Peer attachment and prosocial giving behaviour of highly intelligent children in regular and gifted education

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Abstract

This study examined whether highly intelligent children experience stronger peer attachment and if they show more prosocial giving behaviour when attending gifted education as opposed to regular primary education. To examine the relation between peer attachment, prosocial giving behaviour and education type 117 Dutch students between 9 and 12 years old have filled in the Raven Progressive Matrices, the IRI, the Prosocial Donation Task and the IPPA as part of the Brightwave study. The results show that there is no significant effect of education type on peer attachment in highly intelligent children ($t(1) = .102$, $p = .751$). Furthermore, no significant effect of education type was found on prosocial giving behaviour ($t(44) = .562$, $p = .577$). We did find a significant effect of peer attachment on the number of donated coins $F(2,88) = 10.543$, $p = .002$. However, this effect was not influenced by education type.

The results from this study were unexpected because previous research has shown that highly intelligent children differ from their classmates in terms of emotional development and playstyle (Kroesbergen et al., 2016). This could make them feel less familiar towards their classmates which would cause them to show less prosocial giving behaviour (Amici, 2015). A possible explanation why highly intelligent children do not experience higher peer attachment or show more prosocial giving behaviour in gifted education is that they do not differ as much from their classmates in regular education as previously thought or despite this difference they may still befriend some classmates that share their interests and playstyle.

Introduction

Social and emotional development in the transition to early adolescence

The gradual change from child to adolescent marks the start of many changes in a child's body, cognitive functioning, interests, and relationships (Pike, 2002). Children who are in transition towards adolescence are more motivated to form close friendships. They spend more time with their friends, they are more easily influenced by friends, and they increasingly turn to friends for support instead of to their parents (Xu et al., 2020). An important driving force in this development is the increased executive functioning and the growing verbal abilities that children develop when transitioning towards early adolescence. This allows them to show increased emotion regulation, to incorporate multiple perspectives, to inhibit one's own desires, and to solve social problems (Miller et al., 2020; Xu et al., 2020). They also develop a better understanding of the thoughts, beliefs, motivations and intentions of others (Vetter et al., 2013). This is an important aspect in the development of empathy, which allows them to understand others' emotions and feel what they expect others to feel (Eisenberg, 2000). Children with a high sense of empathy are able to make more accurate interpretations of the emotions or intentions of their peers (Wang et al., 2019). This in turn allows them to react to others in a sensitive and prosocial way, which is important in forming and maintaining relationships.

Prosocial behaviour can be described as voluntary behaviour intended to benefit others (Güroglu et al., 2014). Common prosocial behaviours are displays of fairness, trust and reciprocity in the form of sharing, giving, helping and cooperating. Prosocial behaviour is oriented at interaction partners such as classmates, friends, and family (van de Groep et al., 2020). Engaging in prosocial behaviour is an important factor for the development of friendships because acting in a prosocial way gives peers a feeling of companionship and trust to receive help when needed (Cillessen et al., 2005).

One way to measure prosocial giving behaviour is through the Dictator Game or the Prosocial Donation Task, in which participants have to divide tokens or money between themselves and another person, such as a friend, a classmate, their parents or an anonymous recipient (Schurter & Wilson, 2009). In this task they are fully in control of the way the money is divided. The person on the receiving end has no possibility to control the outcome. A participant is considered more prosocial when more money is given away. The degree of prosocial behaviour we show depends on the familiarity we feel towards the other person (Amici, 2015). For example, Asscheman et al. (2020) found that on average children give 50% of their coins to a friend, 40% to an anonymous recipient, and 20% to a disliked peer. This

effect gradually becomes stronger during adolescence. Where 9- and 12-year-olds show little differentiation between different interaction partners, 15- and 18-year-olds show more prosocial behaviour towards friends and neutral peers than towards disliked or anonymous peers (Güroglu et al., 2014). In line with this finding, van de Groep et al. (2020) found that 12- to 17-year-olds donate more coins to friends than to classmates and least to strangers.

Another important factor for the development of prosocial giving behaviour and social relations is peer attachment. Attachment can be described as an emotional bond with key persons such as parents and friends that is influenced by an internal working model (Schoeps et al., 2020). This internal working model is a mental scheme about the world and other people. The interaction we have with other people at a young age leads us to form attitudes, behaviours and expectations about others. When a child is able to form relationships based on trust, respect, mutual understanding and good communication it will have a secure peer attachment. However, if a child experiences feelings of isolation and alienation it will develop an insecure peer attachment (Schoeps et al., 2020). Children who have formed a secure peer attachment have a positive internal working model which motivates them to collaborate with others. They know from experience that showing prosocial behaviour leads to desirable outcomes such as more positive interactions and better quality of friendship (Cillessen et al., 2005). In turn, these positive interactions reinforce the internal working model that others are worthy of care. This internal working model also plays a part in the development of empathy. When children perceive others with greater esteem and acceptance, they may find it easier to understand and react to their emotions (Schoeps et al., 2020).

Social development of highly intelligent children

Research from Guo et al. (2019) has shown that smarter individuals show more prosocial behaviour. A possible explanation is that these individuals have a better theory of mind and therefore have a better understanding of the desires and feelings of others. This contradicts the commonly heard myth that highly intelligent children lack in emotional intelligence, which makes them socially awkward (Oh et al., 2019). However, it has not been studied yet whether highly intelligent children show a different amount of prosocial giving behaviour and if they experience more, less or about the same level of peer attachment when attending gifted education as opposed to regular primary education. Therefore this study will focus on highly intelligent children in both education types.

Highly intelligent children experience some benefits and issues as a result of their advanced cognitive abilities. Thanks to their sharp observational skills, they tend to be more sensitive to emotional information and thus can infer the mental states of their peers more

accurately (Walker & Shore, 2011). Research from Guo et al. (2019) has shown that highly intelligent children are better at perceiving and understanding the desires and emotions of other persons than peers with average intelligence. This might lead to a better ability to make prosocial decisions and quickly figure out which behaviours are appreciated by others. In addition, highly intelligent children have higher levels of emotion regulation skills which allows them to not get distressed easily when observing peers in difficult situations.

In the current literature there are indications that highly intelligent children may have a more secure peer attachment. For example, children with a high IQ have better social cognition skills and can apply more effective problem solving strategies when they encounter a problem within their friendship (Miller et al., 2020) These are important skills for the development of good communication and mutual understanding. However, there are also studies which suggest that highly intelligent children may have a more insecure peer attachment. For example, Miller et al. (2018) found that highly intelligent children have more empathy, however, in girls this surprisingly led to lower quality friendships. A possible explanation is that highly empathic girls may recognize that sharing resources and giving emotional support have costs and therefore show less prosocial behaviour. Another possible explanation is that they are more sensitive to disturbances in their friendships, which may damage their feeling of trust. Not being able to trust your friends is associated with an insecure peer attachment (Schoeps et al., 2020).

Altogether, there are indications that highly intelligent children have higher emotional and social skills than typically developing peers (Ibanez et al., 2013). However, the heightened social and emotional skills of highly intelligent children may not always translate to more social behaviour (Walker & Shore, 2011). A possible explanation for this poor translation of social skills in social behaviour may be that highly intelligent children are further developed than their peers in terms of intellectual capacity, emotion regulation, and social knowledge (Blaas, 2014). The higher this asynchrony with peers, the harder it is to relate to them. This means that highly intelligent children may have trouble connecting with their peer group and with making friends due to their complex play behaviour and different interests (Gallagher, 2015). When highly intelligent children are grouped together in gifted education, their cognitive and emotional development may be more in sync with peers than when they are part of a regular class which consists of more typically developing children. These typically developing children have different interests, cognitive level of conversations and play which may complicate social interactions with highly intelligent children (Kroesbergen et al., 2016).

Present study

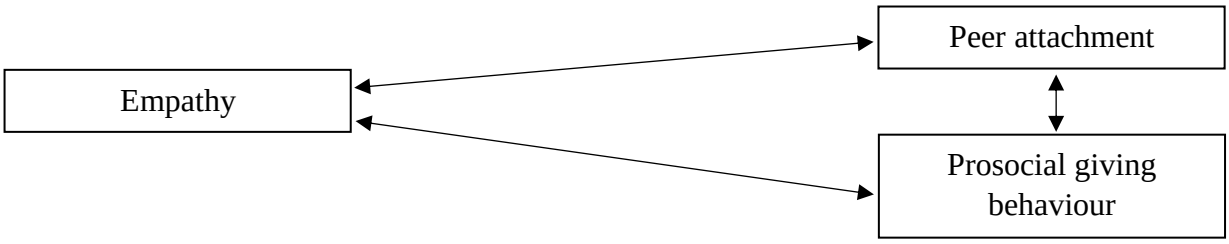
The objective of this study is to compare highly intelligent children between 9-12 years old in regular education and in gifted education in terms of prosocial behaviour and peer attachment. At this age, children start to show more differentiation between interaction partners but this effect is not as evident as in older children (Güroglu et al., 2014). Additionally, children at this age increasingly shift their attention from their parents towards peers (Xu et al., 2020). If children learn to form secure peer attachments during this period, they will have a more positive internal working model which may lead to more prosocial behaviour (Schoeps et al., 2020).

Prosocial giving behaviour is measured through the Prosocial Donation Task where children distribute ten coins between themselves and a stranger, a friend, someone they don't like, their mother and their father in five one-shot games. Peer attachment is measured through the Inventory of Peer and Parent Attachment in which children report the degree of mutual trust, quality of communication, and extent of anger and alienation they experience in relation to peers. The results from these tasks were used to investigate whether highly intelligent children (IQ $\geq$ 119; 90th percentile) in gifted education show more prosocial giving behaviour and whether they experience stronger peer attachment compared to highly intelligent children in regular education.

An important factor to consider when looking at prosocial behaviour and peer attachment is empathy. A meta-analysis from Stern and Cassidy (2018) has shown that more empathic children are more likely to share resources and help others in need. Stern and Cassidy (2018) also found that there are many studies which report a positive association between empathy and attachment. Whether empathy is also correlated with peer attachment and prosocial giving behaviour in highly intelligent children has not yet been researched. To investigate whether empathy needs to be controlled for during this study we first test whether empathy is correlated with peer attachment and prosocial giving behaviour. Based on current literature (Stern & Cassidy, 2018; Wang et al., 2019) it is expected that empathy correlates with peer attachment and prosocial giving behaviour (see Figure 1). If this assumption is confirmed, empathy will be added as a covariate in the analysis for hypothesis 1, 2 and/or 3. This is done to control for the chance that there are more empathic children in either regular or gifted education which may skew the results. If this assumption proves to be false, empathy will not be taken into account furthermore in this study because it will not significantly influence the quality of peer attachment or the amount of prosocial giving behaviour.

Figure 1

Model of the relation between empathy, peer attachment and prosocial giving behaviour



The first hypothesis is that highly intelligent children (IQ ≥ 119) experience stronger peer attachment in gifted education than in regular education, because in gifted education classes they are surrounded by peers who match their cognitive and emotional development and can understand their train of thoughts. This may prevent these children from feeling 'different', which they perceive as a negative factor for their friendships (Košir et al., 2016).

The second hypothesis is that highly intelligent children (IQ ≥ 119) in gifted education give away more coins to peers than in regular education. Studies have shown that we show more prosocial behaviour towards our in-group, which consists of other individuals that share our own traits (Amici, 2015). Highly intelligent adolescents in gifted education may share more traits with their peers compared to highly intelligent adolescents in regular education and therefore may show more prosocial giving behaviour towards their peers. It is expected that they specifically give away more coins to friends relative to other peers because this is their closest in-group.

The third hypothesis is that there is a significant relation between peer attachment and prosocial giving behaviour in highly intelligent children in both education types (see Figure 1). The study from Schoeps et al. (2020) has shown that children who are able to form stronger peer attachment relationships have a positive mental scheme about others. Because of this positive mental scheme it is expected that children who score high on peer attachment, also show more prosocial behaviour towards both their friends and other peers.

Methods

Design and procedure

This study was conducted as part of the Brightwave project. The aim of this project is to gain more insight about the effects of puberty on the social-emotional development of young adolescents. To accomplish this, a whole range of experimental tasks and questionnaires was administered and saliva was collected to measure pubertal hormones. The participants of this project were fifth and sixth graders (groep 7 and 8 in the Dutch school system). Participants attended either a regular primary school or a special primary school for gifted children (HB-school). This is a cross-sectional design.

The schools were approached by different researchers from the Brightwave project. Most of the participating schools are in the vicinity of Leiden and Hilversum. Participation was voluntary and parents signed an informed consent. The study consisted of measurements at school, both in class and in small groups with laptops. The measurements at school took about two hours in total. After that, a battery of questionnaires was administered for both children and parents through a (digital) home visit, which took about 30 to 60 minutes. The participants also filled two small tubes with saliva. As a compensation for their time, participants received a small educational puzzle. All data collection was done accordingly with the Covid-19 regulations and approved by Leiden University Psychology Ethics Committee.

Participants

At the time of data analysis, 116 children had participated in the BrightWave study. For the current study we only included children who completed the Raven Progressive Matrices, the Interpersonal Reactivity Index, the Prosocial Donation Task and the Inventory of Peer and Parent Attachment. Then, all participants with an IQ of 119 or higher were selected by removing participants with a percentile score below 90 on the Raven Progressive Matrices (see Table 1). After removing outliers as described in the Results section, 46 participants remained: 20 children from regular education and 26 children from gifted education. Participants were between the age of 9 and 12 and consisted of 47,8% girls (mean age = 10,92) and 52,2% boys (mean age = 11,10).

Table 1

Crosstabs of school type and Raven percentile scores

	25th	50th	75th	90th	95th	100th	Total
Regular education	4	14	21	17	4	6	66
Gifted education	2	6	13	16	3	10	50
Total	6	20	34	33	7	16	116

Raven Progressive Matrices

The Raven Progressive Matrices is a non-verbal measurement of fluid intelligence (Casé et al., 2002). It consists of 60 items in which participants have to fill in a missing geometric design that follows logically from the surrounding designs (see Appendix A, Figure 5). These 60 items are divided in five sets, each with a different theme (Raven, 1940). The items within this theme gradually become more complex. Cronbach's alpha for the Raven Progressive Matrices in this study is .84.

Interpersonal Reactivity Index (IRI)

The IRI was used to measure how empathic the participants are. The IRI is a questionnaire consisting of 28 items which are rated on a five point likert-scale. It consists of four subscales: Perspective taking, fantasy, empathic concern and personal distress (De Corte et al., 2007). In this study only the perspective taking and empathic concern subscales were administered. These scales were added up to one score for analysis. For the sake of readability, these scales together will be named 'empathy' in this study. However, one should keep in mind that other studies may define 'empathy' more broadly. Cronbach's alpha for the perspective taking scale is .70 and for the empathic concern subscale is .61.

An example item from the perspective taking subscale is: 'Before criticizing somebody, I try to imagine how I would feel if I were in their place'. (Davis, 1980) An example item from empathic concern subscale is: 'I often have tender, concerned feelings for people less fortunate than me'.

Prosocial Donation Task

The Prosocial Donation Task was used to measure prosocial giving behaviour towards different targets. During this task, children distributed ten coins between themselves and somebody else. Once with an unknown peer, once with a friend, once with a disliked peer, once with their mother and once with their father. Participants were instructed that the coins

reflected real money and that per class one trial of one participant would be randomly selected. Based on the division made in this trial the selected participant would receive a gift ensuring the relevance of their divisions. Prosocial giving was measured as the number of coins given to the different targets. The interactions a child has had with his friends, unknown peers and disliked peers is influenced by the type of school they attend. However, the interaction a child has with his parents is completely independent of their education type. Therefore the number of coins participants gave to their parents was not used in this study.

Inventory of Peer and Parent Attachment (IPPA)

The IPPA is a questionnaire which consists of 36 items, which were rated on a five point likert-scale. These statements are divided in 3 groups of 12 items about the child's relationship with his father, mother and close friends (peer-scale). This leads to three attachment scores and each one consists of three dimensions: degree of mutual trust, quality of communication, and extent of anger and alienation (Armsden & Greenberg, 1987). These scores indicate the quality of the relationship between the child and the parent or friends. In the current study, only the peer scale was used and the three subscales were added up to create one score for peer attachment. Cronbach's alpha of the 12 statements combined is .85.

An example item from degree of mutual trust is: 'My friends are good friends.' An example item from quality of communication is: 'My friends encourage me to talk about my problems.' An example item of extent of anger and alienation is: 'I wish I had different friends.'

Statistical analyses

The acquired data was analysed with IBM SPSS Statistics 27. First, the data was checked for normal distribution and outliers. This was done by computing bar graphs and boxplots of the data that was used. The outliers (scores lower than the 1st quartile minus 1,5 times the interquartile range) were removed from the analysis. Participants who did not complete the Raven, The IRI, the Prosocial Donation Task or the IPPA were also removed.

For the first hypothesis, the Pearson correlation between the two combined subscales of the IRI and the total IPPA peer-scale score was calculated to investigate the relationship between empathy and peer attachment. Then, the Pearson correlation between the total IRI score and the amount of coins donated to a friend was calculated to investigate whether there is a significant relationship between empathy and prosocial giving behaviour. For this analysis the data of highly intelligent children who attend regular education and gifted education was combined.

First, to determine whether empathy should be entered as a covariate in our analyses we calculated a Pearson correlation between the IRI and the IPPA and the IRI and the number of coins donated in the Prosocial Donation Task. This resulted in a correlation between the IRI and the IPPA but no correlation between the IRI and the number of coins donated in the Prosocial Donation Task. Therefore we decided to analyse the second hypothesis, highly intelligent children experience stronger peer attachment in gifted education than in regular education, through an ANCOVA with ‘Peer Attachment’ as dependent variable, ‘Education type’ as independent variable, and ‘Empathy’ as covariate.

Results

The data from the Raven Progressive Matrices, the IRI, the Prosocial Donation Task and the IPPA was first checked for normal distribution and outliers. There were three participants with an IPPA score lower than the 1st quartile (3.33) minus 1,5 times the interquartile range (.83), namely 1.08, 1.50 and 1.83 (see Appendix B, Figure 6). These participants were removed from the analysis. 46 participants remained for analysis (see Table 2). See Table 3 for the descriptive statistics of the remaining participants.

Table 2

Crosstabs of school type and gender after selecting all participants with a percentile score of 90 or higher on the Raven and removing outliers

	Boys	Girls	Total
Regular education	11	9	20
Gifted education	13	13	26
Total	24	22	46

Table 3

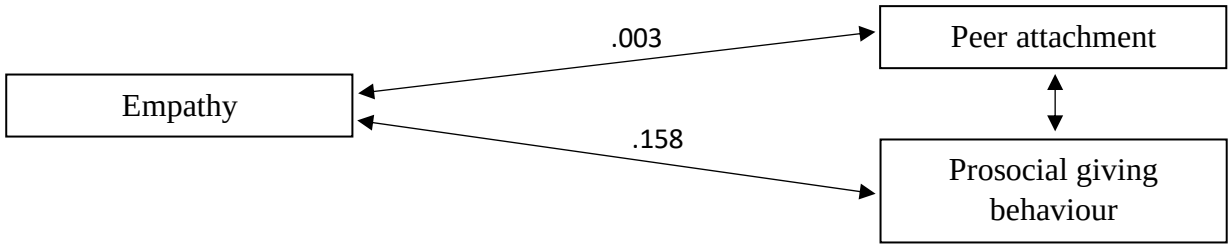
Descriptive statistics of the IRI, IPPA and Prosocial Donation Task

	Min / max regular education	Min / max gifted education	Mean (*SD*) regular education	Mean (*SD*) gifted education
IRI subscales – combined score	2.83-4.75	1.92-4.08	3.63 (*.51*)	3.20 (*.53*)
IPPA – friend subscale	3.00-4.67	2.67-4.42	3.84 (*.58*)	3.71 (*.47*)
Donated coins - Friend	3-6	0-7	4.80 (*.89*)	4.50 (*1.13*)
Donated coins – Disliked peer	0-7	0-6	2.10 (*2.27*)	1.83 (*1.75)*
Donated coins - Stranger	0-6	0-5	2.70 (*2.13*)	2.85 (*1.76*)

To check whether empathy is correlated with peer attachment and/or prosocial giving behaviour in highly intelligent children, the Pearson correlation between the IRI, the IPPA and the amount of coins a child gave away to a friend in the Prosocial Donation Task was calculated. There was a significant correlation between the IRI and the IPPA, $r(44) = .427$, $p = .003$ (See Appendix C, Figure 7). There was no significant correlation between the IRI and the number of coins given to a friend in the Prosocial Donation Task, $r(44) = .212$, $p = .158$ (see Appendix C, Figure 8). Therefore, empathy was added as a covariate in the analysis of the first hypothesis. The model proposed earlier in this study is significant for the correlation between empathy and peer attachment, but not for empathy and prosocial giving behaviour (see Figure 2).

Figure 2

Calculated model of the relation between empathy & prosocial giving behaviour and empathy & peer attachment



To test the first hypothesis whether highly intelligent children experience stronger peer attachment in a special school for gifted children compared to highly intelligent children in regular education, an ANCOVA was performed with the total IPPA peer-score as dependent variable, education type as grouping variable, and the total of the two IRI scales as covariate. When controlled for empathy, the highly intelligent children in gifted education (M = 3.84, SD = .58) did not score significantly higher on the IPPA than the children in regular education (M = 3.71, SD = .47), $t(1) = .102$, $p = .751$ (see Table 3). Therefore, the first hypothesis is rejected. Highly intelligent children in gifted education do not show stronger peer attachment than highly intelligent children in regular education.

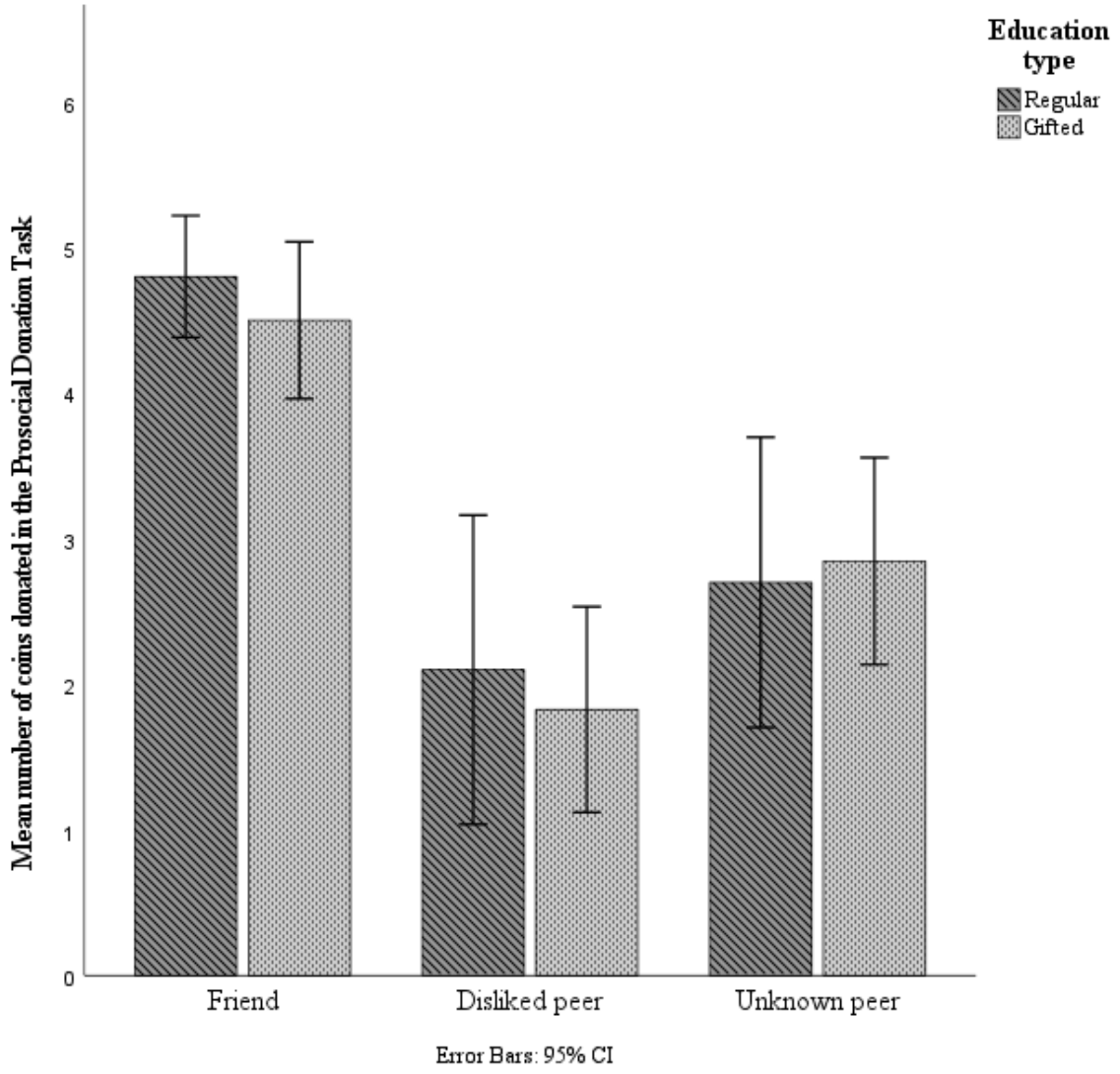
To test the second hypothesis whether highly intelligent children give away more coins to their friends in gifted education than in regular education, a repeated measures ANOVA was performed with the three different targets of the Prosocial Donation Task (friend, disliked person and unknown peer) as a within-subjects factor and education type (regular and gifted) as between-subjects factor (see Figure 3). This analysis shows that there is a significant main

effect of target, F(2,88) = 50.451, $p < .001$. The number of coins highly intelligent children give away in the Prosocial Donation Task depends on the target (see Figure 3). They give away more coins to friends (M = 4.63, SD = 1.16), than to unknown peers (M = 2.78, SD = 1.9) and least to disliked peers (M = 1.95, SD = 1.97) However, there is no significant interaction effect of school type on the number of donated coins, $F(2,88) = .416$, $p = .661$. This means that highly intelligent children in gifted education do not give away more coins to peers than highly intelligent children in regular education.

Next, it was investigated whether highly intelligent children show a stronger differentiation between friends and other peers in gifted education than highly intelligent children in regular education. This was done by calculating the average donation amount in the Prosocial Donation Task. This average donation shows whether children have a tendency to donate many or few coins to peers. Then, the donation they made to a friend was compared with their average donation. This led to the following formula: 'Donation to a friend' – (('Donation to a friend' + 'Donation to a disliked peer' + 'Donation to a unknown peer') / 3) = 'Relative number of coins given to a friend compared to general number of donated coins'. In short this will be called 'Relative giving to a friend'. An independent samples t-test was performed with 'Relative giving to a friend' as test variable and school type as grouping variable. This analysis shows that there is no effect of school type on the relative amount of coins given to a friend, $t(44) = .562$, $p = .577$. This means that hypothesis 3 is also rejected. Highly intelligent children in gifted education do not donate a higher number of coins to peers nor do they give relatively more coins to friends than highly intelligent children in regular education.

Figure 3

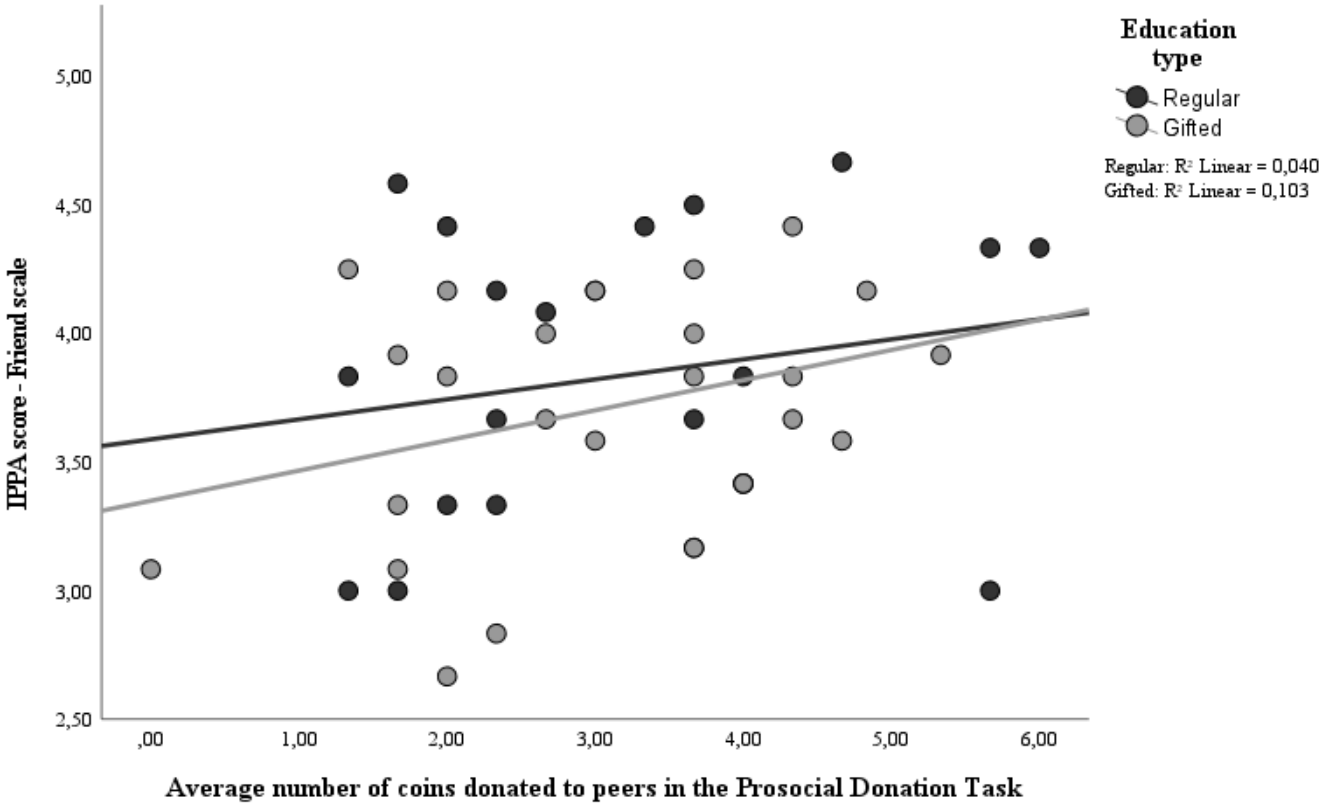
Mean number of coins given to a friend, disliked person and unknown peer



To test whether there is a relation between peer attachment and prosocial giving behaviour in highly intelligent children in both education types, a repeated measures ANOVA was performed with the total IPPA friend-score and the average number of donated coins to peers in the Prosocial Donation Task as within-subject variables and education type as between-subjects factor. This analysis shows that there is a significant effect of IPPA scores on the number of donated coins $F(1,44) = 10.543$, $p = .002$. This means that children with a strong peer attachment show more prosocial giving behaviour in both education types (see Figure 4). Therefore, the third hypothesis is accepted. However, there is no significant effect of education type on the relation between the IPPA scores and the number of donated coins, $F(1, 44) = .001$, $p = .974$. This means that education type does not have an effect on the relation between peer attachment and prosocial giving behaviour.

Figure 4

Relation between IPPA scores and the average number of donated coins on the Prosocial Donation Task



Discussion

The first goal of this study was to research whether highly intelligent children in gifted education show stronger peer attachment than highly intelligent children in regular education when controlled for empathy. It was expected that highly intelligent children would show stronger peer attachment in gifted education because here they are surrounded by peers who match their cognitive and emotional development (Miller et al., 2020). However, the results from this study did not confirm this hypothesis: when controlled for empathy, there was no significant difference between peer attachment and education type. These results suggest that highly intelligent children in both education types experience about the same level of peer interactions. Maybe highly intelligent children do not differ as much from their classmates as previously thought or despite this difference they may still befriend some classmates that share their interests and playstyle.

The second goal was to research whether highly intelligent children in gifted education show more prosocial giving behaviour towards peers than highly intelligent children in regular education. This was expected because highly intelligent children in gifted education may have a lower asynchrony of interests with peers than highly intelligent children in regular education (Gallagher, 2015). When children share interests and play behaviour this could lead to more positive interactions. These positive interactions could create a spiral in which positive interactions lead to a more positive internal working model about peers which could in turn motivate the child to show even more prosocial behaviour (Schoeps et al., 2020). However, this hypothesis was not confirmed: There was no significant difference between the number of coins donated to peers in the Prosocial Donation Task and education type. Additionally it was expected that highly intelligent children in gifted education would show a stronger differentiation between friends and other peers because children share the strongest in-group feeling with their friends (Amici, 2015). Again, these results were not found. Highly intelligent children in both regular and gifted education show more prosocial behaviour towards friends than towards unknown peers and least to disliked peers, but this effect is just as strong for both groups. Highly intelligent children in both gifted and regular education gave about half of their coins to a friend in the Prosocial Donation Task. This shows that they feel familiarity towards their friends (Amici, 2015). These results further strengthen the notion that highly intelligent children make friends in both education types.

The third goal of this study was to research whether there is a relation between peer attachment and prosocial giving behaviour in highly intelligent children in both education types. As expected based on the study of Schoeps et al. (2020), a significant relation between

peer attachment and prosocial giving behaviour was found. Additionally, this relation was not influenced by education type. This shows that highly intelligent children in both education types show prosocial giving behaviour that is expected of them based on their quality of peer attachment. Schoeps et al. (2020) found that children who share interests and concerns with their peers have a greater tendency to help and care for them. This suggests that highly intelligent children in both education types share interests and concerns with their peers. This contradicts the research of Gallagher (2015) and Kroesbergen et al. (2016) who stated that highly intelligent children differ from their peers in interests and emotional development.

This is the first study that directly compares highly intelligent children in gifted education and regular education in terms of peer attachment and prosocial giving behaviour. In a previous study, van de Groep et al. (2020) administered the Prosocial Donation Task to 12 to 17 year olds and they found almost the same number of donated coins to friends (M=4.79) as in this study (see Table 3). This suggests highly intelligent children share just as equally with friends as randomly sampled children. This contradicts the findings of Guo et al. (2019), who found that there is a positive association between intelligence and prosocial behaviour. The participants in the study of Guo et al. (2019) were older (M=19.79) than the participants in the study of van de Groep et al. (2020) and this study. The positive association between intelligence and prosocial behaviour that Guo et al. (2019) found in their study may emerge at a later age than the participants of the current study were. For example, Padilla-Walker et al. (2018) found that prosocial behaviour increases from age 12 to 17. Additionally, Güroglu et al. (2014) found that 15- and 18-year-olds differentiate more between friends and other peers. This increase in differentiation may be caused by the development of close, interpersonal relationships that form during adolescence (Padilla-Walker et al., 2018). It is likely that the participants of the current study were too young to have formed these close relationships yet. It may be possible that highly intelligent children do not show more prosocial behaviour when being grouped with like-minded peers in primary school because they do not feel as close to their friends in class as they will a few years later, when they are in secondary school (Stern & Cassidy, 2018). Therefore it would be interesting to replicate the current research with older participants.

Limitations

The current research has a few important limitations to consider. The first limitation is the way intelligence was tested. The Raven Progressive Matrices is a useful tool to quickly assess non-verbal fluid intelligence in large groups of children. This is an important factor in the current research because children that are able to quickly comprehend novel tasks based on

their observational data are also more sensitive to incoming social information, which can be helpful when trying to show prosocial behaviour(Walker & Shore, 2011). However this is just one part of intelligence. A more complete intelligence test such as the WISC-V also measures verbal comprehension, working memory, visual spatial reasoning and processing speed (Wechsler, 2018). The participants that were removed from analysis because they scored under 90th percentile may have been included when a full intelligence assessment was used. For example, 42% of the children in gifted education did not qualify as highly intelligent based on their Raven Progressive Matrices result (see Table 1). This may indicate that something went wrong while administering the tests because it is unlikely that many children in gifted education score low on the Raven. On the opposite, some children that met the selection criteria may only have a high fluid intelligence but not a high verbal intelligence, which is also important for the development of a strong theory of mind (Walker & Shore, 2011).

Another limitation is the relatively small sample size. Due to Covid-19 regulations in the Netherlands, we were restricted in data-collection, resulting is a smaller sample size than intended. With a larger sample, the results would be more generalizable.

There is also a limitation regarding the locations of data collection. Most schools that participated are located in or near Leiden and Hilversum. The residents of these cities have a relatively high level of education (Leiden in Cijfers, 2019; Provincie Noord-Holland, 2019). Therefore highly intelligent children in regular education may be surrounded by a relatively high number of like-minded peers. This is also supported by the fact 40% of the children in regular education scored in the 90th percentile or higher on the Raven (see Table 1). As described earlier, being surrounded by like-minded peers may have a positive effect on peer attachment and prosocial giving behaviour (Amici, 2015). This could why explain no difference was found in peer attachment and prosocial giving behaviour for highly intelligent children in regular education and gifted education.

Implications for further research

In the current study we found that highly intelligent children do not show more prosocial giving behaviour or better peer attachment when they attend gifted education instead of regular education. However, the participants in this research have an age were differentiation between friends, strangers and disliked persons has not reached its peak (Güroglu et al., 2014). A question for a future study could be how stable peer attachment and prosocial giving are during adolescence. Do highly intelligent adolescents also experience the same quality of peer attachment? And do they show more, less or the same amount of prosocial behaviour as they grow older? To research this it would be interesting to follow highly

intelligent students in a gifted and a regular middle school to investigate whether their peer attachment and prosocial giving behaviour differs. However, this research cannot be done in the Netherlands as children are grouped by ability when they go to middle school. Highly intelligent children would most likely go to VWO where they are grouped with other smart children, which would decrease the cognitive and emotional differences between classmates.

Another topic for a future research could be how peer attachment and prosocial giving behaviour of highly intelligent children in low and high socioeconomic status (SES) schools develops. Children with a low SES on average have a lower intelligence than children with a high SES (Deckers et al., 2017). This could increase the gap in emotional development, interests and play behaviour a highly intelligent child experiences between himself and his classmates, which could have detrimental effects on peer attachment and prosocial giving behaviour (Kroesbergen et al., 2016; Amici, 2015).

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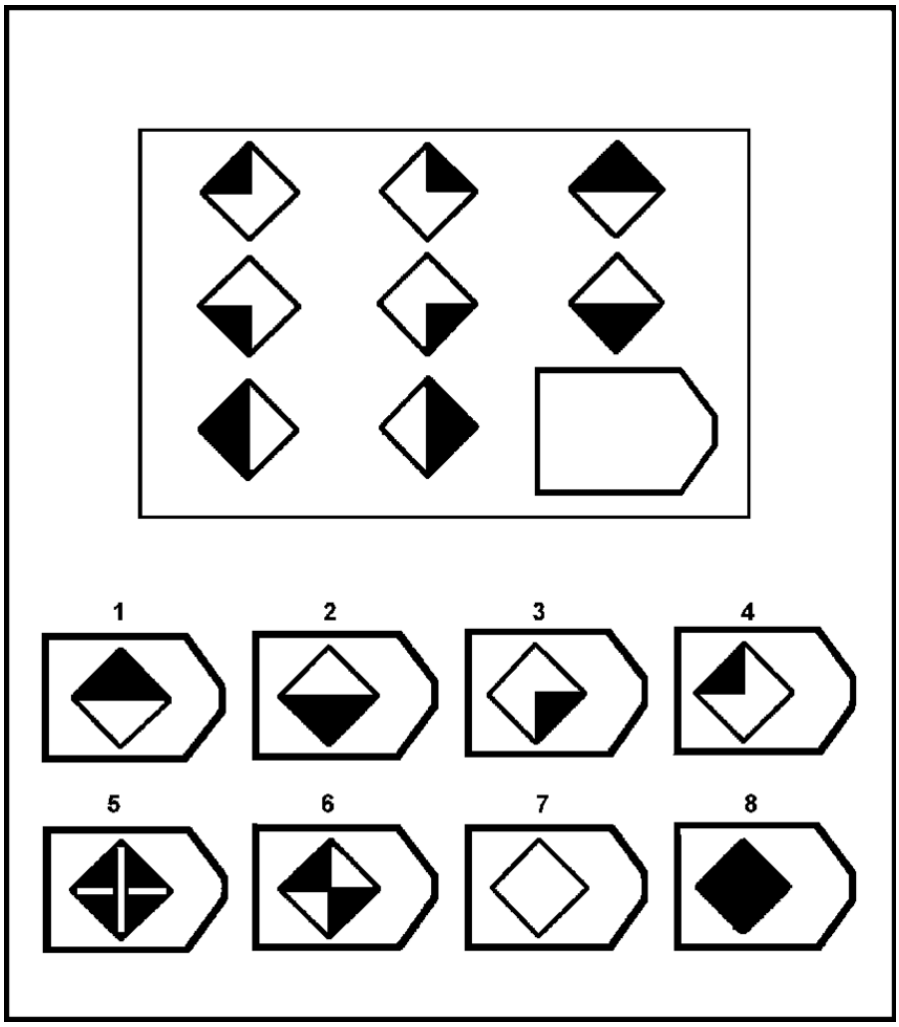
Appendix A

Figure 5

Raven Progressive Matrices example item

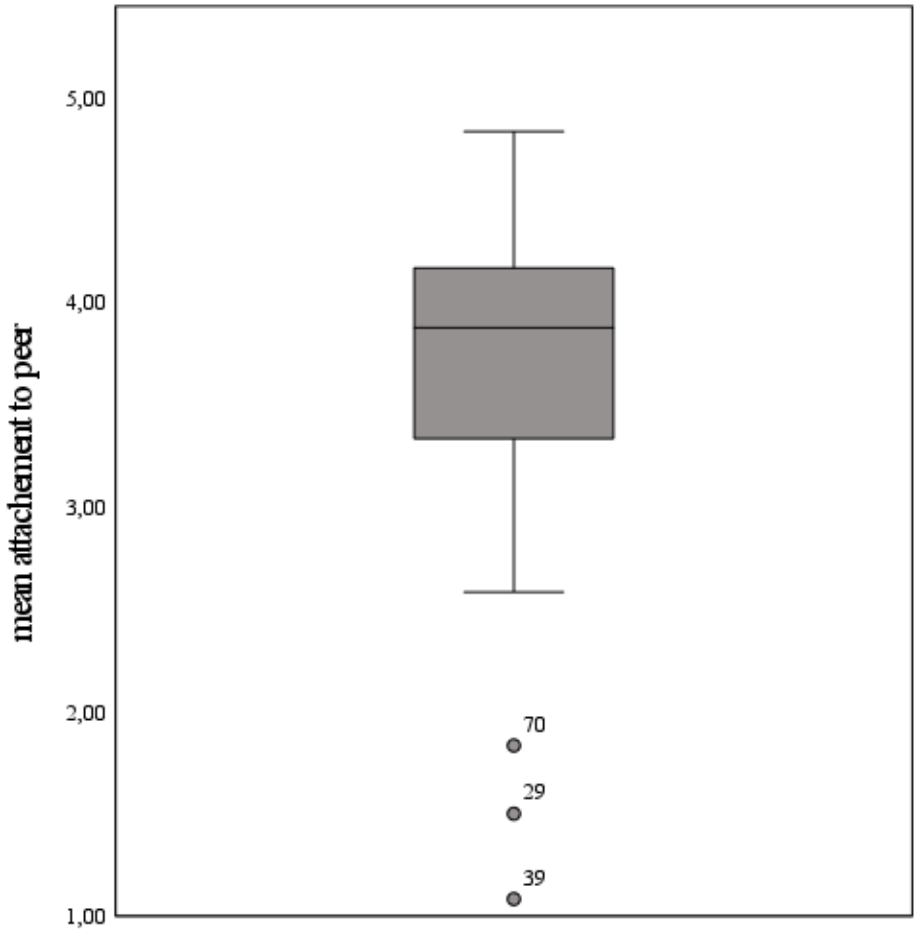


From Blair, C., & Baker, D. (2005).

Appendix B

Figure 6

Boxplot of IPPA scores before removing outliers



Appendix C

Figure 7

Correlation between IRI scores and IPPA-scores (friend scale)

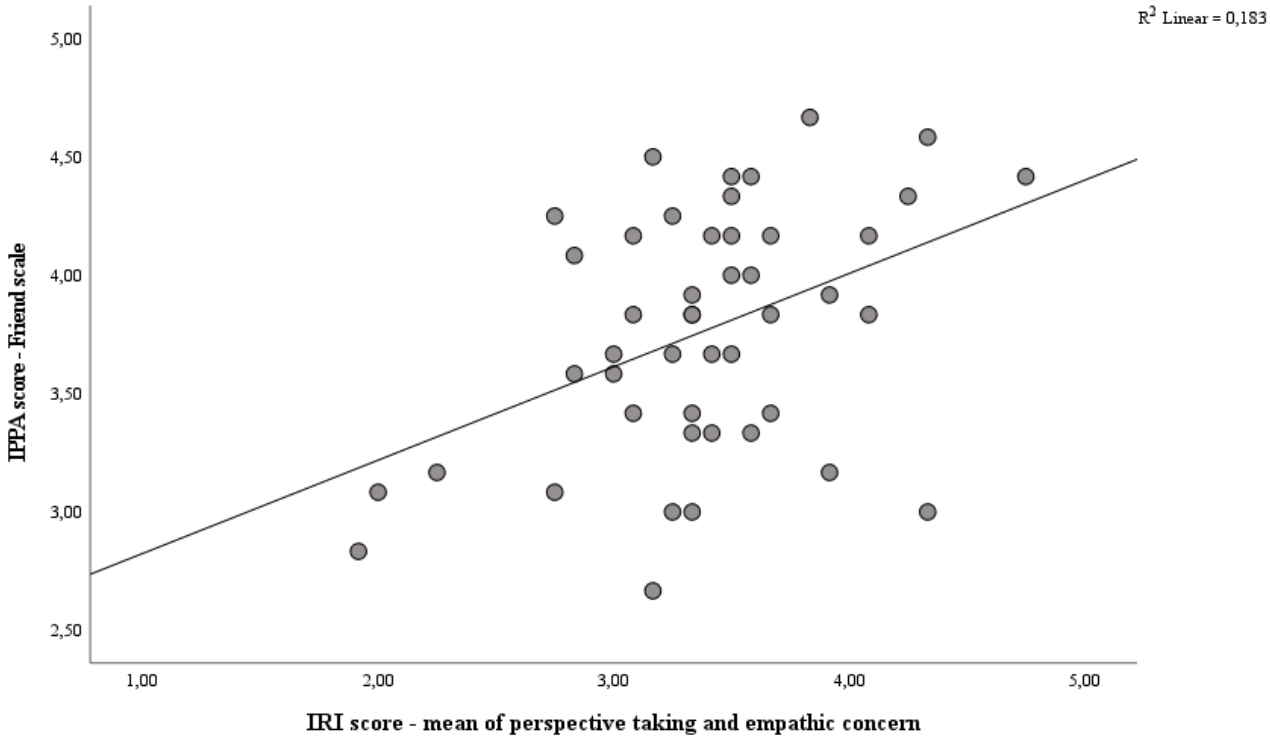


Figure 8

Correlation between IRI scores and coins donated to a friend in the Prosocial Donation Task