

Social- and Emotional Loneliness in a High IQ Sample: A Lonely Life from Adolescence into Adulthood

'The longing for interpersonal intimacy stays with every human being from infancy throughout life; and there is no human being who is not threatened by its loss... the human being is born with the need for contact and tenderness' (Reichmann, 1959)

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Abstract

The purpose of this study is to investigate the effect of a high IQ (>130) on loneliness. Comparing the loneliness in a high IQ sample to a norm group, the current study aims to find out more about the presentation of loneliness in the high IQ population. Using retrospective reports, the occurrence of social- and emotional loneliness over time in will be explored.

Introduction: *Being different can be caused by many different factors. Independently of the factor, being different can be an unpleasant experience. A high IQ has been little researched as a cause of feeling different. The current study aims to explore the effect of a high IQ on loneliness. **Methods:** 101 participants with an IQ above 130 have filled in a questionnaire on loneliness. Reporting on both adolescence and adulthood to explore the presentation of loneliness over time and to compare the current sample to a regular IQ sample. **Results:** The high IQ sample was found to be more lonely than the general Dutch population. Both types of loneliness have been found to decrease over time. Further demographic and social factors influencing factors have been explored **Discussion:** Further research on the characteristics and consequences of a high IQ is needed to adapt the diagnostic procedure and treatment in a way that enables clinical professionals to help high IQ clients in a meaningful way.*

Keywords: Loneliness; Social loneliness; Emotional loneliness; high IQ

Introduction

A recent study by Dubbelden (2015) has shown that people with a high IQ often do not have the quantity of friendships they desire. In addition, other studies have shown that individuals with a high IQ neither have the quality of friendships they desire (Barber & Mueller, 2011; Gerven, 2009). Although this preliminary evidence suggests that high IQ individuals experience more loneliness, little is known about factors contributing to experience of loneliness in this particular population.

Being Different

People can differ from others in many ways, in directly as well as indirectly observable ways. Being different may influence how an individual is treated by others. Studies have pointed out that standing out from peers in a noticeable way may result in being treated differently (Mays & Cochran, 2001; Troop-Gordon, 2017; Finch, Kolody & Vega, 2000; Brody, Chen, Murry, Ge, Simons, Gibbons, Gerrard, & Cutrona, 2006; Bird & Bogart, 2000; Sen, 2000). Moreover, studies have shown that being different is a risk factor for being maltreated by others, for example by being discriminated or bullied (Moayed, Daraiseh, Shell & Salem, 2006). Not being part of an in-group can be found to be a risk-factor for maltreatment as well and a cause of mental distress (Haslam, Cruwys, Haslam, Dingle & Chang, 2016). It could be argued that every person is unique and therefore different in their own way, but can these differences be divergent enough to cause feelings of isolation?

General Negative consequences of being different

Studies have shown being treated different, in a negative way, has detrimental effects on health. Research on racial discrimination for example, has shown that the negative consequences reach as far as a person's health (Karlsen & Nazroo, 2002; Krieger, 1990; 2000; Krieger & Sidney, 1996; Haslam, *et. al.*, 2016). In their meta-analyses, Pascoe and Smart Richman (2009) state that perceived discrimination in general has been found to significantly affect blood pressure. Being treated in a negative manner can cause feelings of being less valuable than one desires to be. This process of falling short is called *relational devaluation* by Leary and Springer (2001). The authors argue that such devaluation comes with acute feelings of emotional distress and is experienced as aversive because it signals an increased probability of ultimate exclusion (Leary & Springer, 2001). For social animals, such as human beings, such ultimate exclusion is often equivalent to death. The process of natural selection therefore favored those who were motivated to be included (MacDonald & Leary, 2005). Nowadays this means that being socially accepted is essential for feeling happy and content, and therefore being treated in a negative manner can cause mental and physical stress facing the

ultimate threat of isolation (Haslam *et. al.*, 2016). This is supported by research by Ryan and Deci (2000), who have suggested that feeling related to others is essential for facilitating optimal functioning, development and personal well-being.

Negative consequences of being different; feelings of isolation

But how does isolation lead to feelings of loneliness? Feelings of being different, not belonging, rejection, low self-esteem, and self-perceived lack of disclosure to others have been linked to loneliness (Dabrowski, 1964; De Jong-Gierveld, 1998)

Research among adolescents suggests that lonely adolescents experience loneliness most directly through a sense of emptiness, isolation and boredom (Moore & Schultz 1983). Loneliness is typically defined as the discrepancy between a person's desired and actual social relationships (Russell, Peplau, & Cutrona, 1980). This discrepancy can be found in two different ways; the number of relationships-, or the quality of the relationships desired, described as *social loneliness* and *emotional loneliness* (Weiss, 1973). The first term defines the number of social contacts in a way that the number of contacts provide enough interaction, for a person not to feel lonely. The second term describes loneliness in a way that the contacts available provide enough quality to the individual to feel like they can share what they desire (Hawkley, Browne & Cacioppo, 2005; Masi, Chen, Hawkley & Cacioppo, 2010; Stroebe, Stroebe, Abakoumkin & Schut, 1996).

Like being treated in a negative manner can cause feelings of being less valuable than one desires (Leary & Springer, 2001), jealousy or shame can also be identified as signals that one is not living up to the expectations of others (MacDonald & Leary, 2005). Children with special needs, for example children with a below or above average IQ, are often supported by special programs to help them overcome the problem at hand. Sukkar, Dunst and Kirkby (2016) say 'early identification and intervention can be crucial for improving children's developmental outcomes', talking about the children with special needs. This perspective seems widely accepted in the field of education, but what does the emphasis on the special needs of a child do to the way the peers see the child? It could be argued that special treatment by the teacher can cause jealousy and shame and place the child in a special position. Leading to feelings of isolation and eventually loneliness.

The cause of deviations is not always in line with the environmental responses

As stated above, people can differ from others in many ways, which can lead to special treatment by the environment (Mays & Cochran, 2001; Troop-Gordon, 2017; Carr, & Friedman, 2005; Troop-Gordon, 2017; Finch, Kolody & Vega, 2000; Brody, *et. al.*, 2006; Bird & Bogart, 2000). The response of the environment does not always have to be similar to the nature of the deviation observed

in an individual, negative responses can be argued to cause negative emotions and feelings if the implicit requirements set by the environment are not met.

Differing in a noticeable way can occur in many ways. Ways like the examples mentioned above, but ways that are essentially positive as well. For example, physical appearance or personality traits. Personality traits like being more conscientious or less competitive can be identified as risk-factors for being bullied (Moayed, *et. al.*, 2006), while these traits do not necessarily have to be ones with a negative load to everyone.

How High IQ is related

As mentioned above personal perception of being different, not belonging, rejection, low self-esteem, and self-perceived lack of disclosure to others have been linked to loneliness (Dabrowski, 1964; De Jong-Gierveld, 1998) and could be argued to be found more often in gifted people, due to presumed differences in characteristics in a significantly deviating group. The definition of giftedness causes discussion, but agreement exists on the core criterion of high general intelligence (Vock, Köller & Nagy, 2013; Wirthwein & Rost, 2011). Providing high IQ people with special attention and facilities could strengthen the process of isolation by emphasizing the difference in ability to their peers, leading to loneliness in a social and emotional way in the long term.

As stated above, characteristics like emotional sensitivity, intensity and perception of giftedness are being linked to people with a high IQ in a non-scientific context (Rinn & Bishop, 2015). Display of these characteristics linked to a high IQ might lead to being observed as different by others. Being different from others, and being perceived as such, might provide a feeling of being less related to others and feelings of isolation and loneliness. Research has shown that individuals with a high IQ feel different from others (Nauta, 2011; Kooijman-van Tiel, 2008).

The current research

In a non-scientific context, having a high IQ can be claimed to be attached to additional characteristics. Preliminary evidence suggested that emotional sensitivity, intensity and the perception of giftedness are aspects that correlate with a high IQ score (Rinn & Bishop, 2015). The current study is aimed at examining the effects of these presumed additional characteristics on feelings social and emotional loneliness to better understand the psychological effects of having a high IQ.

The current research wants to examine loneliness in a group of high IQ adults and compare these results to a comparable norm, addressing whether the experience of loneliness changes over time in the current sample and if any significant differences can be found compared to the norm groups.

It is expected that adults with an IQ above 130 are more lonely than adults from a norm group. The same results are expected for adolescents. Also, *emotional loneliness* is expected to increase over time and *social loneliness* is expected to decrease over time.

Additional analyses will be used to examine possible explanations for the results.

Methods

Sample

158 Dutch participants, between 20 and 45 years of age, filled out the questionnaire. The maximum age of 45 was chosen based on the presumption that the school system in The Netherlands has changed over time. Therefore the experience of participant might not be comparable with too much age difference. The minimum age of 20 was based on the timing of college in life. Expecting that adolescents meet like-minded peers during college, the age of 20 was chosen as a turning point for the prevalence of loneliness. Social media were used to contact the participants (see Procedure). Based on the self-reported IQ scores and age, 57 people were excluded from participation.

Based on IQ score participants with a score below 130 were excluded. If participants reported an IQ-score based on unvalidated tests (online tests) their participation was excluded. The same was the case for participants that did not report an IQ-score.

Some participants reported a range instead of a number ('between 130-135'), in which case the average has been used as the score. One participant did not agree with the terms in the informed consent, this resulted in exclusion as well. After exclusion based on IQ, age and informed consent the total number of participants was $N=101$.

The sample ($N=101$) scored an average IQ of $M=138.94$ with a $SD= 5.93$ and an average age of $M=33.98$ with a $SD=6.23$ (Table 1).

Furthermore the achieved level of education was used in the additional analysis. The sample was divided into two groups: High school and College/ University. Those two groups were divided into 4 comparable levels of education based on the Dutch educational system (Table 2).

Table 1

Descriptive statistics on the distribution of sexes, the corresponding IQ-scores and age.

	N	IQ		Age	
		M	SD	M	SD
Men	25	138.2	4.8	33.6	6.5
Women	76	139.2	6.3	34.1	6.2
Total	101	138.9	5.9	34.0	6.2

Table 2

Descriptive statistics on the distribution of participants in different levels of education achieved.

	Highschool				College/University			
	<i>Vmbo</i>	<i>Havo</i>	<i>VWO</i>	<i>Gymnasium</i>	<i>MBO</i>	<i>HBO</i>	<i>WO</i>	<i>WO Master</i>
Percent	2.0	7.9	5.9	1.0	6.9	33.7	6.9	35.6

Note: It must be considered that a percentage of the participant reporting their highest level of education ‘vmbo’, ‘Havo’, ‘VWO’ or ‘Gymnasium’ are still studying for their higher education and therefore were not able to report higher levels as being achieved.

Design

The design used was a one-time measurement with a retrospective component. The retrospective component was used to compare different periods of time and the subjective experience during both periods. The scores of the current research have been compared to norm scores derived from the Manual of the Loneliness Scale (De Jong-Gierveld & Van Tilburg, 1990). Figure 1 shows the different scores used in the current research, the lines connect the scores compared to each other.

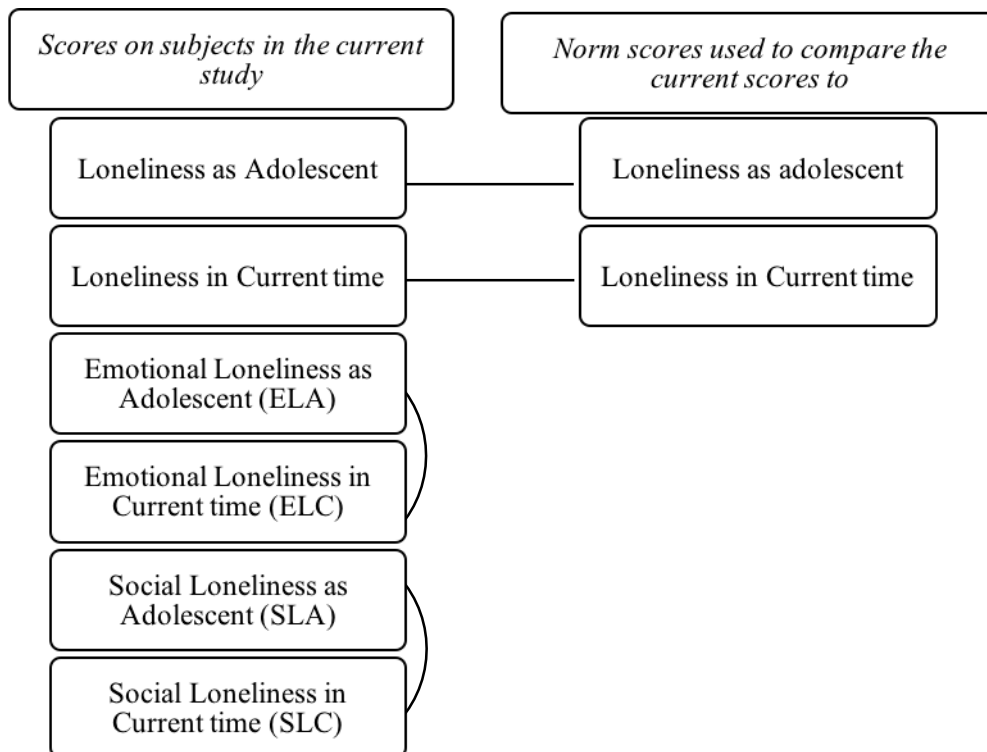


Figure 1. Schematic representation of compared scores for the four analyses from both the current results and from the norm scores used

Procedure

The participation requests were published in the Mensa newsletter, on multiple Facebook pages on the topic of giftedness and were distributed through snowballing.

Mensa is a worldwide association for ‘the intellectually gifted’, with national branches. To become a member, Mensa requires an IQ of 130 or above. The Dutch Mensa branch was contacted to publish the participation request. Facebook pages used included: ‘Hoogbegaafd!’, ‘Vereniging Mensa Nederland’, ‘Hoogbegaafdheid’, ‘Hoogbegaafdheid Hoogsensitiviteit Hechting. Kennis- en begeleidingscentrum’ and others.

Every recruited participant was provided with a link to the digital questionnaire. After agreeing to this in the informed consent and filling in the demographic information the participant continued with the questionnaire.

Retrospectively the participants report feelings about the period between 10 and 18 years of age. This period was chosen because it was expected reporting on feelings from before the age of 10 years old might be too biased. The age of 18 was chosen to create a buffer for the participants that may have entered college at a younger age than 20.

And in the period after 18 years old it was expected that many participants would either find a partner or college friend that could connect and appeal to their nature, causing a bias.

Materials

The materials used are the program of Thesis Tools to conduct the survey composed by the author and the questionnaire by De Jong-Gierveld (de Jong-Gierveld & Kamphuls, 1985).

The questionnaire consisted of two parts: The first 37 questions were formulated by the author (Appendix 1), covering topics on demographic information, bullying, fulfilling the need for connection to others, relationship quality and a comparison between the current situation and the period between 10 and 18 years old on different topics.

The second part was the questionnaire by De Jong-Gierveld and Kamphuls (1985). Participants were asked to fill in this questionnaire twice. The first time answering the questions about the current situation, and the second time retrospective on how the participant felt between the age of 10 and 18 years old. The questionnaire consists of 11 questions; 5 on the topic of social loneliness and 6 on the topic of emotional loneliness. The questionnaires manual (De Jong-Gierveld & Van Tilburg, 1990) states that studies show that the reliability and construct-validity were both sufficient, with reliability ranged between $\rho = .75$ and $\rho = .90$ (De Jong-Gierveld & Van Tilburg, 1987). The authors state that there was surprisingly little difference in mean scale scores among people in comparable populations (de Jong-Gierveld & Van Tilburg, 1989). Furthermore, the results have shown that the

loneliness scale met the psychometric requirements of item non-response, scale homogeneity and person scalability (Van Tilburg & De Leeuw, 1991).

To provide the participants with a score on both types of loneliness, a standardised loneliness questionnaire had been used (De Jong-Gierveld & Kamphuls, 1985). The manual of the questionnaire provided the two norm groups used to compare the loneliness scores to (De Jong-Gierveld & van Tilburg, 1995). The norm group for the adult scores was derived from a study used in the scale manual by Van Doorn (1987). In this study an electronic survey method was used. Respondents ($N=876$) of a panel answered questions by means of a computer (owned by a marketing research institution, and installed in the respondents' homes). The questionnaires and the data were transported via a regular telephone connection. This procedure is called tele-interviewing. The panel was representative of the Dutch population (Van Doorn, 1987; De Jong-Gierveld & Van Tilburg, 1995).

The norm group for the adolescent scores was derived from a study by Baldee *et. al.* (1990) also described in the manual (De Jong-Gierveld & Van Tilburg, 1995). In this study face-to-face interviews were conducted with 109 youngsters (age 11 to 19). The 49 boys and 62 girls were asked to cooperate mostly in school time. The interviewers were students. The aim of the study was to investigate the association between psycho-neurotism and social support (Baldee *et. al.*, 1990; De Jong-Gierveld & Van Tilburg, 1995). The scores from both norm groups on loneliness came from the loneliness manual and were used to compare to the scores from the current sample.

Results

Hypothesis 1: Adults with an IQ above 130 report more loneliness than adults from a representative norm group

To assess if loneliness is significantly higher in adults with a high IQ than in individuals in the general population, a one sample t-test was used. An average loneliness score for the general population was derived from the manual of the loneliness scale (De Jong-Gierveld & Van Tilburg, 1990). Loneliness in the current sample ($M = 6.41$, $SD = 3.47$) was 2.91, CI [2.22 - 3.59], higher than the average loneliness in the general population ($M = 3.5$, $SD = 3.1$). The t -test showed that this difference was statistically significant ($t(100) = 8.41$, $p < .001$, *Cohens d* = .88) and therefore supported this hypothesis.

Hypothesis 2: Adolescents with an IQ above 130 report more loneliness than adolescents from a representative norm group

To assess if loneliness is significantly higher in adolescents with a high IQ compared to their peers in the general population, a one sample t-test was used. An average loneliness score for adolescents in the general population was derived from the manual of the loneliness scale (De Jong-Gierveld & Van Tilburg, 1990). Loneliness in the high IQ sample ($M = 8.31$, $SD = 2.84$) was 6.11 points, 95% CI [5.55 – 6.67], higher than the average loneliness in the general population ($M = 2.2$, $SD = 2.5$). The t -test showed that this difference was statistically significant ($t(100) = 22.63$, $p < .001$, $Cohens\ d = 2.29$). This second hypothesis was therefore supported.

Additional analyses

To explore which factors may be involved in the higher loneliness among individuals with an IQ above 130, additional analyses were conducted. Demographic and psychological variables were examined. For the additional analyses, a distinction was made between emotional loneliness and social loneliness as well as for current experience and the retrospective experience as an adolescent (emotional and social) loneliness.

IQ-score

A one-way between groups analysis of variance (ANOVA) has been conducted to investigate if loneliness scores significantly differed for IQ cohorts. The analyses used cohorts with intervals of 4 IQ points (130-134; 135-139 etc.). Analysis showed that none of the IQ-cohorts had significantly higher scores for either emotional or social loneliness. Emotional Loneliness Adolescence (ELA); $F(4,96) = .52$, $p = .720$, $\eta^2 = .021$. Emotional Loneliness Current (ELC); $F(4,96) = .58$, $p = .68$. Social Loneliness Adolescence (SLA); $F(4,96) = .04$, $p = .99$. Social Loneliness Current (SLC); $F(4,96) = .516$, $p = .72$.

Age Cohorts

To examine if loneliness was higher for specific age cohorts, again ANOVA analyses were used. Age was divided in cohorts of 4 years (20-24, 25-29, etc). For Emotional Loneliness, for current as well as adolescent emotional loneliness, no significant differences were found between age-cohorts (ELA $F(5,95) = .572$, $p = .71$; ELC $F(5,95) = .411$, $p = .84$). For Social Loneliness also no significant differences were found (SLA $F(5,95) = .647$, $p = .66$; SLC $F(5,95) = .291$, $p = .92$).

Gender

To examine if gender might be related to loneliness, Chi-Square tests of contingencies (with $\alpha = .05$) was used. For all types of loneliness, individuals were categorized as either, not lonely (score of 1 - 2 points), mildly lonely (score 3 - 4 points) or severely lonely (score 5 -6 points). The chi-square test was not significant for ELC ($\chi^2(2, N = 101) = .71$, $p = .70$, $\phi = .08$), ELA ($\chi^2(2, N = 101) = 4.25$, p

=.12, $\phi = .21$) and SLA ($\chi^2(2, N = 101) = 4.46, p = .11, \phi = .21$), indicating that loneliness scores did not differ between sexes. For SLC, on the other hand, a significant difference between the sexes was found ($\chi^2(2, N = 101) = 6.92, p < .05, \phi = .26$). As illustrated in Figure 2, the women were significantly more likely to report currently present mild social loneliness.

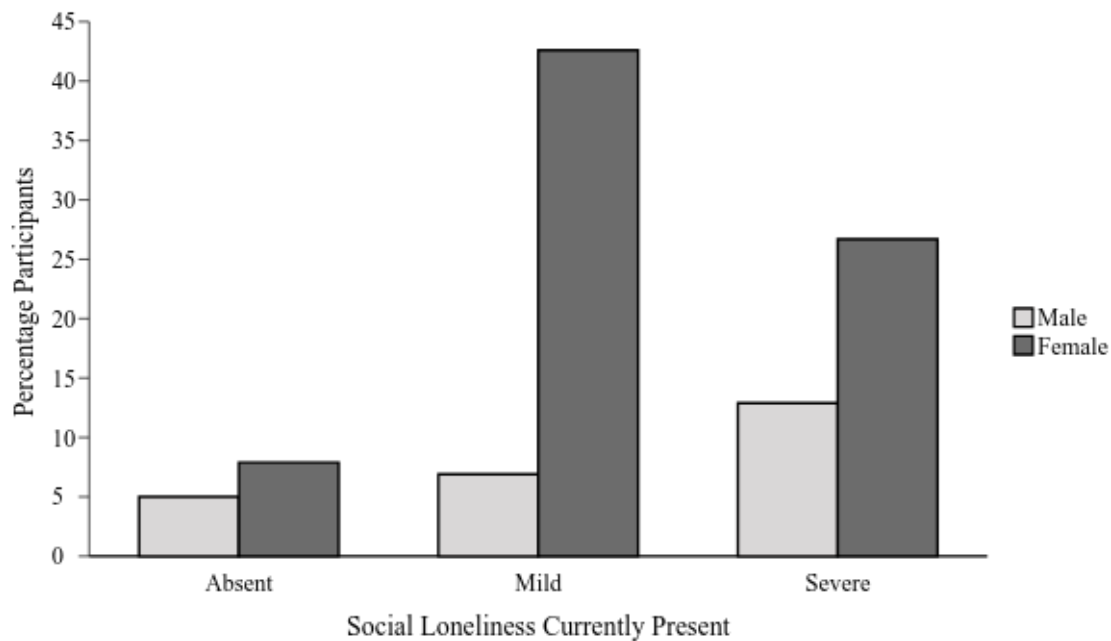


Figure 2. Percentage of participants, divided by gender, reporting feelings of social loneliness in the present time per cohort.

Educational Level

To examine if loneliness was significantly higher for specific educational levels, ANOVA analyses were used. No significant differences were found in the height of the loneliness scores among groups consisting of different educational levels. ELA $F(7,93) = 1.433, p = .20$, ELC $F(7,93) = 1.645, p = .13$, SLA $F(7,93) = 1.399, p = .22$, SLC $F(7,93) = 1.059, p = .40$.

Partner Relationship

To examine if having a partner relationship might be related to loneliness, an independent samples t-test was used. For ELA, no significant difference was found between the average emotional loneliness score for individuals in a relationship ($M = 4.47, SD = 1.63$) compared to individuals not in a relationship ($M = 4.05, SD = 1.93$), $t(99) = 1.12, p = .27$. Also no differences were found for current emotional loneliness (Relationship; $M = 3.58, SD = 1.90$, No Relationship; $M = 3.58, SD = 2.19$), $t(99) = -.00, p = .99$. Furthermore, regarding social loneliness during adolescence as well as currently, no differences were found in the height of the loneliness scores between individuals with and without a relationship (SLA: $t(99) = -1.41, p = .89$, SLC: $t(99) = -.07, p = .94$).

Age learned about IQ

To examine if the age on which individuals learned about their high IQ might be related to loneliness, ANOVA was used. Before conducting an ANOVA the data were divided into 5 cohorts: Young childhood (0-6 years old), Primary school age (7-12), High school age (13-18), Students years (19-24) and Adult (25 and up). No significant results were found in the ANOVA, indicating that the age of awareness about the high IQ did not influence the experience of any type of loneliness, ELC: $F(4,96) = .62, p = .65$, ELA: $F(4,96) = .75, p = .56$, SLC: $F(4,96) = .48, p = .75$, SLA: $F(4,96) = 1.137, p = .34$.

Additional questions

Before answering the standardised loneliness scale, participants were asked to fill in a questionnaire regarding their social (and psychological) functioning, both current and retrospective during adolescence. Using the answers to additional questions in the questionnaire, other factors related to loneliness have been explored. For each type of loneliness (ELC, ELA, SLC, SLA) social factors were examined.

ELC

To examine if, and which, social factors differed significantly between ‘emotional loneliness severity groups’ (absent, light or severe current emotional loneliness), a Kruskal-Wallis ANOVA was conducted (see Table 3). This analysis showed that three social aspects significantly differed between ELC severity-groups: ‘feeling different from others due to a high IQ’ (H (corrected for ties) = 7.732, $df = 2, N = 70, p = .02$, Cohen’s $f = .35$), ‘feeling different from others apart from having a high IQ’ (H (corrected for ties) = 14.030, $df = 2, N = 90, p < .01$, Cohen’s $f = .44$) and ‘feeling like developing social contacts and skills was more easy outside the classroom’ (H (corrected for ties) = 15.741, $df = 2, N = 88, p < .001$, Cohen’s $f = .47$).

Mann-Whitney U tests were conducted to explore which ‘severity groups’ differed significantly from each other. First ‘absent’ and ‘light’ were compared. Significant results were found for the first social factor of ‘feeling different from others due to a high IQ’. The group of participants reporting the absence of emotional loneliness in the present time showed significantly higher report rates ($Mean Rank = 23.50, n = 17$) than the participants reporting light emotional loneliness ($Mean Rank = 15.18, n = 20$), $U = 93.50, z = -2.61$ (not corrected for ties), $p = .009$ (two-tailed). This effect could be considered medium with $r = .43$ (Cohen, 1988).

Comparing the social factors found, on ‘light’ and ‘severe’ reports of emotional loneliness in the present time, the other two factors were found to differ significantly. The second factor ‘feeling different from others apart from having a high IQ’ was found to report significantly higher loneliness

scores in the group reporting light emotional loneliness (*Mean Rank* = 41.39, *n* = 23) than were the participants reporting severe emotional loneliness (*Mean Rank* = 29.28, *n* = 43), *U* = 313.000, *z* = -2.68, *p* = .007. With an *r* = .33 this effect is considered medium as well.

The third social factor identified by the Kruskal-Wallis ANOVA was ‘feeling like developing social contacts and skills was more easy outside the classroom’. The group reporting severe emotional loneliness scored significantly higher (*Mean Rank* = 35.83, *n* = 42) on this factor, than did the group reporting light emotional loneliness (*Mean Rank* = 26.24, *n* = 22), *U* = 322.00, *z* = -2.30, *p* = .021. This effect was found to be negative and medium strong with *r* = -.29.

Comparing the groups reporting ‘absent’ and ‘severe’, significant results were found for all three social factors. The first factor ‘feeling different because of a high IQ’ was found to report severe emotional loneliness significantly higher (*Mean Rank* = 22.73, *n* = 33), that the group reporting absence of emotional loneliness (*Mean Rank* = 30.88, *n* = 17), *U* = 189.00, *z* = -2.127, *p* = .033.

Results found for the social factor of ‘feeling different apart from a high IQ’ showed significantly higher scores for the group reporting ‘severe’ emotional loneliness as well (*Mean Rank* = 28.76, *n* = 67) than the group reporting ‘absent’ emotional loneliness (*Mean Rank* = 43.40, *n* = 24), *U* = 290.50, *z* = -3.259, *p* = .001.

The last social factor of ‘feeling like developing social contacts and skills was more easy outside the classroom’ scored significantly higher on the group reporting ‘severe’ emotional loneliness (*Mean Rank* = 28.20, *n* = 42) than the group reporting the absence of emotional loneliness (*Mean Rank* = 42.77, *n* = 24), *U* = 281.50, *z* = -3.617, *p* < .001.

All three effect were medium strong with respectively *r* = -.30, *r* = -.40 and *r* = -.45.

Table 3.
Questions significantly differing between ELC severity levels

Question	<i>H</i>	<i>df</i>	<i>N</i>	<i>f</i>	<i>p</i>
Feeling different from others due to a high IQ	7.732	2	70	.35	.02
Feeling different from others apart from a high IQ	14.030	2	90	.44	<.01
Feeling like developing social contacts and skills was more easy outside the classroom	15.741	2	88	.47	<.001

ELA

For adolescent emotional loneliness, the same analyses were conducted. A Kruskal-Wallis ANOVA was conducted, which showed that, between the ‘emotional loneliness severity groups’ (absent, light or severe adolescent emotional loneliness), no significant differences existed on answers to the additional questions.

Since no significant differences were found between the groups reporting different severities, no Mann-Whitney U test has been conducted.

SLC

To explore the factors with significantly different answers per severity scale on social loneliness in the present time, the same ANOVA was conducted (see Table 4). The analyses showed multiple significant results. Factors scoring significantly per severity were: ‘feeling different from others due to a high IQ’ (H (corrected for ties) = 6.021, $df = 2$, $N = 68$, $p = .05$, Cohen’s $f = .31$), ‘feeling excluded by others’ (H (corrected for ties) = 6.160, $df = 2$, $N = 90$, $p = .05$, Cohen’s $f = .27$), ‘feeling like developing social contacts and skills was more easy outside the classroom’ (H (corrected for ties) = 11.112, $df = 2$, $N = 86$, $p < .01$, Cohen’s $f = .39$).

Since three social factors have been identified as significantly different between severity-levels as well, another Mann-Whitney U exploration has been conducted to identify which severity groups differ from each other. Comparing severity-level ‘absent’ and ‘light’ results have shown significant differences for all three social factors. The first factor of ‘feeling different due to a high IQ’ was found to have higher scores in the group reporting light social loneliness ($Mean Rank = 20.28$, $n = 23$) than in the group reporting no feelings of social loneliness ($Mean Rank = 13.63$, $n = 12$), $U = 85.50$, $z = -2.06$, $p = .04$. This effect was medium and negative with $r = -.35$.

The same results were found for the social factor of ‘feeling excluded by others’: the group with light social loneliness scores significantly higher ($Mean Rank = 28.69$, $n = 32$) than the group reporting absence of social loneliness ($Mean Rank = 19.83$, $n = 18$), $U = 186.00$, $z = -2.26$, $p = .024$. The effect was medium and negative with $r = -.32$.

Contrary results were found for the social factor of ‘feeling like developing social contacts and skills was more easy outside the classroom’, where higher scores were found in the group reporting the absence of social loneliness ($Mean Rank = 29.00$, $n = 17$) than in the groups reporting light social loneliness ($Mean Rank = 22.88$, $n = 32$), $U = 204.00$, $z = -2.22$, $p = .026$. This effect was medium as well with $r = -.32$.

Comparing the groups reporting light and severe social loneliness, significant results were found for ‘the feeling of being different due to a high IQ’ and ‘feeling excluded by others’. The results for the first factor showed higher scores for the group reporting light feelings of social loneliness ($Mean Rank = 33.67$, $n = 23$) compared to the group reporting severe social loneliness ($Mean Rank = 24.89$, $n = 33$), $U = 260.50$, $z = -2.18$, $p = .029$. And with $r = -.29$ this effect was found to be small.

Similar results were found for the second factor of ‘feeling excluded by others’, with a higher score for the group reporting light social loneliness ($Mean Rank = 41.59$, $n = 32$) compared to the group reporting severe social loneliness ($Mean Rank = 32.43$, $n = 40$), $U = 477.00$, $z = -2.02$, $p = .04$, being a small effect with $r = -.24$.

Comparing the severity levels of ‘absent’ and ‘severe’ significant results were found for the social factor of ‘feeling like the development of social contacts and skills was more easy outside the classroom’, with higher scores for the group reporting ‘severe’ (*Mean Rank* = 23.59, *n* = 37) than the group reporting ‘absent’ (*Mean Rank* = 36.00, *n* = 17), $U = 170.00$, $z = -3.302$, $p = .001$. This was a medium strong effect with $r = -0.45$.

Table 4.

Questions significantly differing between SLC severity levels

Question	<i>H</i>	<i>df</i>	<i>N</i>	<i>f</i>	<i>p</i>
Feeling different from others due to a high IQ	6.021	2	68	.31	.05
Feeling excluded by others	6.160	2	90	.27	.05
Feeling like developing social contacts and skills was more easy outside the classroom	11.112	2	86	.39	<.01

SLA

For adolescent social loneliness, the same analyses as used above were conducted. The Kruskal-Wallis ANOVA showed that, between the ‘social loneliness severity groups’ (absent, light or severe adolescent emotional loneliness), no significant differences existed on answers to the additional questions.

Hypothesis 3: Emotional Loneliness increases over time in a high IQ sample

To assess if emotional loneliness increased during lifetime, a paired sample *t*-test was used to compare emotional loneliness in adolescence ($M = 4.20$, $SD = 1.83$) to current emotional loneliness ($M = 3.58$, $SD = 2.08$). Analysis showed that, on average, emotional loneliness was 0.61 points, 95% CI [.11, 1.11], lower in present day than during adolescence (see Figure 3.). The *t*-test suggested that this difference was statistically significant, $t(100) = 2.43$, $p < .01$, *Cohen’s d* = .31. This hypothesis was therefore rejected.

Hypothesis 4: Social Loneliness decreases over time in a high IQ sample

To assess if social loneliness decreased during lifetime, a paired sample *t*-test was used to compare social loneliness in adolescence ($M = 4.11$, $SD = 1.35$) to current social loneliness ($M = 2.82$, $SD = 1.69$). Analysis showed that, on average, social loneliness was 1.29 points, 95% CI [.90, 1.67],

lower currently than during adolescence. The t -test suggested that this was a statistically significant difference, $t(100) = 6.60, p < .001, Cohen's d = .85$. The analysis supported the hypothesis.

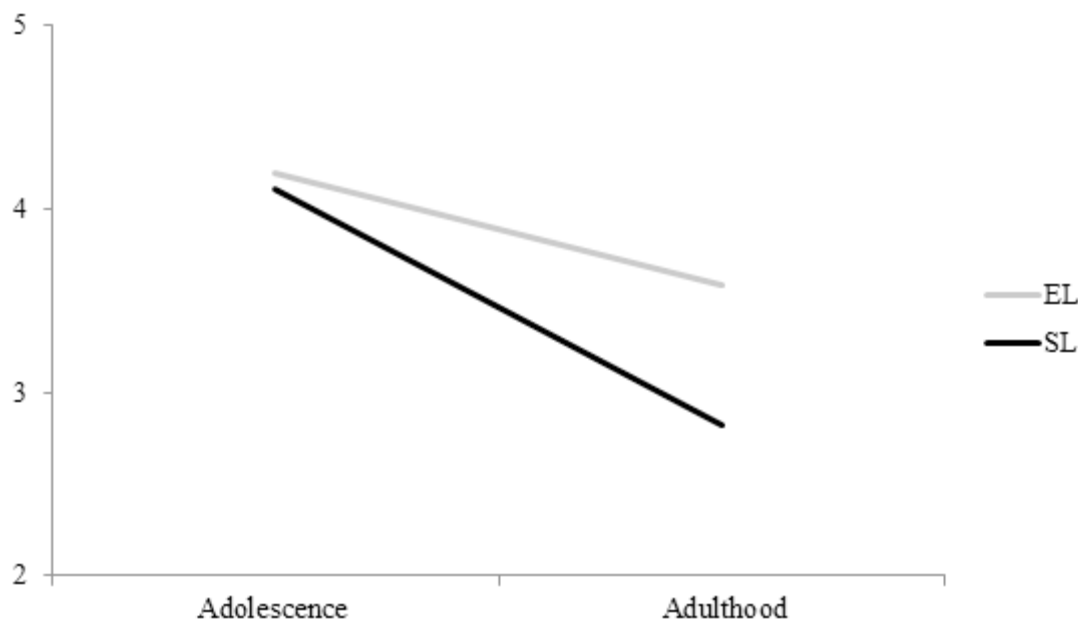


Figure 3. Decrease in Emotional and Social Loneliness from adolescence into adulthood

Additional analysis

Additional analyses have been conducted to explore which factors might explain the results found in the above mentioned analysis, that is that both emotional and social loneliness decreased after adolescence.

Five of the additional questions have been formulated in a way that comparison between the retrospective experience as an adult and the experience in the current time can be compared. A paired samples t test has been used to compare the means for these five topics (see Figure 4.).

The first topic concerned the need to isolate oneself from their environment. The paired samples t -test ($\alpha = .05$) compared two mean scores for the retrospective experience during adolescence ($M = 4.33, SD = .73$) and the current experience as an adult ($M = 3.91, SD = .78$). On average the participants reported a decrease in the need for isolation by .42 points on a scale of 1-5, with a 95% CI [.24, .60]. This difference was found to be statistically different, $t(99) = 4.72, p < .001$, and small, $d = .14$. This shows a decrease in experience of the need to isolate oneself from others over time. It needs to be stated that in the questions on this topic a low score meant a high need for isolation. We therefore conclude that the need for isolation does not decrease, but increase over time.

The second topic was the need for solitude. The t test (α of .05) results showed a significant decrease in the experience of the need for solitude over time, $t(100) = 2.66, p < .05$, with a small effect size, $d = .36$. The retrospective adolescent experience and the current experience were compared ($M = 4.18, SD = .82$ and $M = 3.91, SD = .79$), with a 95% CI [.07, .47]. It can be concluded that the results

show a decrease (.27) in the experience of the need for solitude. As with the previous topic, in the questions used to ask about this topic, a low score was the equivalent of a strong need for solitude. We therefore conclude that the need for solitude increases over time.

The third topic explored the ability to achieve meaningful interactions with others over time. The assumptions of normality and normality of difference scores were met. A significant (α of .05) decrease was found ($p < .001$) between the two mean scores ($M = 3.53, SD = 1.17$ and $M = 2.53, SD = .98$), with a 95% CI [.77, 1.24]. The effect size was large, $d = .93$ and $t(100) = 8.43$. These results show a strong decrease (1.00) in the experience of the ability to achieve meaningful interactions with others. The questions used to investigate this topic scored higher on a negative answer, thus meaning that a higher score meant less meaningful interaction. The results found, therefore show a decrease in score, but an increase in achieving meaningful interaction.

The feeling of being understood by others was the fourth topic analysed with a paired samples t-test (α of .05). The two means for both scores were compared ($M = 4.01, SD = 1.11$ and $M = 2.98, SD = 1.02$), showing a strong ($d = .96$) significant ($p < .001$) decrease (1.03) in the experience over time, with a 95% CI [.78, 1.28] and $t(100) = 8.32$. For this topic a higher score means less feelings of being understood, the results therefore show that as adolescents the participants felt less understanding than they do now, showing an increase in the experience of feeling understood by others.

The final topic investigated with a paired samples t test (α of .05) over time was the feeling of reaching the desired depth in interaction. Comparing the two mean scores ($M = 4.12, SD = 1.15$ and $M = 2.91, SD = 1.27$), test results show a strong ($d = 1.00$) significant ($p < .001$) decrease (1.21) over time, with $t(100) = 8.17$ and a 95% CI [.92, 1.50]. Since a higher score means less depth in interaction, the results found show that with time the desired depth in interaction reached in interaction increases.

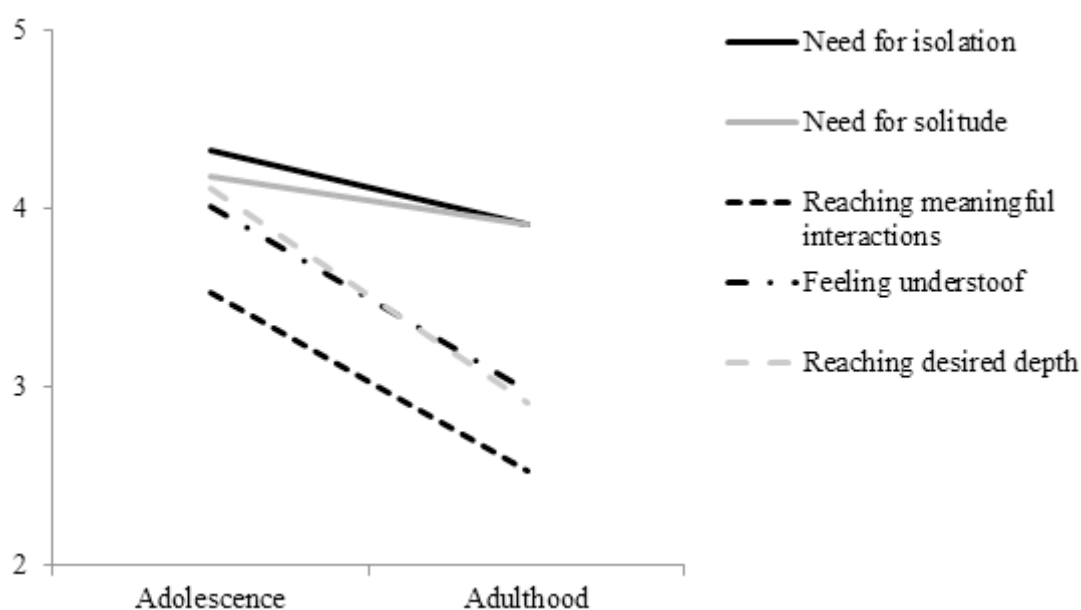


Figure 4. Decrease in different topics explored from adolescence into adulthood

Discussion

The current study has examined the effects of presumed characteristics in a high IQ sample on feelings of loneliness. Focusing on the effects of a high IQ on both social- and emotional loneliness, the findings are intended to contribute to the understanding of the psychological effects of having a high IQ. The results showed a higher level of loneliness in adults with a high IQ, compared to the norm-group representing the general Dutch population. Similar results were found for the retrospective experience in adolescence. Furthermore results have shown that both emotional- and social loneliness decline from adolescence into adulthood.

The results showed that Adults with an IQ above 130 are more lonely than adults from the general population and that adolescents with an IQ above 130 are more lonely than adolescents from the general population. These findings were in line the expectations (Haslam *et. al.*, 2016; Leary & Springer, 2001; MacDonald & Leary, 2005; Rinn & Bishop, 2015; Wirthwein & Rost, 2011). To explore possible explanations for the higher levels of loneliness in the current sample, additional analyses have been done. None of the demographic variables (IQ, age, gender, education level, relationship status) appeared to be related to the severity of loneliness. Although a study by Dykstra and Fokkema (2007) suggested that loneliness increased with IQ, current results were not in line with this suggestion. That is, no differences were found between IQ cohorts, suggesting that the height of the IQ was not related to loneliness in the current sample. As for age, the conclusion from a study by De Jong-Gierveld and Van Tilburg (2016), that loneliness increased during adulthood, was not supported by the current findings. As would be expected based on the conclusions in a meta-analysis by Pinquart and Sörensen (2001) and other research (Chodorow, 1978), the current research did find a stronger prevalence of light social loneliness in women. But no differences were found in the general experience loneliness between the sexes. Research done by Fokkema, De Jong-Gierveld and Dykstra (2012) suggested that the achieved level of education could be linked to the experience of loneliness. No such findings were supported by the current research. Therefore, thinking that going to university will make one feel like they fit in more, does not seem to be so for the current sample. Last, due to findings from other research (De Jong-Gierveld & Van Tilburg, 1988, 2016; Dykstra & Fokkema, 2007) and in line with the attachment perspective proposed by Weiss (1974), it was expected that having a partner relationship would influence the experience of loneliness. The current results showed no influence of a partner relationship on the experience of loneliness.

Further additional analysis showed that learning about one's high IQ at a young age did not result in lesser experience of loneliness over time. This could imply that knowing about one's high IQ does not help to find a place that's less lonely, for example due to differences in personal factors such

as self-esteem or social-skills (Hawkley, Hughes, Waite, Masi, Thisted & Cacioppo, 2008) . This does not mean that finding out early does not have other benefits, maybe for development of self-image or self-esteem, but the current research did not find any positive or negative influences on the experience of loneliness. The same can be stated about finding out later in life; the experience of loneliness is similar over time. This does not mean that understanding what causes the loneliness cannot be a relief and make it more easy to deal with.

As expected result show a decrease in social loneliness. Against the expectations, a decrease in emotional loneliness was found. This means that the high IQ sample experienced more loneliness in general, and that both emotional and social loneliness show a relative decline, transitioning from adolescence into adulthood. Important about this is to state that even though both loneliness types get better, they remain at such a level that they are higher than the levels in the general Dutch population.

An increase in emotional loneliness was expected. The decrease found instead is in line with the research done by Dykstra (2009). This research states that a decline in loneliness is expected when the age cohort of 15-24 is compared to the cohort of 25-44 years of age (comparable to the age categories of the current research). An increase does not occur until 65-79 years of age compared to 80+ years of age. Furthermore, research by Dykstra (2009) and De Jong-Gierveld and Van Tilburg (1990) also emphasizes that higher loneliness scores can be found in an adolescent sample in general. In contrast with these findings, research done by Jylhä (2004) and more (Aartsen & Jylhä, 2011; Cohen-Mansfield, Shmotkin & Goldberg, 2009; Dahlberg, Andersson, McKee & Lennartsson, 2015), shows a constant increase in loneliness over time and a stronger increase at older age. A stronger increase later in life concurs with findings by Dykstra (2009). Based on the research by Dykstra (2009) and De Jong-Gierveld and Van Tilburg (1990) it could be argued that higher scores can be common during the adolescent period in general. Higher scores during adolescence would argue that a decrease of emotional loneliness actually was to be expected.

Possible explanations for the decrease in emotional and social loneliness can be that the need for stronger and more emotional connections diminishes due to either *satisfaction* of the need, or *decrease* of the need.

A first possible explanation for the satisfaction of the need, can be found in the additional analysis of the factors of the ability to achieve meaningful interaction with others, feeling understood by others and being able to achieve the desired depth in connection with others. The results show that all three of these factors increase transitioning from adolescence into adulthood. With these factors having an elevating influence on loneliness (De Jong-Gierveld, 1998; De Jong-Gierveld & Van Tilburg, 2016; Hawkley, *et. al.*, 2008) it could be argued that they influenced the loneliness in the current sample as well.

A second possible factor contributing to the satisfaction of the need could be the role of a partner (De Jong-Gierveld & Van Tilburg ,1989). As research done by De Jong-Gierveld and Van

Tilburg (1989). As mentioned above, the role of a partner has been found to influence loneliness as well. Other research shows that partner relationship does not protect against loneliness (Dykstra, Van Tilburg & De Jong Gierveld, 2005), thus concurring with the current findings. A possible explanation for the lack of effect for partner relationship could be that the loneliness in the current sample is very high in general, and that having one valuable relationship in one's life does not make a difference in the overall loneliness experience.

A third explanation could be that individuals with a high IQ hold different standards to their relationships (Barber & Mueller, 2011; Bowlby, 1974; Gerven, 2009) and feel disappointed and hurt if others do not live up to their expectations (Barber & Mueller, 2011; Gerven, 2009).

A fourth explanation could be that the partner relationship is not as highly valued as one would expect (Barber & Mueller, 2011; Bowlby, 1974; Gerven, 2009). Analysis of the reported value of a partner relationship shows the opposite, with an increase in value as the IQ score goes up. This suggests that an increase in IQ does not complicate the establishment of a partner relationship.

A fifth factor possibly contributing to the satisfaction of the need for stronger emotional connections is having a valued network of friends (Asher & Weeks, 2012; Cacioppo & Patrick, 2009; Scott, Bergeman, Verney, Longenbaker, Markey & Bisconti, 2007; Russell, Cutrona, McRae & Gomez, 2012). As the results have shown, reports of having a valued network of friends decline as the IQ score above 130 increases. This suggests that the higher the IQ score grows above 130, the lesser chance of having a valued network of friends. As any other human does, people with a high IQ prefer others like themselves in social interaction (Adams-Byers, 2004). If they do find others with a high IQ, this will positively influence their well-being by increasing feelings of happiness, interest and pleasure (Diener & Ryan, 2009). With a scarcity of people to form friendships with and feeling different from others, people with a high IQ could be argued to be at risk for feelings of loneliness (De Jong-Gierveld & Van Tilburg, 2016; Hawkey, *et. al.*, 2008; Russel *et. al.*, 2012).

The fulfilling of the desire could also be caused by a sixth factor: A selection-process in the environment through finding like-minded people or people with similar interests (De Jong-Gierveld, 1998; De Jong-Gierveld & Van Tilburg, 2016). This could, for example, occur in college or work-related environments.

Apart from the satisfaction of the need for more and stronger social relationships, a decrease in loneliness could also be caused by a decreases in this need.

A first explanation for the decrease in need can be found in the additional analyses again. As the results show, the factors of the need for isolation and the need for seclusion, both increase transitioning into adulthood. By definition contradicting the need for more and stronger social relationships, these factors could be argued to influence the experience of loneliness.

A second possible explanation could be the extra importance of peers and fitting in as an adolescent (Berndt, 1982). The longing for a larger number of social contacts could therefore be argued to just be higher in adolescence, and naturally decrease into adulthood.

It should also be considered a third possible explanation that with age people start to accept that the type of intimate social contacts desired, may not be a realistic aim to have (Barber & Mueller, 2011; Gerven, 2009) and/or start to appreciate spending time alone (Bowlby, 1974; current results).

Concluding it can be stated that the sample in the current research reported significantly more feelings of loneliness in both adolescence and adulthood, than the general Dutch population.

Several factors should be taken into consideration on the matter of limitations of the current study.

The first factor is the possibility that the sample could be biased. A bias of the sample could have occurred by asking participants to take part in research on loneliness. This could have attracted participants that are more lonely than other people with a high IQ.

The second concern for bias comes from the fact that all participants were aware of their IQ. It could be argued that not every person with a high IQ is aware of this fact. Making the current sample feel different to begin with. And not having the influence of the high IQ individuals not-knowing about their IQ, because they never had reason to search for a high IQ as an explanation

A third factor influencing generalisability is the self-report of IQ scores. Another point to be considered about IQ scores in the current sample, is the fact that the scores are not normally distributed. Possibly causing statistical distortion.

The fourth main influence on the generalisability of the results is the fact that participants reported their feelings during adolescence retrospectively. The effect of reflecting on loneliness retrospectively is unknown, but it could be argued to work two ways. The first way is the way in which participants understand themselves and what they missed in this period better when looking back. This means that the scores may be more in concurrence with reality. The second way the retrospective nature of the questionnaire could influence the answers is when the participants felt lonely during adolescence but trivialise these feelings as an adult.

A last influence on the generalisability of the results is the fact that the scale used in the questionnaire (De Jong-Gierveld & Van Tilburg, 1990) has not been validated on a high IQ sample. This influencing factor could have been limited in the current study by pilot testing the scale on a high IQ sample, but this has not been done.

Taking all the above-mentioned shortcomings into account it could be stated that even though the results seem relevant, a lot could be improved to strengthen the generalisability. These shortcomings on the other hand do not reverse the fact that the results are significant. The current

research has found support for the hypotheses that individuals with a high IQ might experience more loneliness than the general population, compromising factors that can be linked to quality of life (Diener & Ryan, 2009).

The current study has clinical implications. As characteristics of a high IQ often bring people into the clinical practice with many questions but their intelligence (Dubbelden, 2015), mental health professionals do not look for possible explanations in the latter direction either. Often looking for the most efficient way to help their clients (American Psychiatric Association, 2000; Egberink, Holly-Middelkamp & Vermeulen, 2017) and a lack of basic knowledge on the subject (Dubbelden, 2015), the risks of misdiagnosing seems real.

Since statistically, 2,5% of the population has an IQ significantly higher than average, it could be argued that there is a chance that misdiagnosis occurs on a regular basis. Causing insufficient help and possibly even further damage to the client ('Hondt & van Rossen, 1999; Drent & van Gerven, 2007; Neihart, 1999; Shechtman & Silektor, 2012). This is a cause for concern (Jacobsen, 1999). As research by Schinke and colleagues (Schinka, Van Dulmen, Bossarte, & Swahn, 2012) shows, chronic loneliness can lead to more psychopathology, depression, suicidality and social skill deficits.

Further research is suggested to focus on the identification of additional characteristics, influencing factors and its consequences. Long term research would be extra valuable if it could further research the changes desired to provide meaningful treatment in mental health care. Due to a large number of shortcomings it cannot be stated that individuals with a high IQ are more lonely in general, but the number of participants and the strength of the results at least provide reason to suspect there might be more to the subject.

Concluding it can be said that the results give reason to further research the characteristics accompanying a high IQ. Bearing in mind the shortcomings mentioned above, the results lead us to state that further research on not only characteristics of having a high IQ and its consequences for development, but its consequences on treatment as well, are worth researching further. Not only could it be important to find out more about the overall picture of people with a high IQ, but it can also be of great value to clinical practice.

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