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## Adolescent Social Cognition: Development and Individual Differences

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2015

### **document version**

Publisher's PDF, also known as Version of record

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### **citation for published version (APA)**

Derks, J. (2015). *Adolescent Social Cognition: Development and Individual Differences*.

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## SUMMARY

Adolescent is a period of drastic physical, psychological and social changes that marks the transformation from childhood to adolescence. In adolescence, the focus of social interactions evolves from simple interactions mostly with parents to deep meaningful relations with peers. For most adolescents, the social-cognitive processes that characterize adolescence are appropriate for the challenges of this life phase. However, for some adolescents these same processes can lead to a downward spiral with several negative outcomes. Therefore, adolescent social cognition is an essential concept in understanding adolescent behavior.

The aim of this thesis was to examine adolescent social cognition in further detail. Chapter 1 gives an introduction on the subject and provides three objectives. The first objective was to examine the development of social cognition in early adolescence. This objective is the main focus of chapter 2 and 3. The second objective was to study the role of sex differences in adolescent social cognition. Chapter 2, 3, 4 and 8 deal with this subject. The third objective was to examine the role trust behavior plays in adolescence. Chapter 4, 5, 6 and 7 focus on this objective. Finally, chapter 9 aims to connect the different chapters and come to general conclusions.

**Chapter 2** describes a study on the development of empathizing in early adolescence using a longitudinal design. Our aim was to examine the predictive value of mindreading, the ability to read mental states in pairs of eyes, and social value orientation, whether someone has a prosocial or a proself orientation in cooperation situations, for empathizing, the ability to use empathy in everyday life situations. For three subsequent years, 95 students ( $M_{age} = 12.9$  years old at T1) completed a battery of tests including the Empathizing Quotient, the Reading the Mind in the Eyes Task and the Triple Dominance Measure for social value orientation. The results of the analyses showed that both mindreading and social value orientation were significant predictors of levels of empathizing one and two years later. Social value orientation remained a significant predictor after controlling for empathizing at T1. In addition, developmental trajectories and sex differences of the measures are described. The results of this study show that adolescents need both skill and will in order to empathize with others, suggesting that training programs for empathy should not exclusively focus on the development of social skills, but should take into consideration the willingness to act prosocial towards others.

In **chapter 3**, a longitudinal study on the relation between social-cognitive variables and school performance is described. Cooperative learning, with a focus on interdependence between students, is a key aspect of present-day education. Therefore, the importance of social-cognitive development may extend beyond everyday life social relations and have an impact on school performance. For three subsequent years, 89 secondary school students ( $M_{age} = 12.9$  years at T1) performed a number of tests, including the Empathizing Quotient, the Reading the Mind in the Eyes Task and the Triple Dominance Measure for social value orientation. At the end of these three school years and at the end of the fourth school year, their school grades for Dutch (native language), English (foreign

language) and mathematics were obtained. Multilevel linear analyses showed that mindreading and empathizing were significant predictors of school grades for language courses in the following year. Mindreading remained a significant predictor for Dutch grade when controlling for Dutch grade at the time of measurement. These findings emphasize the importance of social-cognitive development for school performance.

The study described in **chapter 4** examined the role of sex and social value orientation in adolescent trust behavior. A group of 206 adolescents ( $M_{\text{age}} = 15.1$  years) performed a Trust Game, to measure trust and trustworthiness, and the Triple Dominance Measure for social value orientation. The Trust Game is a social dilemma in which participants first invest money in a second player with the possibility to receive a larger amount of money back from this player but also the risk of being exploited. Second, the participant takes the role of the second player and has to decide whether to return a share of the money invested in them or to keep all the money for themselves. The results showed that boys were more trusting than girls. That is, boys invested on average a larger amount of money in the second player than girls. However, there were no sex differences in trustworthiness: on average boys and girls returned the same share of the investment to the first player. Prosocials were both more trusting and trustworthy than proselers. Moreover, sex and social value orientation were independent predictors of trust (but not of trustworthiness). These findings show that sex differences in trust are not the result of sex differences in prosocial orientation. In addition, these results show that certain situations, particularly situations of trust, can elicit higher levels of trust in boys compared to girls.

The aim of **chapter 5** was to examine the role of mindreading and social value orientation in adolescent trust. The decision to cooperate with another does not only depend on someone's willingness to cooperate (prosocial orientation) but may also depend on the expectations of the other person. In order to understand the decision that the other faces, adolescents may want to take the perspective of this person. However, adolescents may differ considerably in their ability to read the mind of others. Moreover, being able to read the mind of the other may have different consequences for prosocials and proselers. The hypothesis in this study was that proselers and prosocials use their ability to read the mind of the trustee in a different way. The Trust Game, the Reading the Mind in the Eyes Task and the Triple Dominance Measure for social value orientation were performed by 217 adolescents ( $M_{\text{age}} = 15.1$  years). The results showed that social value orientation moderates the relation between mindreading and trust. Proselers with good mindreading skills were less trusting than those with low mindreading skills. For prosocials, no relation between mindreading and trust was found. These findings indicate that proselers use their mindreading skills to assess that the trustee is likely to exploit their trust and then decide not to trust. Proselers with lower mindreading skills seem to be less likely to realize the possibility of being exploited by the other. For prosocials, being able to read the mind in the eyes does not influence the trust decision.

In **chapter 6** the motives for adolescent trust were studied. In order to do this, trust and trustworthiness dilemmas were constructed based on the Trust Game. These dilemmas were simplified versions of the Trust Game in which participants could make a binary decision between trusting and not trusting

and, in the trustworthiness dilemmas, between being trustworthy and not being trustworthy. The use of these dilemmas made it possible to manipulate the pay-offs in the dilemmas and thereby make a distinction between two possible motives for trust in the Trust Game: self-interest and inequality aversion. Three trust dilemmas were created. Trust Dilemma 1 reflects the original Trust Game. In Trust Dilemma 2 the decision to trust cannot increase the own pay-offs, eliminating self-interest as a motive. In Trust Dilemma 3, the pay-offs for not trusting are equal, eliminating inequality aversion as a trust motive. The dilemmas were performed by 376 adolescents ( $M_{\text{age}} = 14.7$  years old). The results show that in Trust Dilemma 3 only 20% of the participants decided to trust, whereas in the other dilemmas over 50% did. The results of the study strongly support the hypothesis that inequality aversion is the main motivation for adolescent trust. Thus, the main motive for making the decision to trust in the Trust Game was not to maximize the own outcomes, but to secure fair pay-offs for the self and the trustee.

**Chapter 7** describes a study on the relation between risk-taking and trust behavior. Risk-taking preferences may play a role in adolescent trust decisions. Real-life adolescent risk-taking often takes place in the presence of peers. Therefore, taking into account the role of peer influences may help to understand the relation between adolescent risk-taking and trust. A group of 169 adolescents ( $M_{\text{age}} = 15.2$  years of age) performed both a Trust Game and a risk-taking task. Half of the participants performed this risk-taking task individually and the other half performed the risk-taking task with a peer present. All participants performed the Trust Game by themselves. As expected, risk-taking behavior was higher in the peer condition. Furthermore, analyses showed that trust is only related to risk-taking in the peer condition and not to risk-taking in the individual condition. Thus, to the extent that adolescent trust behavior was influenced by risk-taking, this was moderated by peer influences. These findings may help in the interpretation of studies using a Trust Game in adolescent populations. The results indicate that high levels of trust in adolescents is not simply the result of high levels of risk-taking preferences, but that peer sensitivity plays a crucial role.

**Chapter 8** gives a perspective on the role that scientific findings on brain differences between boys and girls should play in educational practices. The chapter begins with a summary of scientific findings on gender differences in the brain. The evidence for gender differences in the brain is impressive, but not yet conclusive and not always consistent. Second, the challenges in interpreting these neuroscientific findings are discussed. Interpretations of gender differences in the brain are often speculative and therefore further research by psychologists and educational scientists are necessary. Lastly, the perils and promises of implementing these findings in educational methods are discussed. Overall, we argue for a cautious approach in applying neuroscientific findings on gender differences to educational practice schools. The chapter ends with suggestions for further directions for the field of mind, brain and education.

Lastly, **chapter 9** provides concluding remarks on the studies described in this dissertation. The chapter is a discussion of the different findings based on the three objectives set out in the introduction. Moreover, overall recommendations for further research are presented.