



Social-emotional characteristics of gifted accelerated and non-accelerated students in the Netherlands

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Background. In the studies of acceleration conducted so far a multidimensional perspective has largely been neglected. No attempt has been made to relate social-emotional characteristics of accelerated versus non-accelerated students in perspective of environmental factors.

Aims. In this study, social-emotional characteristics of accelerated gifted students in the Netherlands were examined in relation to personal and environmental factors.

Samples. Self-concept and social contacts of accelerated ($n = 148$) and non-accelerated ($n = 55$) gifted students, aged 4 to 27 ($M = 11.22$, $SD = 4.27$) were measured.

Method. Self-concept and social contacts of accelerated and non-accelerated gifted students were measured using a questionnaire and a diary, and parents of these students evaluated their behavioural characteristics. Gender and birth order were studied as personal factors and grade, classroom, teachers' gender, teaching experience, and the quality of parent-school contact as environmental factors.

Results. The results showed minimal differences in the social-emotional characteristics of accelerated and non-accelerated gifted students. The few differences we found favoured the accelerated students. We also found that multiple grade skipping does not have negative effects on social-emotional characteristics, and that long-term effects of acceleration tend to be positive. As regards the possible modulation of personal and environmental factors, we merely found an impact of such factors in the non-accelerated group.

Conclusions. The results of this study strongly suggest that social-emotional characteristics of accelerated gifted students and non-accelerated gifted students are largely similar. These results thus do not support worries expressed by teachers about the acceleration of gifted students. Our findings parallel the outcomes of earlier studies in the United States and Germany in that we observed that acceleration does not harm gifted students, not even in the case of multiple grade skipping. On the contrary, there is a suggestion in the data that accelerated students are more socially competent

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than non-accelerated students. The findings in this study can reassure those parents and teachers who worry about the social-emotional consequences of acceleration in school: If a student is gifted, acceleration seems to be a sound and, in many cases, appropriate measure in gifted education.

Gifted students often learn faster than their classmates. For that reason, teachers and parents sometimes decide to academically accelerate a child for example by skipping a grade. Many parents and teachers, however, worry about the social-emotional consequences (Hoogeveen, van Hell, & Verhoeven, 2005, 2009). In this article, we report on a study that examined social-emotional characteristics of gifted accelerated and gifted non-accelerated students in the Netherlands. We adopted a multidimensional perspective, and examined gifted accelerated and gifted non-accelerated students' social-emotional characteristics (i.e., self-concept, behavioural characteristics, and social contacts) in relation to personal factors (e.g., age, gender, and birth order) and environmental factors (e.g., classroom size, teachers' gender and experience, and quality of parent-school contact).

Giftedness is defined and conceptualized in many ways (Colangelo & Davis, 2003). Renzulli (1978) proposed a 'three-ring conception' model which suggests that gifted achievement consists of a least three traits: (1) above average ability, (2) task commitment, and (3) creativity. Gagné (2003) put forward a more differentiated model of giftedness and talent, defining gifts as untrained natural abilities that can develop into measurable talents via learning and practice. According to Gagné (2003, 2008), the transformation from gifts to talents involves three types of catalysts, which positively or negatively impact learning: intrapersonal factors (e.g., physical, motivational, and personality factors), environmental factors (e.g., persons, events, and one's social milieu), and chance. Sternberg (2002) introduced the concept of successful intelligence, for which analytical, creative, and practical thinking must be in balance. All models of giftedness have in common that they consider intelligence to be a crucial factor (Feldhusen & Jarwan, 2000; Gagné, 1993, 2000, 2003; Heller, 1990, 1991; Renzulli, 1978; Sternberg, 2002; Ziegler & Heller, 2000). Apart from intelligence, other factors, like intrapersonal characteristics (e.g., motivation, stress) and environmental conditions (e.g., quality of teaching, family), are considered to be essential for the manifestation of gifted behaviour. Nowadays, most researchers agree that giftedness is a multidimensional concept (Feldhusen & Jarwan, 2000; Gagné, 1993, 2000; Heller, 1990, 1991; Ziegler & Heller, 2000). Consistent with this idea, highly intelligent students need to have certain optimal intrapersonal characteristics and environmental conditions in order to express their talents in performance.

The educational programme that is offered can be considered as an important environmental condition that affects students' performance. One specific educational option in gifted education is academic acceleration. There are many forms of academic acceleration (see, e.g., Rogers & Kimpston, 1992; Southern & Jones, 2004; Southern, Jones, & Stanley, 1993). Most common forms of acceleration are grade skipping, early entrance, or telescoping curriculum, which all imply that after acceleration the student is younger than her or his classmates (Mönks & Pflüger, 2005).

Although acceleration is the most frequently applied educational intervention for gifted students, teachers, and parents who worry about the social and emotional development of accelerated students (Hoogeveen *et al.*, 2005; Southern, Jones, & Fiscus, 1989). These worries are supported by some empirical studies, but not by all (for a review, see Kulik, 2004). Some studies on the effects of acceleration on students'

social-emotional performance found no or small negative effects (Cornell, Callahan, & Loyd, 1991; Robinson & Janos, 1986), whereas other studies reported positive effects (Ingersol & Cornell, 1995; Janos & Robinson, 1985; Saylor & Brookshire, 1993).

Definitions of social performance are diverse. Dodge (1985) states that many definitions include the frequency and quality of interaction with other people as a measure of social performance. Other researchers consider the presence or absence of behavioural problems as a measure of social performance (Deater-Deckard & Dun, 2002; Pilowsky, Yirmiya, Doppelt, Gross-Tsur, & Shalev, 2004). Regarding the social performance of gifted students, Gallagher (2003) listed two conflicting views. One view suggests that gifted students are more at risk for adjustment problems (Hollingworth, 1926; Janos & Robinson, 1985). The other view suggests that gifted children are better adjusted than their non-gifted peers (Baker, 1995; Freeman, 1983). Gallagher (2003) observed that most scholars in the field agree that, when the circumstances are favourable, there is little difference in emotional adjustment between gifted and non-gifted students, but that some intrapersonal and environmental factors might cause social-emotional problems in gifted students that do not have that effect on non-gifted students. An educational environment, not adapted for gifted students, can be such a factor (Gross, 2000).

Kulik (2004) described the effect sizes of 13 studies on social and emotional effects of acceleration. Three studies investigated participation in school activities as a measure of social performance and concluded that accelerated students participate in school activities to nearly the same extent as non-accelerated students do. Gross (1992) concluded, based on the results of her study of 40 extremely gifted students (IQ 160–200), that accelerated students have closer and more productive social relationships than non-accelerated students.

The outcomes of studies on social-emotional consequences of acceleration can at best be called inconclusive (Kulik, 2004). A possible explanation for these divergent findings can be found in students' intrapersonal characteristics and environmental conditions, other than the educational programme that is offered, that influence students' social-emotional performance.

An influential intrapersonal characteristic that affects students' (social) performance is their self-concept (Comer, Haynes, Hamilton-Lee, Boger, & Rollock, 1987; Marsh, Chessor, Craven, & Roche, 1995; Saylor & Brookshire, 1993). Several studies found that self-concept is an important predictor of the school performance of gifted students (Bell & McCallum, 1995; Castellanos Simons, 2001; Marsh & Yeung, 1998; Swann, Chang-Schneider, & McClarty, 2007). Saylor and Brookshire (1993) investigated eighth-grade students and compared accelerated students with students in gifted classes and students in regular classes. They found that accelerated students and students in gifted classes had more positive self-concepts than students in regular classes. Positive results of acceleration were also found by Gross (1992, 1996) in two longitudinal studies in which she compared accelerated and non-accelerated gifted children. However, in a 10-year longitudinal study, Swiatek and Benbow (1991) found no differences in self-concept between accelerated and non-accelerated students. The different findings of the above studies may be related to different definitions and measurements of self-concept. Swiatek and Benbow (1991) and Saylor and Brookshire (1993), for example, used a one-dimensional, more general self-esteem scale, with questions like 'I take a positive attitude towards myself' (Swiatek & Benbow, 1991, p. 531). Gross (1992, 1996), on the other hand, used a multidimensional instrument. She found that the accelerated students' social self-concept was more positive than that of non-accelerated

students. The academic self-concept of accelerated students, however, was less positive than the very positive academic self-concept of non-accelerated students. The decrease in academic self-concept can be explained by the phenomenon of social comparison termed the Big-Fish-Little-Pond-Effect that has been extensively studied by Marsh (1987): Gifted accelerated students compare their academic achievements with older students and the difference in academic achievement between accelerated students and older students is likely to be smaller than that between accelerated students and same-age peers. In our study, we use the Self-Description Questionnaire (SDQ) developed by Marsh (1990), in order to measure self-concept in different social and academic domains.

Students' behaviour can be seen as another intrapersonal characteristics and possible predictor of students' school performance (Betts & Neihart, 1988; Heller, 1991). Betts and Neihart (1988) developed a theoretical model of six typical profiles of gifted children. The purpose of this model was to differentiate gifted children on the basis of behaviour, feelings, and needs. The underlying theory is that gifted children are influenced by their families, their education, their relationships, and their personal development. Betts and Neihart (1988), as well as Gagné (1993), Gallagher (2003), Heller (1991), Rimm (2003), and Ziegler and Heller (2000), all agree that non-favourable behavioural characteristics may impede school performance, whereas favourable behavioural characteristics may benefit school performance. Consequently, developing and maintaining favourable behavioural characteristics should be an important goal of education. For our study, we developed a questionnaire for parents, based on Betts and Neihart's (1988) behavioural profiles of gifted and talented students, which measures students' critical attitude, risk-avoiding behaviour, underground behaviour (students hiding their giftedness), and social-emotional problems.

Not only intrapersonal characteristics influence students' social-emotional performance, but also environmental factors, like school-related factors, may have an impact. One such school-related factor is class size, and studies show positive effects of reduced class size on students' social-emotional performance (Finn & Achilles, 1990, 1999; Finn & Pannozzo, 2003; NICHD Early Child Care Research Network, 2004). Other factors of influence are teachers' experience (Hargreaves, Galton, & Pell, 1998) and teachers' gender (Duffy, Warren, & Walsh, 2001). Besides school-related environmental conditions, family-related factors appear to be an important factor (see Freeman, 2000). Some scholars argue, for example, that birth order affects educational attainment, favouring first-born children (Gottfried, Gottfried, Bathurst, & Guerin, 1994; Simonton, 2000; Travis & Kohli, 1995; but see, e.g., Blake, 1989; Harris, 2000). The relation between parents and school can also be of influence. Various studies have indicated that a high-quality parent-school contact positively affects the performance of students (Bierman, 1996; Eccles & Harold, 1993, 1996; Finn, 1998; Stevenson & Baker, 1987).

The large majority of earlier studies on the social-emotional characteristics of gifted accelerated and non-accelerated students focused either on students' personal factors or on environmental factors, but made no attempt to relate students' social-emotional characteristics to both personal and environmental factors. In the present study, we adopted a multidimensional perspective to arrive at a better understanding of the effect of academic acceleration on social-emotional characteristics of gifted students. The central question was how the school intervention 'acceleration' (in interaction with other environmental and personal conditions) is related to social-emotional characteristics of gifted students. Therefore, the self-concept, behavioural characteristics (critical attitude, risk-avoiding behaviour, underground behaviour, and social-emotional adjustment), and

social contacts of accelerated and non-accelerated students aged 4 to 27 were examined in relation to personal factors (i.e., age, gender, birth order) and environmental factors (school conditions, including class size, teachers' gender and experience, and quality of parent-school contact). The accelerated students had skipped one or more grades, were early entrants, or went through grades faster than usual (telescoping curriculum). We examined a broad age range of accelerated and non-accelerated students, from kindergartners to university students, to gain more insight into the effects of acceleration at various ages, as well as the short- and longer-term effects of this educational adaptation. In his review of meta-analytic studies on acceleration, Kulik (2004) concluded that there may be a temporary drop in self-acceptance in students right after acceleration that improves over time. Moreover, in a teacher rating study, McCluskey, Massey, and Baker (1997) found that early entrance students assessed at the end of their first year seemed to do less well than when rated several years later.

Based on earlier research we made the following predictions. First, we expected that, in general, accelerated students would show more positive behavioural characteristics, better social-emotional adjustment, and would have more social contacts than non-accelerated students. Second, concerning the self-concept, we expected that the academic self-concept of accelerated students would be less positive and that the non-academic self-concept would be equal to or more positive than that of non-accelerated students. Finally, we expected that personal and environmental factors would interact with acceleration and explored to what extent these factors would differentially affect accelerated and non-accelerated students.

Method

Participants

Data were collected from 203 children, adolescents, and young adults, aged 4 to 27 (boys: 136, of which 94 had been accelerated; girls: 67, of which 54 had been accelerated), and their parents and teachers. One hundred and twenty participants were primary school students (88 accelerated and 32 non-accelerated students), 74 were secondary school¹ students (55 accelerated and 19 non-accelerated students), and nine were university students (5 accelerated and 4 non-accelerated students). Of the primary school children, the mean age of accelerated and non-accelerated children was 9.28 years ($SD = 1.45$; range 5.60–11.50 years) and 9.83 years ($SD = 1.93$; range 4.50–12.30 years), respectively. Of the secondary school students, the mean age of the accelerated and non-accelerated students was 13.58 years ($SD = 1.52$; range 11.30–17.40 years) and 15.40 years ($SD = 1.81$; range 12.70–18.50 years), respectively. The age range of the university students was 17.50–23.50 years for the accelerated students, and 19.00–26.80 years for the non-accelerated students. All participants had been diagnosed as gifted by psychologists of the Center for the Study of Giftedness of the Radboud University Nijmegen, the Netherlands.²

¹ Children in the Netherlands start primary school at the age of 4, and in the standard curriculum children enter secondary school at the age of 12. The first and second year of secondary school in the Netherlands can, considering the age of the students, be compared with the 8th and 9th grade of secondary schools in the United States.

² The Center for the Study of Giftedness (CBO) is part of the Radboud University Nijmegen (the Netherlands). Activities are the assessment of (gifted) children and adolescents, counseling parents, teachers and social workers, offering classes for gifted children, teacher training and scientific research on giftedness and education.

Table 1. Number (and percentages) of participants in each age group who completed the SDQ, parent questionnaire and diary

	SDQ		Parent Questionnaire		Diary	
	Acc.*	Non-acc.*	Acc.*	Non-acc.*	Acc.*	Non-acc.*
<10 years	47 (38)	13 (29)	47 (37)	13 (32)	38 (40)	13 (32)
10–17 years	73 (58)	27 (59)	77 (61)	26 (63)	55 (57)	24 (58)
>17 years	5 (4)	6 (13)	2 (2)	2 (5)	3 (3)	4 (10)

*Acc. = accelerated; Non-acc. = non-accelerated.

One hundred seventy-one participants filled in the SDQ (boys: 112, of which 88 were accelerated; girls: 59, of which 47 were accelerated; age: $M = 11.58$, $SD = 3.31$) (see Table 1). Parents of 170 participants filled in a questionnaire, based on Betts and Neihart's (1988) profiles of gifted children, and some open questions about school and parent-school contact. Teachers of 150 participants provided information about class-size and teacher's age ($M = 40.93$, $SD = 8.90$), gender (male: 72; female: 77), and teaching experience. One hundred and thirty-seven participants filled in a diary for 1 week in October (boys: 94, of which 63 were accelerated, girls: 43, of which 33 were accelerated, age: $M = 11.29$, $SD = 3.16$).

Materials

Questionnaires and a structured diary were used to measure self-concept, behavioural characteristics, and social performance. In the structured diary, participants self-registered, on an hour-by-hour basis, the duration of their social interaction at that time and with whom they interacted. Following Ralph (1997), a structured diary provides information about actual social interactions in the normal day-to-day activities of participants. This detailed registration of actual interactions provides more direct information of a person's daily interactions than do questionnaires, and thus adds a new dimension to the data. Below we describe each of the questionnaires and the structured diary in more detail.

Self-concept

The SDQ (Marsh, 1988, 1990, 1992; Peters, 1998) was used to measure self-concept. For the youngest children (younger than 10), a Dutch translation of the SDQ-I (Marsh, 1988) was used. Children between 10 and 17 years old filled in the Dutch translation of the SDQ-II (Peters, 1998). Participants older than 17 filled in a Dutch translation of the SDQ-III (Marsh, 1992). The SDQ is based on the model of Shavelson, Hubner, and Stanton (1976), as described earlier. The SDQ-I, SDQ-II, and SDQ-III consist of 76, 102, and 136 statements, respectively. Non-academic and academic self-concept (see Appendix 1), derived from the Shavelson model, and a General-Self-Concept scale, derived from the Rosenberg self-esteem scale, were assessed. These scales reflect a child's or adolescent's self-ratings in various areas of self-concept. The validity of the SDQ proved to be high (Marsh, 1988, 1990). The reliability of the scales of the SDQ-I, SDQ-II, and SDQ-III, as measured in this study, ranged from .80 to .90, .81 to .91, and .79 to .97, respectively.

Table 2. Reliabilities and fit of the behavioural questionnaire scales

	α	X^2 (df)	GFI	AGFI	NFI	RMSEA
Critical attitude	.76	13.64(9)	.973	.938	.942	.056
Underground behaviour	.64	9.99(5)	.977	.932	.896	.078
Risk-avoiding behaviour	.89	2.42(2)	.993	.965	.989	.035
Social-emotional problems	.76	51.49(27)	.935	.892	.820	.074

Behavioural characteristics

Based on the profiles of the gifted and talented (Betts & Neihart, 1988), we constructed a questionnaire. Parents of primary and secondary school students³ were asked to indicate to what extent 40 behaviour characteristics, like 'perfectionism', 'mood swings', or 'isolation', were applicable to their child, with five possible answers: 'very applicable', 'applicable', 'sometimes applicable', 'hardly applicable', or 'not applicable'. In order to distinguish different scales in this questionnaire, factor analyses were executed. Fit of the factor model was judged by using the chi-square test, the goodness-of-fit index (GFI), the adjusted goodness-of-fit index (AGFI), the normed fit index (NFI), and the root mean square error of approximation (RMSEA). The total fit of the model was not good (chi-square (286) = 594.19; GFI = .795; AGFI = .749, NFI = .668, RMSEA = .081). For the separate Critical Attitude, Underground Behaviour, Risk-Avoiding Behaviour, and Social-Emotional Problem scales (see Appendix 2 for the items of the four scales), however, reasonable to good fits were found (e.g., GFI ranged from .935-.993, see Table 2), showing one-dimensional traits in the different scales. Table 2 gives an overview of the reliabilities and fits for each of the four scales.

Social contacts

To gain insight into participants' social contacts, two diaries were constructed. The first one consisted of ten pages (one front page, two pages each for Saturday and Sunday, one page for every other day of the week). Each page contained a table, with rows indicating the hours from 3 p.m. until 9 p.m. for weekdays, and 9.00 a.m. to 9.00 p.m. for Saturday and Sunday. The columns indicated the person(s) the participant was with at that hour, the age(s) of that person(s), and the activity engaged in. On the basis of the persons and activities filled in by the children and adolescents in June, the diary for October was constructed in a multiple choice form: The children and adolescents were asked to mark, for every hour, if they were alone or with (a) particular person(s), like 'parent', 'older brother', 'younger friend', and in which activities, like 'watching television' or 'making homework', they were involved. The analyses were based on the social contacts participants had registered in their October diary.

Environmental factors

Parents were asked to answer questions concerning the contact between parents and school (Is there any contact between parents and school? yes/no. If yes, how do you experience the contact?). Teachers provided information about their gender, age, teaching experience, and classroom size.

³Because the behavioral questionnaire targeted children's behavior and is supposed to be filled out by parents, behavioral characteristics data for university students were not collected.

Procedure

A letter of invitation to participate in the study was sent to the parents of children that had been examined and diagnosed to be gifted by qualified psychologists from the Center of the Study of Giftedness (Radboud University Nijmegen). Participants older than 18 received the letter themselves. The letter explained the study and contained a form asking for information about the educational career and the school the participant was attending at this moment. In June, all persons who were willing to participate received the diary, the SDQ (I, II, or III, depending on the participant's age), and the elementary and secondary school children's parents received the parent questionnaire. The same questionnaire that was sent to the parents was sent to the participant's teacher. In October of the same year, the second diary was sent.

The scale scores of the three different questionnaires of the SDQ were standardized, in order to integrate the data of the three age-groups (e.g., the variable mathematical self-concept contained z-scores from all three SDQ-scales). Only scales measured in all three versions of the SDQ were included in the analyses (this means that the scales 'problem solving', 'spiritual self-concept' (SDQ-III), 'honesty', and 'emotional stability' (SDQ-II and SDQ-III) were left out). The average of the same and opposite-sex relations scores of students who filled in the SDQ-II and SDQ-III was considered as the variable peer relations, which could be taken together with the SDQ-I scale peer relations. Because we considered the difference between same and opposite-sex relations important for participants older than 10 years old, we also analysed the data separately for the group of students older than 10 years, who filled in the SDQ-II or III (discerning same and opposite-sex relations).

To measure social contacts, we calculated how many times a parent, friend, or sibling was mentioned in the diary. The total hours of contact was then calculated by summing up all moments of contact, irrespective of the person the participant was in contact with. Due to different bedtimes of the participants (their age ranged from 4–27 years) and the resulting differences in the time left to interact with others, the potential total hours of contact will not be the same for all participants. Because we were interested in the relative time spent with parents, siblings, and peers, we controlled for this by calculating percentages for every person with whom the participant had interacted, as follows: percentage of contact with a particular person (e.g., parent) = hours of contact with a particular person (e.g., parent)/total hours of contact \times 100. For the variable reflecting the time a participant was alone, the actual amount of hours was used in the analyses.

Childrens' behavioural characteristics were assessed by one of their parents, using the questionnaire based on Betts and Neihart's (1988) distinction of six profiles. In order to distinguish scales from each other in this behavioural questionnaire, factor analyses were executed, which were described earlier.

Results

Statistical analyses

For each of the factors self-concept, behavioural profile, and social contacts, we performed two analyses. First we performed Multivariate Analyses of Variance (MANOVAs), with acceleration (accelerated or non-accelerated) as the between-subjects factor. In subsequent analyses, we explored whether social-emotional characteristics and performance were modulated by effects of acceleration and personal or environmental

Table 3. Mean scores and standard deviations (SD) on the self-description questionnaire of accelerated and non-accelerated gifted students

SDQ	Accelerated			Non-accelerated		
	M	SD	n	M	SD	n
Mathematics	.03	1.00	125	-.09	.99	46
Verbal	-.03	1.00	125	.08	.99	46
Academic	.05	1.01	125	-.13	.96	46
Physical abilities	-.06	1.02	125	.17	.90	46
Physical appearance	.09	.92	125	-.25	1.14	46
Same sex relations ¹	.03	.94	79	-.07	1.13	33
Opposite-sex relations ¹	.02	.94	79	.04	1.02	33
Peer relations	.00	.87	125	.02	1.04	46
Parent relations	.02	1.02	125	-.04	.94	46
General self-concept	.03	.96	125	-.07	1.09	46
Total self-concept	.05	.87	125	-.14	1.27	46

¹The same and opposite-sex relations scales were filled in by 79 accelerated and 33 non-accelerated students (age ≥ 10).

factors. To answer this question, the data were analysed by a series of two-factor MANOVAs with acceleration (accelerated, non-accelerated) as one independent variable, and either students' gender (male, female), birth order (first born, latter-born), grade (grade 1-3, grade 4-6, secondary school), classroom size (fewer than 25 students, 25 or more students), teachers' experience (1-9 years, 10-21 years, more than 21 years), teachers' gender (male, female), or parents' assessment of quality of parent-school contact (bad, average, good) as the second independent variable and self-concept, behavioural characteristics, and social contacts as the dependent variables. An alpha level of .05 was used for all statistical tests.

Self-concept

MANOVAs were carried out on the nine SDQ scales Mathematics, Verbal, Academic, Physical Abilities, Physical Appearance, Peer Relation, Parent Relation, and General Self-Concept to test differences in self-concept between accelerated and non-accelerated students. Subsequently, in order to allow for the differentiated peer-relation scales (same-sex-relations and opposite-sex relations), MANOVAs were carried out on the 10 SDQ scales Mathematics, Verbal, Academic, Physical Abilities, Physical Appearance, Same and Opposite-Sex Relations, and Parent Relations to test differences in self-concepts of accelerated and non-accelerated students, older than 10 years. Because the general self-concept is the sum of the differentiated self-concepts, it could not be included in the MANOVA. A *t*-test was conducted to test differences in general self-concept between accelerated and non-accelerated students.

Table 3 presents the *self-concept* of accelerated and non-accelerated gifted students, based on scores on the nine scales the SDQ-I, II, and III have in common, plus the gender-differentiated scales of the SDQ II and III.

Multivariate tests revealed no significant differences between the self-concepts of accelerated and non-accelerated students ($F(8,162) = 1.61, p = .126$; $F_{age > 10}(9,102) = 1.10, p = .367$; $t_{totalself-concept}(169) = 1.15, p = .251$).

Table 4. Means and standard deviations of self-concept scales that were significantly modulated by the two-way interaction of acceleration and grade

	Accelerated			Non-accelerated			$F(2,151)$	p	Partial η^2
	M	SD	n	M	SD	n			
Peer relations									
Grade 1–3 p.e.*	−.06	.90	20	.54	.70	11	3.14	.046	.04
Grade 4–6 p.e.	−.09	.87	56	−.52	1.33	16			
Secondary school	.12	.89	45	.28	.69	15			
Parent relations									
Grade 1–3 p.e.	−.14	1.06	20	.45	.43	11	3.30	.039	.04
Grade 4–6 p.e.	.19	.75	56	−.39	1.22	16			
Secondary school	−.13	1.24	45	−.07	.80	15			
General self-concept									
Grade 1–3 p.e.	−.04	.87	20	.39	.62	11	3.97	.018	.05
Grade 4–6 p.e.	.10	.86	56	−.56	1.41	16			
Secondary school	−.10	1.13	45	.22	.75	15			

*p.e. = primary education.

No significant two-way interaction effects were found when considering *acceleration* and either *student's gender*, *classroom size*, *teachers' experience*, and *teachers' gender* ($p > .10$).

For acceleration and *birth order*, a marginally significant two-way interaction effect was found ($F(9,140) = 1.94$, $p = .059$, partial $\eta^2 = .10$). The analyses revealed a significant interaction effect on Physical Appearance ($F(1,147) = 4.05$, $p = .046$, partial $\eta^2 = .03$). In the accelerated group, first-borns showed a less positive self-concept concerning Physical Appearance ($M = -.02$, $SD = 1.01$) than did latter-borns ($M = .24$, $SD = 0.82$). In the non-accelerated group, the first-borns showed a more positive self-concept concerning Physical Appearance ($M = -.07$, $SD = 0.90$) than did the latter-borns ($M = -.57$, $SD = 1.52$). Focusing only on the students older than 10 years, we again found a marginally significant interaction effect between acceleration and birth order ($F(9,87) = 1.73$, $p = .094$, partial $\eta^2 = .15$). The analyses revealed a significant interaction effect on Verbal Abilities ($F(1,99) = 4.24$, $p = .042$, partial $\eta^2 = .04$). Accelerated first-borns showed a more positive verbal self-concept ($M = .15$, $SD = 0.97$, $n = 43$) than did accelerated latter-borns ($M = -.35$, $SD = 1.11$, $n = 29$), whereas non-accelerated first-borns showed a more negative verbal self-concept ($M = -.13$, $SD = 1.00$, $n = 16$) than non-accelerated latter-borns ($M = .33$, $SD = 0.78$, $n = 11$). No significant interaction effect for acceleration and *birth order* on the Total Self-Concept was found.

For acceleration and *grade*, a significant two-way interaction effect on self-concept was found ($F(16,300) = 1.81$, $p = .029$, partial $\eta^2 = .09$). The analyses revealed a significant interaction effect on the self-concept concerning Peer Relations, Parent Relations, and the General Self-Concept. Table 4 shows that for the accelerated students, the differences in self-concept among the various grade levels is small. For the non-accelerated students, however, the differences were much larger, with negative self-concepts in grades 4–6 of primary education. For the group of older students (> 10 years), no significant interaction effect of acceleration and grade was found. There was also no significant interaction effect of acceleration with *grade* on Total Self-Concept.

Table 5. Means and standard deviations of self-concept scales that were significantly modulated by the two-way interaction of acceleration and the quality of parent-school contact in students older than 10 years (SDQ II and SDQ III)

	Accelerated			Non-accelerated			$F(2,96)$	p	Partial η^2
	M	SD	n	M	SD	n			
Verbal									
Bad/below average	.31	.98	21	-.43	1.04	7	4.50	.011	.15
Average	-.46	1.01	14	.26	.60	9			
Good/very good	-.17	1.09	35	.69	.61	10			
Physical appearance									
Bad/below average	.38	.69	21	-.72	2.05	7	3.15	.047	.07
Average	.04	.78	14	-.13	.91	9			
Good/very good	-.15	1.01	35	.16	.84	10			
Same-sex relations									
Bad/below average	.26	.62	21	-1.01	1.77	7	4.49	.014	.09
Average	-.01	.53	14	.02	.87	9			
Good/very good	-.20	1.23	35	.24	.87	10			
General self-concept									
Bad/below average	.29	.70	21	-.66	1.35	7	5.62	.020	.06
Average	.12	.64	14	.06	.98	9			
Good/very good	-.24	1.24	35	.18	.72	10			

No significant interaction effect of acceleration with *quality of parent-school contact* on self-concept was found for the whole group ($p > .10$). The interaction effect of acceleration with *quality of parent-school contact* of students, older than 10 years, was significant ($F(18,164) = 1.68, p = .048, \text{partial } \eta^2 = .15$). The analyses revealed a significant interaction effect on the self-concept concerning Verbal Abilities, Physical Appearance, Same-Sex Relations, and General Self-Concept of students older than 10 years. Table 5 demonstrates that in the group of older students (>10 years), the non-accelerated students showed more variability across the three groups of *quality of school-parents contact* (bad, average, or good) than the accelerated students did on the self-concept scales Verbal Abilities, Physical Appearance, Same-Sex Relations, and General Self-Concept.

A significant interaction effect of acceleration with *quality of parent-school contact* was also found on the Total Self-Concept of the whole group (see Table 6). For non-accelerated students, there is a clear relation between the *quality of contact between parents and school* and the self-concept of the non-accelerated students; the self-concept

Table 6. Means and standard deviations of total self-concept modulated by the two-way interaction of acceleration and the quality of parent-school contact

	Accelerated			Non-accelerated			$F(2,153)$	p	Partial η^2
	M	SD	n	M	SD	n			
Total self-concept									
Bad/below average	.21	.79	32	-1.02	1.99	11	6.86	.001	.09
Average	.05	.63	26	.06	.95	15			
Good/very good	-.08	1.03	56	.35	.78	13			

Table 7. Mean scores and standard deviations (SD) of accelerated and non-accelerated students on behavioural characteristics

Behavioural Profile	Accelerated ($n = 126$)		Non-accelerated ($n = 41$)	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Critical attitude	3.81	.70	3.61	.68
Underground behaviour	2.56	.77	2.90	.93
Risk-avoiding behaviour	2.71	.87	3.13	.86
Social-emotional problems	2.35	.63	2.34	.70

is more positive as parent-school contact is more positive, and self-concept is more negative as parent-school contact is more negative. Such a marked relation was not found in the accelerated students.

Behavioural characteristics

MANOVAs, with acceleration (accelerated or non-accelerated) as the between-subjects factor, were carried out on the questionnaire data to test differences in the behavioural characteristics of accelerated and non-accelerated students.

Multivariate tests showed statistically significant differences between accelerated and non-accelerated students ($F(4,162) = 3.13, p = .016$, partial $\eta^2 = .07$). Tests of between-subjects revealed that accelerated and non-accelerated students differed in Underground Behaviour ($F(1,167) = 5.65, p = .019$, partial $\eta^2 = .03$) and Risk-Avoiding Behaviour ($F(1,167) = 5.66, p = .007$, partial $\eta^2 = .04$). Table 7 shows that parents of accelerated students observed less Underground Behaviour than parents of non-accelerated students, and they labelled their children less often as risk-avoiding than parents of non-accelerated students did.

The Critical Attitude of accelerated students did not differ significantly from that of non-accelerated students. The difference between accelerated and non-accelerated students concerning Social-Emotional Problems was not significant either ($p > .10$).

No significant two-way interaction effects were found between acceleration and *students' gender, grade, classroom size, teachers' experience, quality of parent-school contact, or teachers' gender* on the on the four behavioural profile scales ($p > .10$).

For acceleration and *birth order*, a significant two-way interaction effect was found ($F(4,139) = 2.63, p = .037$, partial $\eta^2 = .07$). The analyses revealed a significant interaction effect for students' Critical Attitude ($F(1,146) = 4.44, p = .037$, partial $\eta^2 = .03$) and Risk-Avoiding Behaviour ($F(1,146) = 4.88, p = .029$, partial $\eta^2 = .03$). In the accelerated group, first-borns showed a more Critical Attitude ($M = 3.89, SD = 0.66$) than did latter-borns ($M = 3.66, SD = 0.76$), whereas in the non-accelerated students first-borns showed a less Critical Attitude ($M = 3.48, SD = 0.72$) than latter-borns ($M = 3.82, SD = 0.65$). Birth order did not affect Risk-Avoiding Behaviour in the accelerated students, but in the non-accelerated students first-borns ($M = 3.32, SD = 0.85$) showed more Risk-Avoiding Behaviour than did latter-borns ($M = 2.64, SD = 0.76$).

Social contacts

MANOVAs, with acceleration (accelerated or non-accelerated) as the between-subjects factor, were carried out on the diary data to test differences in social contacts of accelerated and non-accelerated students.

Table 8. Mean scores and standard deviations (SD) on the percentage of time accelerated and non-accelerated gifted students spent on social contacts

Contact with	Accelerated (n = 96)		Non-accelerated (n = 41)	
	M	SD	M	SD
Parent(s)	35.66	20.01	31.19	13.62
Sibling(s)	29.08	17.35	31.60	15.41
Peer(s)	27.87	16.94	32.12	20.48
Being alone	21.84	9.40	22.71	10.63

Table 8 presents the percentage of time spent on *social contacts*, as reported by accelerated and non-accelerated participants in their diary. No main effects of acceleration were found in the time children and adolescents spent with peers, siblings or parents (all p 's > .10). This finding implies that the pattern of spending time with peers, siblings, or parents, and the amount of time being alone, did not differ between the accelerated and the non-accelerated students.

No two-way interaction effects were found between acceleration and students' gender, grade, classroom size, teachers' gender, and teachers' experience, or the quality of parent-school contact on any of the Social Contacts measures (all p 's > .10).

The interaction between acceleration and *birth order* was marginally significant ($F(3,115) = 2.53, p = .061$, partial $\eta^2 = .06$). The analyses revealed a significant two-way interaction effects on the Time with Peers ($F(1, 121) = 7.60, p = .007$, partial $\eta^2 = .06$). Accelerated first-borns spent more Time with Peers ($M = 32.26, SD = 18.16$) than accelerated latter-borns ($M = 22.18, SD = 13.77$), whereas non-accelerated first-borns spent less Time with Peers ($M = 28.25, SD = 20.49$) than non-accelerated latter-borns ($M = 38.48, SD = 21.34$).

Individual variation among accelerated students

Within this group of accelerated students ($n = 148$), five students repeated a year at some point after their acceleration, and 25 students were accelerated more than once. The age-difference of the accelerated students with the mean age of their classmates thus varied, and ranged from 1 to 18 months. Another factor that varied within the group of accelerated students was the time that had expired between the time of the student's acceleration and the day s/he participated in this study, which varied from 1 to 10 years. To examine if the factors *Age-Deviation* and *Time Expired since the Moment of Acceleration* were related to the variables of interest in this study, correlational studies were performed with these two variables and *Self-Concept*, *Behavioural Characteristics*, and *Social Contacts*.

Pearson's correlations were calculated between *Age-Deviation* (amount of months a student differs from the average age in his/her grade) and *Time Expired since the Moment of Acceleration* on the one hand, and *Self-Concept*, *Behavioural Characteristics*, and *Social Contacts*, on the other hand. Results revealed that 17 out of 21 correlations were not significant.

The correlations that were significant indicated that the younger a student was (*Age-Deviation*), in comparison to her or his classmates, the more Time s/he Spent with Older Peers ($r = .32, p < .001$). The results also indicated that as more time had passed since acceleration, accelerated students had a more positive self-concept concerning

Opposite-Sex Relations ($r = .41, p < .001$), showed less Risk-Avoiding Behaviour ($r = -.35, p < .001$), spent less Time with Siblings ($r = -.35, p < .001$), and spent more Time with Same-Age Peers ($r = .32, p < .001$).

Discussion and Conclusions

In this study, we examined how academic acceleration in the Dutch educational system is related to gifted students' self-concept, behavioural characteristics, and social contacts, and how personal and environmental factors modulate these relations. Our results suggest that acceleration had no notable effect on gifted students' self-concept. Moreover, most two-way interactions between acceleration and other environmental factors (like family and school conditions) and personal factors on the various self-concept scales were not significant. According to the interaction effects that were significant, though, the quality of parent-school contact seemed to affect non-accelerated students' self-concept, but not the self-concept of accelerated students.

Accelerated and non-accelerated gifted students' critical attitude and social-emotional adjustment did not seem to differ. Parents of accelerated students, however, reported less underground and risk-avoiding behaviour of their children than did parents of non-accelerated students. Moreover, the majority of the two-way interaction effects of acceleration and other factors on behaviour characteristics of students were not significant. Accelerated and non-accelerated gifted students also did not differ in the amount of social contacts. Again, the majority of the two-way interaction effects between acceleration and environmental or personal factors were not significant.

In our study, accelerated students seemed to be less susceptible to personal and environmental factors than non-accelerated students. Of course, we cannot conclude that acceleration *causes* less susceptibility to personal and environmental factors, and it is possible that teachers and parents are more likely to accelerate students with a mature disposition. In their comprehensive survey of research on psychological vulnerability of gifted students, Neihart, Reis, Robins, and Moon (2002) found no evidence that gifted students are more psychologically vulnerable than other students. They did find, however, that unmet needs for academic advancement and compatible peers can cause psychological problems. This finding may explain the higher susceptibility to external factors of the non-accelerated gifted students in our study and, more specifically, the more negative general self-concepts of non-accelerated students in the last three years of primary school in comparison with the first three years of primary school. Possibly, more years in school in which gifted students' needs are not, or not sufficiently, met can lead to a drop in general self-concept.

Furthermore, concerning the family factor birth order, we did find some opposite effects for accelerated and non-accelerated students. Nowadays researchers emphasize the complexity of the impact birth order can have on children's functioning (Blake, 1989; Freese, Powell, & Steelman, 1999; Harris, 2000; Simonton, 2000). Because most participants in our study were first-borns from families with two children, and other important variables, like size and sex composition of the sibship, the age spacing of siblings, single- or step-parenthood, and parental age at birth (Freese *et al.*, 1999) were not considered, drawing strong conclusions would be inappropriate. Considering that differences were found, and that family can be considered to be highly important for gifted children (Freeman, 2000), it is important to further examine the role of birth order and other family variables in the social-emotional development of accelerated gifted students. The results of such research may help to guide the decision process concerning acceleration and other educational adjustments for gifted students.

Within the group of accelerated students, we found that very few emotional characteristics were related to the *difference of age (Age-Deviation)* between the accelerated student and her or his classmates and the *Time Expired since the Moment of Acceleration*. The few correlations that were significant suggest that skipping more than one grade, resulting in a larger age-difference with classmates, did not negatively affect personality and performance. On the contrary, we found that the younger students were, compared to their classmates, the less underground behaviour was observed. In line with findings of other researchers (Gross, 1992; Janos, 1988; Pollins, 1983; Stanley & Benbow, 1983), it can tentatively be concluded that skipping more than one grade does not lead to impeded social functioning.

It is interesting to note that the effects of acceleration tended to be more positive in the case of early accelerated students, as reflected in the decrease in risk-avoiding behaviour and the increase in self-concept concerning opposite-sex relations. Considering the latter factor, we should take into account that students who were accelerated a longer time ago, were, in general, older, which often leads to more opposite-sex relations. In earlier research, however, we also found that passing time had a positive effect on the self-concept of accelerated students (Hooegeveen & van Hell, in preparation). These positive long-term effects are also in line with the many studies carried out within the framework of the Study of Mathematically Precocious Youth (SMPY) (Lubinski, 2004). In these studies, the school results of thousands of participants, who experienced different kinds of educational acceleration, were examined for three decades. Summarizing the results of these studies, Lubinski (2004) concluded that intellectually precocious students who experience educational acceleration in school evaluate their school experiences afterwards as more positive than intellectually precocious peers who were not accelerated.

Some gifted children accelerate more than one grade during their school career. Multiple-grade accelerated students are clearly younger than their classmates, which potentially has a profound effect on their academic and social self-concept, behavioural profile, and social contacts. Twenty-five out of the 148 accelerated students tested in our study were multiple-grade accelerated students. The number of multiple-grade accelerated students in our sample was too low for a systematic two-group comparison with single-grade accelerated students. We therefore conducted a correlational analysis including age-deviation (of accelerated students versus classmates) and the various measures of self-concept, behavioural profile, and social contacts. Although this correlational analysis revealed no major differences between multiple-grade and single-grade accelerated students, we would like to emphasize that further research with larger samples of multiple-grade and single-year accelerated students, is needed before any firm conclusions can be drawn.

A further limitation of our study is that the number of adult participants was relatively small. Therefore, our study remains largely silent on the (very) long-term effects of acceleration. In a related study on self-concept and acceleration, we observed that when students were tested in the first two years of secondary school, accelerated boys (but not girls) had a somewhat less positive social self-concept than non-accelerated boys (Hooegeveen *et al.*, 2009). However, when these same students were tested four years later, in the final year of secondary school, differences between social self-concept of accelerated and non-accelerated students had disappeared (Hooegeveen & van Hell, 2006). This finding parallels the wealth of studies within the Study of Mathematically Precocious Youth (SMPY) project (Lubinski, 2004), in which scholastic performance of accelerated students has been examined for a period of decades.

One final remark regarding the interpretation of the present findings is in order. The general picture that emerges from the analyses of the self-concept, behavioural profile, and social contacts of the gifted accelerated and gifted non-accelerated students is that there were no substantial differences between the two groups. In cases where differences were observed, the accelerated students appeared to be slightly more socially competent than the non-accelerated students. It is important to realize that, in case statistically significant differences were observed, the partial eta-squared effect size measures indicated that the magnitude of the effects were small or medium at best. Such small effect sizes are not uncommon in research in the social sciences (Cohen, 1973; Pierce, Block, & Aguinis, 2004), and our study is no exception. In our view, the most salient pattern of our study is the absence of notable differences in social-emotional behaviour between gifted accelerated and gifted non-accelerated students, which is in marked contrast to the worries about the social-emotional development of accelerated students that many parents and teachers share.

Implications and conclusions

To conclude, the results of this study strongly suggest that social-emotional characteristics of accelerated gifted students and non-accelerated gifted students are largely similar. These results thus do not support worries expressed by teachers about the acceleration of gifted students (Hooegeveen *et al.*, 2005; Southern *et al.*, 1989). Our findings parallel the outcomes of earlier studies in the United States (e.g., Robinson, 2004; Southern & Jones, 1991), Australia (Gross, 1992, 1996, 2000), and Germany (Heinbokel, 1997). Like in other studies, we found that acceleration does not harm gifted students, not even in the case of multiple grade skipping. If anything, there is a subtle suggestion in the data that accelerated students are more socially competent than non-accelerated students. The findings in this study can reassure those parents and teachers who worry about the social-emotional consequences of acceleration in school: If a student is gifted, acceleration seems to be a sound and, in many cases, appropriate measure in gifted education.

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Appendix I. Subscales and example items in the SDQ (Marsh, 1988, 1990, 1992)

Sub-Scales	Example Item
Physical abilities	I am good in sports (SDQ-I) I can run a long way without stopping (SDQ-II) I am a good athlete (SDQ-III)
Physical appearance	Other kids think I am good looking (SDQ-I) I am ugly (SDQ-II/III)
Peer (same and opposite-sex) relations	I get along with kids easily (SDQ-I) I have lots of friends of the opposite sex (SDQ-II/III)
Parent relations	My parents like me (SDQ-I) My parents really love me a lot (SDQ-II) My values are similar to those of my parents (SDQ-III)
Reading/Verbal	I like reading (SDQ-I) I get good marks in Dutch (SDQ-II) I have a poor vocabulary (SDQ-III)
Mathematics	I get good marks in mathematics (SDQ-I) I hate mathematics (SDQ-II) I am quite good at mathematics (SDQ-III)
General-school	I look forward to all school subjects (SDQ-I) I have trouble with most school subjects (SDQ-II) I learn quickly in most academic subjects (SDQ-III)
General-self scale	When I do something, I do it well (SDQ-I) I can do things as well as most people (SDQ-II) Overall, I have a lot of respect for myself (SDQ-III)

Appendix 2. Scales and items of the behavioural checklist for parents

Scale 1: Critical attitude	<ul style="list-style-type: none"> Corrects teacher Questions rules Stands up for convictions Prefers discussion Criticizes others Is direct
Scale 2: Underground behaviour	<ul style="list-style-type: none"> Refuses to join special programme for gifted students Denies talent Resists challenges Is defensive Has mood swings
Scale 3: Risk-avoiding behaviour	<ul style="list-style-type: none"> Resists challenges Non-risk taking Takes no risks Is independent (reverse)
Scale 4: Social/emotional problems	<ul style="list-style-type: none"> Is defensive Does not participate in class Lacks social skills Isolates self Is dependent Is dishonest Has good self-control (reverse) Is disruptive Neglects him/her self <hr/>