enjoyment, as well as expressed externalizing problems and prosocial skills. The only differences were that gifted children experienced lower self-worth and social acceptance but also fewer internalizing problems. It should be noted that these differences were found even though the children were only in first or second grade. When children grow older and have more educational experience, their well-being may change. Especially when the educational environment is not adapted to the needs of these children, this may have a negative effect on the development of self-worth and social acceptance.

Further analyses were conducted within the group of gifted children. The results showed a trend that children selected based on high creativity reported lower self-concept and experienced more internalizing and externalizing problems than less creative children. It might be that creative children do not have lower levels of well-being than less creative children per se, but that teachers are not always aware of the creative intelligence of children, leading to educational misfit and a lack of acknowledgment. Additionally, children who were nominated by their teacher showed a higher self-concept and fewer internalizing and externalizing problems than children who were not nominated by their teacher. These results support the assumption that educational fit is better for children when the

teacher is aware of their giftedness and their talents, and can be regarded as a predictor of psychological well-being (Litster & Roberts, 2011; Neihart, 1999). It should be noted, however, that children with higher levels of well-being and higher academic achievement were more easily identified as gifted, which might explain why children identified by their teachers had higher levels of well-being. Finally, the hypothesis stating that high-performing gifted children experience higher levels of well-being than underachieving gifted children was largely confirmed. The high-achieving children possessed a more positive self-concept and experienced fewer psychological problems than the underachievers.

Limitations

Our results should be interpreted with caution due to the relatively small sample size. Even though the Bayesian analyses were particularly suitable for small sample sizes, the group differences that were found on the individual well-being components can still be considered small. In addition, there was considerable heterogeneity within the gifted group, as was illustrated by some subgroups showing higher well-being than others. The fact that overall no differences were found for the gifted children on most components of well-being (differences were found in subgroups), may partly be explained by the large heterogeneity of the group and also the age of the children might have played a role (Mooij, Hoogeveen, Driessen, Van Hell, & Verhoeven, 2007). The children in this study were younger than in most other studies (Bain & Bell, 2004; Vialle et al., 2007). Lee et al. (2012), who also included young children, did not find a difference either. Moreover, the utilized measure of well-being might not have captured the entire range of well-being present within the gifted population. In other studies, gifted children were shown to have lower social and physical well-being (Lee et al., 2012; Litster & Roberts, 2011). Including these features might provide a more complete image.

The selection criteria were based on quite narrow measures, derived from a single instrument covering one aspect of giftedness per criterion (e.g., the use of Raven's SPM for measuring IQ), and further research should involve a more extensive test battery for all criteria. It should be noted that in this study both the IQ test and the creativity test had a strong visual component, which may have influenced the intercorrelations among the measures. Furthermore, the children included in this sample have only had formal schooling for 6 to 18 months and because these results were based on single measures of reading and math, the academic achievement measures should be interpreted with caution. Nonetheless, examining the trends provides important information, since this is the first study to investigate differences in psychological well-being in such a young group of children.

Additionally, only 15 gifted children met the criteria for creativity, whereas a gifted child is to a certain extent assumed to possess a high level of creativity (Heller, 1999). A possible explanation for this relatively low number of highly creative gifted children may be explained by the measurement of creativity. Within the present study, a rather specific expression of creativity was used (i.e., making a drawing to measure divergent thinking), whereas creativity may also be expressed in other forms (e.g., problem solving). Lubart, Pacteau, Jacquet, and Caroff (2010) recommended evaluating creativity using multiple scoring systems and using several tasks. Another viable explanation is that the 90th percentile criterion for the creativity test may be too high to identify a gifted child. In line with Subotnik et al. (2011), this study illustrated that it is not clear whether creativity may help in identifying gifted children. In order to use creativity as a selection criterion, it is necessary to gain more information regarding the expression of creativity for different types of gifted children and the way in which creativity may help identify giftedness.

Only those children who met two or more criteria of giftedness were included in this study. Accordingly, 35 gifted children were selected from a sample of 233 children. In this study, most children were selected based on the combination of intelligence and teacher nomination, while only five children met all three criteria. Consequently, particular types of gifted children who met only one criterion may have been excluded (Betts & Neihart, 1988). To determine whether this exclusion derogates gifted children, more research into separate selection criteria is needed. In line with other research, it appears that identifying gifted children on the basis of tangible behavior is easier than identifying children on the basis of nontangible factors. However, it may also be possible that there is a larger number of identified high-achieving gifted children compared with nonidentified gifted children, although the relatively low number of gifted students with high academic achievement contradicts this hypothesis.

Implications for Practice and Research

One of the merits of this study was that it used different selection methods for the identification of gifted children. Our study revealed that within the gifted population, different types of identification were related to different levels of well-being. This means that teachers should more thoroughly investigate their perceptions of giftedness and should carefully choose their identification procedures. Two thirds of the gifted children in this study could be identified as underachieving regarding the core subjects of mathematics and reading, because they failed to perform above the 75th percentile. Although these results should be interpreted with care, as our conceptual underpinning of underachievement in this young age group needs more research, it is remarkable that many of the children identified as gifted scored lower than expected on academic measures. This warrants the importance of early identification and education adjusted to their individual needs to allow these children to reach their full potential.

Although few differences were found between the gifted and the comparison group, within the gifted group, several subsamples were identified that had lower feelings of well-being. As self-concept is subject to change, especially at the age of 6 to 8 years, it is of great importance that processes regarding well-being and self-concept are monitored in all children but in gifted children in particular.

Conclusion

In sum, the present study forms a limited but thought-provoking contribution to the literature on giftedness and psychological well-being. Although the small sample size demands that the results are interpreted with caution, the contribution of this study is unique in terms of the young age of the sample. In addition, the use of different selection criteria for giftedness is a topic that has not been reported on before. In general, the results showed that gifted children do not necessarily have a lower or higher level of well-being than their peers at a young age. However, specific subgroups of gifted children that teachers fail to identify, due to underachievement or in education undervalued talents such as creativity, are at risk for lower levels of psychological well-being. If one is of the opinion that gifted children are our future leaders, scientists, or entrepreneurs, a considerable investment in the understanding, development, and use of these talents is mandatory. Therefore, it is important to employ a proper identification method, anticipate at an early age, and to be knowledgeable about contributors to well-being in an effort to allow talents to flourish.

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References

Amini, M. (2005). Identifying stressors and reactions to stressors in gifted and non-gifted students. *International Education Journal*, *6*, 136-140. Retrieved from http://ehlt.flinders.edu.au/education/iej/articles/V6n2/Amini/paper.pdf

Bain, S. K., & Bell, S. M. (2004). Social self-concept, social attributions, and peer relationships in fourth, fifth, and sixth graders who are gifted compared to high achievers. *Gifted Child Quarterly*, *48*, 167-178. doi:10.1177/001698620404800302

Betts, G. T., & Neihart, M. (1988). Profiles of the gifted and talented. *Gifted Child Quarterly*, *32*, 248-253. doi:10.1177/001698628803200202

Csikszentmihalyi, M., & Wolfe, R. (2000). New conceptions and research approach to creativity: Implications of a systems perspective for creativity in education. In K. A. Heller, F. J. Mönks, R. J. Sternberg, & R. F. Subotnik (Eds.), *International handbook of giftedness and talent* (2nd ed., pp. 81-94). Oxford, England: Elsevier.

Curby, T. W., Rudasill, K. M., Rimm-Kaufman, S. E., & Konold, T. R. (2008). The role of social competence in predicting gifted enrollment. *Psychology in the Schools*, *45*, 729-744. doi:10.1002/pits.20338

Duckworth, A. L., Kirby, T. A., Tsukayama, E., Berstein, H., & Ericsson, K. A. (2010). Deliberate practice spells success: Why grittier competitors triumph at the National Spelling Bee. *Social Psychological & Personality Science*, *2*, 174-181. doi:10.1177/1948550610385872

Eccles, J., Wigfield, A., Harold, R. D., & Blumenfeld, P. (1993). Age and gender differences in children's self- and task perceptions during elementary school. *Child Development*, *64*, 830-847. doi:10.1111/j.1467-8624.1993.tb02946.x

Evers, A., Braak, M. S. L., Frima, R. M., & Van Vliet-Mulder, J. C. (2009-2011). *COTAN Documentatie* [COTAN documentation]. Amsterdam, Netherlands: Boom Test Uitgevers.

Gagné, F. (1985). Giftedness and talent: Reexamining a reexamination of the definitions. *Gifted Child Quarterly*, *29*, 103-112. doi:10.1177/001698628502900302

Gagné, F. (2004). Transforming gifts into talents: The DMGT as a developmental theory. *High Ability Studies*, *15*, 119-147. doi:10.1080/1359813042000314682

Gagné, F. (2010). Motivation within the DMGT 2.0 framework. *High Ability Studies*, *21*, 81-99. doi:10.1080/13598139.2010.525341

Gill, J. (2008). *Bayesian methods: A social and behavioral sciences approach* (2nd ed.). Boca Raton, FL: Chapman and Hall/CRC Press.

Goodman, A., Lamping, D. L., & Ploubidis, G. B. (2010). When to use broader internalising and externalising subscales instead of the hypothesised five subscales on the Strengths and Difficulties Questionnaire (SDQ): Data from British parents, teachers and children. *Journal of Abnormal Child Psychology*, *38*, 1179-1191. doi:10.1007/s10802-010-9434-x

Goodman, R. (1997). The Strengths and Difficulties Questionnaire: A research note. *Journal of Child Psychology and Psychiatry*, *38*, 581-586. doi:10.1111/j.1469-7610.1997.tb01545.x

Harter, S. (1985). *Manual for the self-perception profile for children*. Denver, CO: University of Denver. Retrieved from https://portfolio.du.edu/SusanHarter/page/44210

Heller, K. A. (1999). Individual (learning and motivational) needs versus instructional conditions of gifted education. *High Ability Studies*, *10*, 9-21. doi:10.1080/1359813990100102

Heller, K. A. (2004). Identification of gifted and talented students. *Psychology Science*, *46*, 302-323. Retrieved from http://www.pabst-publishers.de/psychology-science/3-2004/05

Hoijtink, H. E. (2012). *Informative hypotheses: Theory and practice for behavioral and social scientists*. Boca Raton, FL: Chapman and Hall/CRC Press.

Hoijtink, H. E., Klugkist, I. E., & Boelen, P. A. (Eds.). (2008). *Bayesian evaluation of informative hypotheses*. New York, NY: Springer.

Horowitz, F. D., Subotnik, R. F., & Matthews, D. J. (Eds.). (2009). *The development of giftedness and talent across the life span*. Washington, DC: American Psychological Association. doi:10.1037/11867-000

Hughes, J. N., Cavell, T. A., & Wilson, V. (2001). Further support for the developmental significance of the quality of the

teacher-student relationship. *Journal of School Psychology*, *39*, 289-301. doi:10.1016/S0022-4405(01)00074-7

Jackson, N. E. (2003). Young gifted children. In N. Colangelo & G. A. Davis (Eds.), *Handbook of gifted education* (3rd ed., pp. 470-482). Boston, MA: Pearson.

Janssen, J., Scheltens, F., & Kraemer, J.-M. (2005). *Leerling- en onderwijsvolgsysteem rekenen-wiskunde* [Pupil and education tracking system arithmetic-mathematics]. Arnhem, Netherlands: Cito.

Kass, R. E., & Raftery, A. E. (1995). Bayes factors. *Journal of the American Statistical Association*, *90*, 773-795. doi:10.1080/01621459.1995.10476572

Kaufman, J. C., Plucker, J. A., & Russell, C. M. (2012). Identifying and assessing creativity as a component of giftedness. *Journal of Psychoeducational Assessment*, *30*, 60-73. doi:10.1177/0734282911428196

Kim, K. H. (2005). Can only intelligent people be creative? A meta-analysis. *Journal of Secondary Gifted Education*, *16*, 57-66. doi:10.4219/jsge-2005-473

Kim, K. H. (2011). The creativity crisis: The decrease in creative thinking scores on the Torrance Test for Creative Thinking. *Creative Research Journal*, *23*, 285-295. doi:10.1080/10400419.2011.627805

Klugkist, I., Laudy, O., & Hoijtink, H. (2005). Inequality constrained analysis of variance: A Bayesian approach. *Psychological Methods*, *10*, 477-493. doi:10.1037/1082-989X.10.4.477

Klugkist, I., van Wesel, F., & Bullens, J. (2011). Do we know what we test and do we test what we want to know? *International Journal of Behavioral Development*, *35*, 550-560. doi:10.1177/0165025411425873

Kluytmans, A., Van de Schoot, R., Mulder, J., & Hoijtink, H. (2012). Illustrating Bayesian evaluation of informative hypotheses for regression models. *Frontiers in Psychology*, *3*, 1-11. doi:10.3389/fpsyg.2012.00002

Lakin, J. M., & Lohman, D. F. (2011). The predictive accuracy of verbal, quantitative, and nonverbal reasoning tests: Consequences for talent identification and program diversity. *Journal for the Education of the Gifted*, *34*, 595-623. doi:10.1177/016235321103400404

Lee, S., Olszewski-Kubilius, P., & Thomson, D. T. (2012). Academically gifted students' perceived interpersonal competence and peer relationships. *Gifted Child Quarterly*, *2*, 90-104. doi:10.1177/0016986212442568

Lippman, L. H., Moore, K. A., & McIntosh, H. (2011). Positive indicators of child well-being: A conceptual framework, measures, and methodological issues. *Applied Research in Quality of Life*, *6*, 425-449. doi:10.1007/s11482-011-9138-6

Litster, K., & Roberts, J. (2011). The self-concepts and perceived competencies of gifted and non-gifted students: A meta-analysis. *Journal of Research in Special Educational Needs*, *11*, 130-140. doi:10.1111/j.1471-3802.2010.01166.x

Lohman, D. F. (2005a). An aptitude perspective on talent: Implications for identification of academically gifted minority students. *Journal for the Education of the Gifted*, *28*, 333-360.

Lohman, D. F. (2005b). The role of nonverbal ability tests in identifying academically gifted students: An aptitude perspective. *Gifted Child Quarterly*, *49*, 111-138. doi:10.1177/001698620504900203

Lohman, D. F., & Gambrell, J. L. (2012). Using nonverbal tests to help identify academically talented children. *Journal of Psychoeducational Assessment*, *30*, 25-44. doi:10.1177/0734282911428194

Lohman, D. F., & Korb, K. A. (2006). Gifted today but not tomorrow? Longitudinal changes in ability and achievement during elementary school. *Journal for the Education of the Gifted*, *29*, 451-484.

Lohman, D. F., Korb, K. A., & Lakin, J. M. (2008). Identifying academically gifted English-language learners using nonverbal tests: A comparison of the Raven, NNAT, and CogAT. *Gifted Child Quarterly*, *52*, 275-296. doi:10.1177/0016986208321808

Lubart, T., Pacteau, C., Jacquet, A., & Caroff, X. (2010). Children's creative potential: An empirical study of measurement issues. *Learning and Individual Differences*, *20*, 388-392. doi:10.1016/j.lindif.2010.02.006

Mönks, F. J., & Katzko, M. W. (2005). Giftedness and gifted education. In R. J. Sternberg & J. E. Davidson (Eds.), *Conceptions of giftedness* (2nd ed., pp. 187-200). Boston, MA: Cambridge University Press. doi:10.1017/CBO9780511610455.012

Mooij, T., Hoogeveen, L., Driessen, G., Van Hell, J., & Verhoeven, L. (2007). *Succescondities voor onderwijs aan hoogbegaafde leerlingen: Eindverslag van drie deelonderzoeken* [Conditions for success in education for gifted students. Report of three part projects]. Nijmegen, Gelderland, Netherlands: Radboud Universiteit.

Moon, S. M., & Rosselli, H. C. (2000). *Developing gifted programs*. In K. A. Heller, F. J. Mönks, R. J. Sternberg, & R. F. Subotnik (Eds.), *International handbook of giftedness and talent* (2nd ed., pp. 499-521). Oxford, England: Elsevier.

Mulder, J., Hoijtink, H., & de Leeuw, C. (2012). BIEMS: A Fortran 90 program for calculating Bayes factors for inequality and equality constrained models. *Journal of Statistical Software*, *46*(2), 1-39.

Mulder, J., Hoijtink, H., & Klugkist, I. (2010). Equality and inequality constrained multivariate linear models: Objective model selection using constrained posterior priors. *Journal of Statistical Planning and Inference*, *140*, 887-906. doi:10.1016/j.jspi.2009.09.022

Mulder, J., Klugkist, I., Van de Schoot, R., Meeus, W. H. J., Selfhout, M., & Hoijtink, H. (2009). Bayesian model selection of informative hypotheses for repeated measurements. *Journal of Mathematical Psychology*, *53*, 530-546. doi:10.1016/j.jmp.2009.09.003

Muris, P., Meesters, C., & van den Berg, F. (2003). The strengths and difficulties questionnaire (SDQ): Further evidence for its reliability and validity in a community sample of Dutch children and adolescents. *European Child & Adolescent Psychiatry*, *12*, 1-8. doi:10.1007/s00787-003-0298-2

Neihart, M. (1999). The impact of giftedness on psychological well-being: What does the empirical literature say? *Roeper Review*, *22*, 10-17. doi:10.1080/02783199909553991

Neihart, M., Reis, S. M., Robinson, N. M., & Moon, S. M. (Eds.). (2002). *The social and emotional development of gifted children: What do we know?* Waco, TX: Prufrock.

Pfeiffer, S. I. (2009). The gifted: Clinical challenges for child psychiatry. *Journal of the American Academy of Child & Adolescent Psychiatry*, *48*, 787-790. doi:10.1097/CHI.0b013e3181aa039d

Pollard, E. L., & Lee, P. D. (2003). Child well-being: A systematic review of the literature. *Social Indicators Research*, *61*, 59-78. doi:10.1023/A:1021284215801

Preckel, F., Götz, T., & Frenzel, A. (2010). Ability grouping of gifted students: Effects on academic self-concept and boredom. *British Journal of Educational Psychology*, *80*, 451-472. doi: 10.1348/000709909X480716

Raven, J. C., Court, J. H., & Raven, J. (1979). *Manual for Raven's Progressive Matrices and Vocabulary Scales: Section 1. General overview*. London, England: H.K. Lewis.

Reis, S. M., & Renzulli, J. S. (2010). Is there still a need for gifted education? An examination of current research. *Learning and Individual Differences*, *20*, 308-317. doi:10.1016/j.lindif.2009.10.012

Robertson, K. F., Smeets, S., Lubinski, D., & Benbow, C. P. (2010). Beyond the threshold hypothesis: Even among the gifted and top math/science graduate students, cognitive abilities, vocational interests, and lifestyle preferences matter for career choice, performance, and persistence. *Current Directions in Psychological Science*, *19*, 346-351. doi:10.1177/0963721410391442

Rudasill, K. M., & Callahan, C. M. (2008). Psychometric characteristics of the Harter Self-Perception Profiles for adolescents and children for use with gifted populations. *Gifted Child Quarterly*, *52*, 70-86. doi:10.1177/0016986207311056

Shechtman, Z., & Silektor, A. (2012). Social competencies and difficulties of gifted children compared to nongifted peers. *Roeper Review*, *34*, 63-72. doi:10.1080/02783193.2012.627555

Shi, J., Li, Y., & Zhang, X. (2008). Self-concept of gifted children aged 9 to 13 years old. *Journal for the Education of the Gifted*, *31*, 481-499.

Spratt, J., Shucksmith, J., Philip, K., & Watson, C. (2006). Part of who we are as a school should include responsibility for well-being: Links between the school environment, mental health, and behaviour. *Pastoral Care in Education*, *24*, 14-21. doi:10.1111/j.1468-0122.2006.00374.x

Sternberg, R. J. (2005). *The WICS model of giftedness*. In R. J. Sternberg & J. E. Davidson (Eds.), *Conceptions of giftedness* (2nd ed., pp. 327-342). Cambridge, England: Cambridge University Press. doi:10.1017/cbo9780511610455.019

Sternberg, R. J. (2010). Assessment of gifted students for identification purposes: New techniques for a new millennium. *Learning and Individual Differences*, *20*, 327-336. doi:10.1016/j.lindif.2009.08.003

Subotnik, R. F., Olszewski-Kubilius, P., & Worrell, F. C. (2011). Rethinking giftedness and gifted education: A proposed direction forward based on psychological science. *Psychological Science in the Public Interest*, *12*, 3-54. doi:10.1177/1529100611418056

Subotnik, R. F., & Rickoff, R. (2010). Should eminence based on outstanding innovation be the goal of gifted education and talent development? Implications for policy and research. *Learning and Individual Differences*, *20*, 358-364. doi:10.1016/j.lindif.2009.12.005

Suldo, S. M., Friedrich, A. A., White, T., Farmer, J., Minch, D., & Michalowski, J. (2009). Teacher support and adolescents' subjective well-being: A mixed-methods investigation. *School Psychology Review*, *38*, 67-85.

Terman, L. M. (1922). A new approach to the study of genius. *Psychological Review*, *29*, 310-318. doi:10.1037/h0071072

Urban, K. K. (2005). Assessing creativity: The Test for Creative Thinking–Drawing Production (TCT-DP). *International Education Journal*, *6*, 272-280.

Urban, K. K., & Jellen, H. G. (1996). *Test for Creative Thinking–Drawing Production (TCT-DP)*. Lisse, South Holland, Netherlands: Swets & Zeitlinger.

Van de Schoot, R., Hoijting, H., Mulder, J., Van Aken, M. A. G., de Castro, B, O., Meeus, W., & Romeijn, J. (2011). Evaluating expectations about negative emotional states of aggressive boys using Bayesian model selection. *Developmental Psychology*, *47*, 203-212. doi:10.1037/a0020957

VanTassel-Baska, J., Bracken, B., Feng, A., & Brown, E. (2009). A longitudinal study of enhancing critical thinking and reading comprehension in Title I classrooms. *Journal for the Education of the Gifted*, *33*, 7-37.

Veerman, J. W., Straathof, M. A. E., Treffers, D. A., van den Berg, B. R. H., & Ten Brink, L. T. (1997). *Handleiding Competentie Belevingsschaal voor Kinderen* [Manual CBSK]. Lisse, South Holland, Netherlands: Swets & Zeitlinger.

Vialle, W., Heaven, P. C. L., & Ciarrochi, J. (2007). On being gifted, but sad and misunderstood: Social, emotional, and academic outcomes of gifted students in the Wollongong Youth Study. *Educational Research and Evaluation*, *13*, 569-586. doi:10.1080/13803610701786046

Wai, J., Lubinski, D., & Benbow, C. P. (2005). Creativity and occupational accomplishments among intellectually precocious youths: An age 13 to age 33 longitudinal study. *Journal of Educational Psychology*, *97*, 484-492. doi:10.1037/0022-0663.97.3.484

Walsh, R. L., Kemp, C. R., Hodge, K. A., & Bowes, J. M. (2012). Searching for evidence-based practice: A review of the research on educational interventions for intellectually gifted children in the early childhood years. *Journal for the Education of the Gifted*, *35*, 103-128. doi:10.1177/0162353212440610

Wigfield, A. (1994). Expectancy-value theory of achievement motivation: A developmental perspective. *Educational Psychology Review*, *6*, 49-78. doi:10.1007/BF02209024

Wigfield, A., & Eccles, J. S. (2000). Expectancy-value theory of achievement motivation. *Contemporary Educational Psychology*, *25*, 68-81. doi:10.1006/ceps.1999.1015

Author Biographies

Evelyn H. Kroesbergen received her PhD in 2002 at Utrecht University, where she studied interventions for children with mathematical learning disabilities. The focus of her research shifted to the mathematical development of all children, including typically developing children, children with learning disabilities, and gifted children. She uses behavioral and neurocognitive methods to understand the causes of individual differences in learning. She has a special interest in the early identification and education of gifted children and children with learning disabilities. A recent line of her research focuses on the assessment and stimulation of creativity.

Mare van Hooijdonk has a research master's degree in educational sciences. She works as a PhD student at Utrecht University on a project titled "Nurturing Young Creative Thinkers: Assessing Creative Problem Solving in Primary Education." Within this project, an assessment program to assess creative problem solving in the classroom will be developed and evaluated. Additionally, the aim is to gain insight in factors influencing creative problem solving at several levels, including teachers' ability to think creatively and students' academic achievement, distractibility, and intelligence.

Sietske van Viersen has a bachelor's degree in pedagogical sciences and a research master's degree in educational sciences. She is an educational psychologist and started her academic career as a junior researcher at Utrecht University. At this moment, she works as a PhD student at the University of Amsterdam. Her research involves dyslexia in gifted children and the early etiology of dyslexia.

Marieke M. N. Middel-Lalleman completed a bachelor of education in 2010 and went on to complete a master of education in special education in 2012 and a post-master degree in 2014. She currently works in a private psychology practice where she works with children with special needs.

Juliët J. W. Reijnders received her master degree in pedagogical science at the University of Utrecht in 2012 after she conducted research regarding giftedness of primary school children. As an experienced special educational needs teacher, she is currently employed as a pedagogical specialist with a main focus on learning and development of primary school children.