Consortium on Individual Development

Booklet CID special issue

Preparation CID meet 28th March 2019

Consortium on Individual Development

Content

Consortium on Individual Development

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Expertise: *Twin studies, Educational achievement, Population genetics, Behavioural problems*

Consortium on Individual Development

Preface

Developmental Cognitive Neuroscience (DCN) has given us the opportunity to describe different aspects of our consortium in a special issue. We aim to not only present our theory and guiding concepts, but also demonstrate the available data, the advanced methods and possibilities of our large (integrated) experimental and longitudinal datasets.

The editorial team has reviewed the letters of intent and selected the papers included in this booklet. Each paper is briefly described. Those open to additional co-authors have an 

sign at the top of their page, indicating the corresponding author may be contacted by interested parties.

We send this booklet in advance of the next CID meeting with the intention to foster discussion and exchange about the special issue. We hope you find it informative, make plenty of notes and are able to join us the 28th of March 2019.

Editorial team

Chantal Kemner, Anna van Duijvenvoorde, Stefanie Nelemans, Margot Peeters, Angela Sarabdjitsingh, Eveline de Zeeuw

Editorial

Authors

Chantal Kemner (corresponding), Angela Sarabdjitsingh, Anna van Duijvenvoorde, Eveline de Zeeuw, Margot Peeters, Stefanie Nelemans

Editor

TBD/ Not applicable

Brief content

Some children thrive and others don't, but why? This question is as important for science as it is for parents, educators and society at large. Child development is affected by biological and psychological child characteristics as well as the family and broader environment. These factors are not independent, but how they covary and interact is poorly understood. To date, in-depth insight into these processes was hampered by traditional boundaries of the research areas involved. The Consortium on Individual Development (CID) is a Dutch consortium that unites developmental researchers from seven Dutch universities and a wide range of behavioral and social science disciplines, including behavioral genetics, developmental (neuro)biology, psychiatry, neurocognition, developmental psychology, pedagogical sciences, communication science, and mathematics. CID aims to build a comprehensive model of how developmental differences between children arise as a result of the interplay of child characteristics and environmental factors, by filling crucial knowledge gaps. First, on brain development by employing state-of-the-art imaging techniques from birth to adolescence. Second, on environmental influences using a rigorous experimental design. Third, on intergenerational processes by capitalizing on the existence of multiple generation cohort data in the Netherlands. Furthermore to complement cohort studies in these three areas, animal models and statistical expertise are explicitly part of CID. In our studies we focus on social competence (SC) and behavioral control (BC), two key components of childhood development that are crucial factors in individual, societal, and economical success.

This Special Issue describes the rationale and setup of CID. We present the integrated human and animal (working) models of behavioral control and social competence that we developed as guiding CID concepts as well as the methodology needed to ultimately understand and predict individual differences.

Continued on next page

Brief content (continued)

Separate papers describe the theoretical scope and approach of the four different work packages. The workpackage 1 paper focuses on longitudinal changes in brain structure and the way these changes relate to genetic and environmental factors, and how this brain development in turn mediates behavioral development. A second paper, on workpackage 2, describes how large-scale experimental-longitudinal interventions of parent behavior differentially affect neurocognitive development. The paper on work package 3 focuses on the continuity of thriving (or failure to thrive) across three generations, and which biological and social factors are involved in the transmission of behavior between grandparents, parents, and children. One paper will cover advanced modelling of longitudinal effects in animal models of social and adaptive behavior in rodents, as part of workpackage 4.

As CID focuses on development from birth to adolescence, large-scale longitudinal cohort studies, a method for which the Netherlands has a strong reputation, are at the core of all work packages. The cohorts within CID are characterised by an extensive range of measurements (from advanced gene sequencing and neural connectivity analyses to interviews and diary-assessment of parental discourse or child media use), for an extended period (prenatally up to 17 years, and/or spanning several generations). CID unites all existing Dutch cohorts on socio-emotional development, which together encompass data from ten thousands of children and adolescents: TRAILS, Generation-R, RADAR, and The Netherlands Twin Register. In addition, two large new cohorts were set up that include extensive neurocognitive measurements (the YOUth cohort and L-CID). In this special issue we describe the assessment protocols for the two new cohorts, including a separate paper on the structural imaging protocols in the YOUth cohort. Moreover, the importance of data management is emphasised by a paper on how we incorporated the FAIR Data Principles to make data findable, accessible, interoperable and reusable for the YOUth cohort.

Finally, we present a series of empirical papers, including a paper detailing the choice for the standard measures of behavioral control and social competence we collect in all our cohorts and the first data on these, as well as several papers to demonstrate the available data, the advanced methods and possibilities of our large (integrated) experimental and longitudinal datasets.

Behavioural control framework in CID

Authors

Matthijs Vink (corresponding), Wilma Vollebergh, Sarah Durston, Pascal Pas, Sanne Geeraerts

Editor

TBD

Brief content

In this paper, we will outline the current state of affairs regarding what is known about the development of behavioral control. We will then describe how behavioral control is being measured in the WPs. We conclude with an outlook on how these data can be used to inform predictive models of the developmental trajectories of behavioral control.

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Social competence framework in CID

Authors

Caroline Junge (corresponding), Maja Deković

Editor

TBD

Brief content

This review paper will first outline the current state of knowledge on the development of social competence. Then we will describe how social competence is measured in the human cohorts available within CID. Finally, we will present an outlook on how these data can be used to examine the developmental trajectories of social competence.

Methodological Challenges of CID

Authors

Ellen Hamaker (corresponding), Marinus van IJzendoorn

Editor

TBD

Brief content

Social competence and behavioral control are two skills that are considered critical to function in society and to reduce the risk of behavioral and emotional problems. The goal of CID is to build a comprehensive model of how the development of these skills is affected by the interplay between environmental factors such as family characteristics, parents, siblings, peers, and broader societal influences including media, and child characteristics such as genetic makeup, temperament, and pre- and perinatal factors. CID aims to fill crucial knowledge gaps on the role of brain development, effects of interventions in the environment, and intergenerational transmission.

Building such a comprehensive model is no easy enterprise. An important prerequisite that we will focus on in this review is the match between research questions and methodology. Research questions can be divided into three categories depending on the goal one pursues, which can be: description, prediction, or explanation. Whether a particular research design and statistical analysis technique form appropriate and sufficient methods, depends critically on the goal of the study. Hence, without clearly formulating the research question and explicitly stating the goal of a particular study, it is not possible to evaluate the successfulness of it.

We will begin our review by clearly distinguishing between these three categories of research questions, and providing concrete examples of them within the context of CID. Then we will discuss which research designs and statistical modelling techniques align with these diverse goals. We will cover both mainstream methods and methods that are not yet included in the social scientist's standard toolbox, such as: machine learning techniques from data science, forecasting techniques from econometrics, and causal analysis techniques using instrumental variables or directed acyclical graphs (DAGs). This will result in a comprehensive overview of research strategies that researchers may consult when deciding on their options for studying a particular research question.

With this review we aim to clarify the connection between goals and methods, and to inspire researchers to explore untraveled methodological avenues.

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Combining multiple cohort data: The development of behavioural control

Authors

Mariëlle Zondervan-Zwijnenburg (corresponding), Herbert Hoijtink

Editor

TBD

Brief content

CID includes several cohort studies that collected longitudinal data on one of the key processes in CID: behavioral control. In this paper, we will demonstrate how information on behavioral control can be combined over cohorts. That is, we will compose competing informative hypotheses about the development of behavioral control in a longitudinal model. Subsequently, we evaluate how much each of the hypotheses are supported by the data for each cohort separately, and which hypothesis is best supported by all cohorts. In this method the cohorts do not need to provide data from the exact same measure of behavioral control. On the opposite, if we include different measures of the same construct (i.e., behavioral control), we will observe which informative hypothesis receives the most support by all cohorts and measures, demonstrating a robust finding.

Socioeconomic sampling bias in adolescent social competence and behavioural control

Authors

Matthijs (Ties) Fakkel(corresponding), Margot Peeters

Editor

TBD

Brief content

Although cohort studies generally aim at selecting a sample that is representative for the whole population, vulnerable groups in our society are less often part of these cohort studies. This can result for instance in a sampling bias of participants from a higher socioeconomic status (SES). An important question that follows is whether these cohort studies reflect the psychosocial development of the whole population or a subsample of our society.

Participants from a lower socioeconomic background are more difficult to include and retain than their higher SES counterparts. Some researchers – or policy makers – assume minimal variation in development across social strata, or assume that research findings in middle-to-high SES participants can be extrapolated to low SES individuals. Are these assumptions justified? Socioeconomic circumstances are known to covary and interact with the psychosocial development of children and adolescents. Multiple socioeconomic risk factors impede development above and beyond the effects of individual risk factors. Thus, SES may be non-linearly related to development, or SES may moderate development. The extent to which a sample reflects the population's SES diversity requires less or more caution when asserting why some children thrive and others do not.

The goals of this paper are 1) to describe the extent to which developmental studies (struggle to) include and retain a representative distribution of socioeconomic strata in the sample, focusing on the various CID cohorts, 2) to examine how social competence and behavioural control differ between SES strata, and 3) to provide recommendations for including and retaining low SES participants. Investigating the SES sampling in the CID cohorts will add further clarity to (the limitations of) our understanding of why some children thrive and others do not.

More detailed content on the next page

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Socioeconomic sampling bias in adolescent social competence and behavioural control

Brief content (continued)

Planned analysis/comparisons

The distribution of SES indicators will be described for each CID cohort (i.e., Generation R, L-CID, NTR, TRAILS, RADAR, YOUth) and the Dutch census. Per cohort, the deviation of each SES indicator (e.g., parental education, parental occupation, family income) to the national census will be calculated and used to weight the raw data for subsequent analyses. All cohorts have investigated adolescent social competence and behavioural control. We plan to examine differences in levels of social competence and behavioural control between SES strata in each cohort. These comparisons will be made with both raw, unweighted SES data, as well as with weighted SES data that matches national socioeconomic statistics. Additionally, for each cohort we will investigate attrition to see if drop-outs are more often from a lower SES, and if drop-outs scored differently on social competence and behavioural control. As such, we aim to quantify the socioeconomic representativeness of our CID cohorts to the population of interest as well as the size of the possible sampling bias on the outcomes (i.e., adolescent social competence and behavioural control).

Recommendations

Developmental researchers who try to reach participants from lower socioeconomic strata experience inclusion issues and retention issues. Though there appears to be overlap in challenges regarding inclusion and retention (e.g., time constraints) both aspects also have their unique challenges (e.g., understanding the informed consent at inclusion; disliking the prospect of certain measurements at follow-up). We will strive to identify the most common obstacles to inclusion and retention of lower SES participants in CID cohorts, and compare these to commonly described obstacles in the literature. Empirical recommendations will be provided based on these obstacles. For each recommendation we will describe the benefits as well as possible downsides of implementation.

How childhood individual brain development relates to behavioural control and social competence

Authors

Hilleke Hulshoff Pol (corresponding), Maja Deković, Sarah Durston, René Kager, René Kahn, Patti Valkenburg, Wilma Vollebergh

Editor

TBD

Brief content

Explain why the combined studies of brain development, behavioural control and social competence are needed and what its results provide. Brief overview of brain development studies done so far, its relationship to behavioural control and social competence, and how YOUth cohorts contribute to the next steps. Explain unique setup by combining knowledge from behavioural/social sciences and imaging/medical sciences to develop rich cohorts. Discuss how the results impact the individual development of children in the future.

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The YOUth study: Rationale and Design

Authors

Charlotte Onland-Moret (corresponding), Chantal Kemner, Hilleke Hulshoff Pol

Editor

TBD

Brief content

The paper will describe in detail the design and set-up of the YOUth cohort. We will provide a concise overview of the setting, study population, including the in- and exclusion criteria, recruitment procedures, study procedures at baseline and follow-up, measurement rounds, experiments and questionnaires taken, biological materials collected, outcomes, etc. In addition, we will provide background on several methodological choices that were made during the design of this study. Also, we will describe in brief our Datamanagement structure, how to access these data, the current status of the project and the embedding of YOUth locally and internationally.

Reliability of magnetic resonance imaging in the YOUth cohort

Authors

René Mandl (corresponding), members of the YOUth MRI group

Editor

TBD

Brief content

This manuscript will first describe the acquisition and scanning procedure, which includes a T1-weighted scan, diffusion weighted imaging scan and (resting state) functional magnetic resonance imaging scans made for the YOUth cohort. This part will serve as a reference for future studies on these data. Additionally, we will provide a number of reliability measures based on test-retest data in adults, acquired on the same scanner and using the same scanning protocol as is used in the YOUth cohort. Intraclass correlations assessing stability over time will be given for the various brain measures, and the implications for the YOUth data will be discussed.

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Longitudinal developmental eye tracking: the good, the bad, the ugly

Authors

Roy Hessels (corresponding), Ignace Hooge

Editor

TBD

Brief content

One of the main research methods for gaining insights into cognitive development is eye tracking, through which gaze direction is objectively measured. The main benefit of this technique is that it provides a glimpse of the world through the eyes of a developing child (*the good*). In the YOUth cohorts, eye-tracking is therefore one of the main neurocognitive domains. However, eye tracking in the context of development is also challenging. Eye-tracking data quality is often low compared with adult research, and dependent on many human and technical factors. This may cause invalid conclusions to be drawn about child development, particularly at the individual level (*the bad*).

The question addressed in this paper is "How can we use our knowledge on eye-tracking data quality to improve eye-tracking measurements in the YOUth cohorts so that valid conclusions about child development may be drawn?" In answering this question, we show how state-of-the-art techniques have been used to optimize:

1. The geometry of the measurement, which includes the participant, the eye tracker, and the laboratory.
2. The data-collection protocol, which includes the training of the research assistants, the calibration and data-monitoring procedures.
3. How developmental eye-tracking data is best analysed to allow comparison of experimental findings across all ages.

Empirical examples from the YOUth cohort data will be used to illustrate these three points.

In this paper, we tackle *the ugly* problems that are not always the primary interest of developmental psychologists, yet are imperative to ensure that valid developmental conclusions can be drawn. We end with advice for longitudinal eye-tracking studies and generalizations to other neurocognitive domains (e.g. EEG).

FAIR and safe data: datainfrastructure and accessibility YOUth

Authors

Jelmer Zondergeld (corresponding), Dennis Hofman, Matthijs Vink, Ron Scholten

Editor

TBD

Brief content

The data from the YOUth study should be FAIR, safe and good (i.e. of high quality). This paper will describe how our data infrastructure has been set up to meet these qualifications. These qualifications will be described, together with related UU institutional goals and policies. Technical aspects of the YOUth study relevant to the discussion of our data infrastructure will be explained (such as the scale of our data collection and the sources of the data).

Next, an overview of the components of our data infrastructure will be given (Slim, RO, RDP, YODA). We will then describe the steps we have taken to achieve FAIR, safe, and good data at every phase of the study (i.e. before, during and after the data collection). These steps include, among others, the training of our assistants, automated quality controls and data (pre-)processing, our use of metadata and the role of dedicated data managers.

Throughout this discussion, we will highlight the cooperative nature of our infrastructure efforts, e.g. our collaboration with the university's IT department, the UMCU and the university library.

The paper will close with a discussion of future opportunities, for example, integration with national and international initiatives in the field of research data management (Health-RI, Open Science Cloud).

Social acceptance and inclusion from early to middle childhood: The Leiden Consortium on Individual Development on neurocognitive development and social enrichment

Authors

Eveline Crone (corresponding), Michelle Achterberg, Saskia Euser, Bianca van den Bulk, Mara van der Meulen, Marian Bakermans-Kranenburg, Marinus van IJzendoorn

Editor

TBD

Brief content

Individuals have a strong need to fit in and be part of a social group. Already early on in development being rejected or excluded affects children's sense of belonging and control, and regulating negative emotions associated with rejection develops over the course of childhood development. Moreover, with increasing age children more strongly mentalize about the needs of others and engage more proactively towards inclusion of others.

Various studies have demonstrated that variations in the social environment affect children differently, including their social development (Belsky and De Haan 2011, Bakermans-Kranenburg and Van IJzendoorn 2015). We hypothesize that these effects can be explained by individual differences in susceptibility to environmental factors, such that some children are more sensitive to changes in the environment than others. The goal of the Leiden Consortium on Individual Development (L-CID) is to unravel these markers, using behavioral and brain imaging measures for social development.

The perspective of differential susceptibility has recently also received much attention in models of brain development. It is well characterized that structurally, the brain goes through a period of accelerated grey matter reduction between early childhood and late adolescence/ early adulthood (Tamnes, Herting et al. 2017). These changes are most pronounced and consistent for cortical brain areas, but have been observed for subcortical brain regions as well (Herting, Johnson et al. 2018, Wierenga, Bos et al. 2018). Models of adolescent development have suggested that the prolonged development of cortical brain regions may be associated with the development of cognitive/ behavioral control, whereas the upsurge in development around puberty of subcortical brain regions creates a window of social-affective sensitivity (Casey, Jones et al. 2011). This period of neural sensitivity may create a window for susceptibility to the environment, such as that under some circumstances, the same individuals may be more prone to develop positively (in a positive environment) or negatively (in a negative environment) (Crone and Dahl 2012). Given the large changes in brain development around early puberty, effects of variations in the social environment may be different for younger and older children, thereby providing opportunities to test for sensitive windows in development.

In this review, we describe the theoretical model that drives the questions from the L-CID research group. The general goal of L-CID is to unravel genetic and environmental influences on behavioral control and social competence using behavioral, brain imaging, self-report, ambulatory, and observational measures. We will highlight the unique contribution of each of these research methods, including the benefits of a twin intervention design to test the differential susceptibility hypothesis.

The review will provide several conclusions based on our ongoing work and will describe several compelling research questions for future agenda setting.

Consortium on Individual Development

Factors underlying the effects of the Video-feedback intervention to promote Positive Parenting and Sensitive Discipline on parenting behaviour: the role of neural face processing

Authors

Laura Kolijn (corresponding), Rens Huffmeijer, Bianca van den Bulk, Saskia Euser, Marinus van IJzendoorn, Marian Bakermans-Kranenburg

Editor

TBD

Brief content

As parents play a central and determining role in the lives of their children, a large body of research into child development is devoted to factors contributing to positive parenting behavior. One of the key factors of positive parenting is parental sensitivity: the ability to perceive, accurately interpret and promptly respond to the emotional needs of children. Positive parenting will in turn result in positive child outcomes (i.e. socially, cognitively and emotionally). Due to a variety of reasons not all parents are capable to be highly sensitive toward the (emotional) needs of their children. Research showed that the Video-feedback Intervention to promote Positive Parenting and Sensitive Discipline (VIPP-SD) is effective in enhancing parental sensitivity and sensitive discipline with moderate effects on parenting behavior and smaller but long-lasting effects on child development. However, knowledge about mechanisms that explain the effects of the VIPP-SD on parenting behavior is surprisingly scarce. Methods to examine maternal neurobiology allow us to examine one of the mechanisms that might explain the effects of the VIPP-SD on parenting behavior.

In a randomized controlled trial including pre- and post-intervention assessments, we tested whether the VIPP-SD program affected maternal neural processing of emotional child faces by using electro-encephalography (EEG) (see Kolijn et al., 2017 for the study protocol). We found a lower (less negative) N170 in the intervention group compared to the control group (Kolijn et al., under review). The intervention, supporting and promoting parents to adequately perceive, interpret and respond to emotional child signals, may have enhanced mothers' neural processing of emotional facial expressions. As a result, face processing may have become more efficient, requiring less neural effort that was reflected in a reduction of N170 amplitudes in the intervention group. In the current paper we will examine whether changes in N170 amplitude in response to emotional and neutral child faces mediate any changes in observed parenting behavior. Furthermore, we will report on the mediating role of the P1 and the LPP in intervention effects on parental sensitivity and sensitive discipline. These neurocognitive processes may reveal some of the mechanisms underlying the behavioral effects of successful parenting intervention programs and will benefit the development of such programs.

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WP3: Intergenerational transmission of behavioural control and social competence

Authors

Susan Branje (corresponding), Dorret Boomsma, Manon Hillegers, Tineke Oldehinkel

Editor

TBD

Brief content

1. The aim of work package 3 is to examine the extent to which genetic and non-genetic transmission between generations causes differences between children and adolescents in behavioral control and social competence.

2. Theoretical overview of intergenerational transmission
a. Associations in BC and SC across generations
b. Assessing transmission over time, addressing the importance of longitudinal studies across generations
c. Disentangling mechanisms of transmission
    i. Genetic transmission
    ii. Non-genetic (cultural) transmission: mechanisms
    iii. Moderators of transmission; child characteristics; situational factors, differential susceptibility, GxE interaction, epigenetic processes
    iv. Transmission during the transition to parenthood

3. Each of the cohort descriptions will focus on the design of the study and its relevance to studying intergenerational transmission. The studies will also address how they will operationalize SC and BC.
Two studies with two-generation data will be used to study the epigenetics of cross-generational transmission:
    a. NTR (Children of Twins design)
    b. Gen-R
Two ongoing longitudinal multi-informant three-generation studies with comparable design and measures that allow testing effects for grandparents to parents to children over time. Both studies are being enriched with measures of a third generation:
    a. RADAR-G3
    b. TRAILS-next

4. Which main research questions will be addressed and how will the four cohorts be used to answer these research questions?

Analysing multigenerational cohort data using Bayesian Methods

Authors

Tina Kretschmer (corresponding), Herbert Hoijtink

Editor

TBD

Brief content

The report will discuss the usefulness and methodological challenges of multigenerational cohorts and demonstrate how Bayesian methods, specifically Sequential Bayes Factor can be utilized to analyse multigenerational cohort data.

More detailed content on the next page

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Analysing multigenerational cohort data using Bayesian Methods

Brief content (continued)

We will first present an overview of studies that have tracked a group of same-age individuals longitudinally (G1) from birth or childhood into adulthood and collected data from offspring (G2) at least once (multigenerational cohorts), for which we will describe measures included and review current practice with respect to analytic strategies. The goal of this part of the report is to describe how the **multigenerational cohorts in CID add unique information and allow for answering research questions that as yet cannot be tackled** with existing data.

In multigenerational cohort studies such as the ones collected in CID, offspring data "trickle in" over many years. This implies that researchers either need to wait until they consider all children born, or analyze data and publish their findings based on only a subset of all offspring, e.g., those that have turned a specific age before a certain cut-off moment. The same problem applies for other multigenerational cohorts, none of which seems to have found a systematic way of dealing with such changing sample sizes.

The main emphasis of our paper will therefore be on showing **how Bayesian methods, specifically Sequential Bayes Factor can be used to analyze multigenerational data**. Sequential Bayes Factor allows for updating analyses as sample sizes change: Researchers define in advance the cut-off Bayes Factor boundary at which they consider their data to be convincingly more in favor of the alternative hypothesis than the null hypothesis, and compute analyses sequentially with increasing sample sizes until the boundary for either the null or alternative hypothesis is reached. Thus, data of each offspring that enters the study can be used to update the analyses and inform conclusion as to whether the data are more in favor or the null or alternative hypotheses. Despite its potential, no multigenerational study using Sequential Bayes Factor has been published yet; in fact, the procedure is promising but vastly underused in developmental research in general. To facilitate greater use and demonstrate a strategy to analyze evolving data, we **demonstrate an application of Sequential Bayes Factor to multigenerational cohort data**.

Developmental Cognitive Neuroscience as outlet is particularly suited given that the journal is read by researchers from different fields who deal with small samples and will thus benefit from learning about Sequential Bayes Factor. We will ensure to provide easy-to-use code and instructions to ensure that the approach can be taken up by many colleagues.

Rodent model analogues for development in BC and SC, and choice of tasks

Authors

Marian Joëls (corresponding), Rixt vd Veen

Editor

TBD

Brief content

Environmental conditions, particularly during (early) development, impact on wiring of brain. This has consequences for behaviour in adulthood, including behavioural control and social competence.

Our hypothesis: Early life environment adapts brain such that it helps the individual to optimally perform in comparable conditions later on ("thrive"). If conditions do not match, vulnerability to brain disorders may ensue.

In the context of CID we used two models of rearing conditions.
First, a model that taps on the importance of mother-offspring interaction early in life; one variant with severe maternal neglect and another in which unpredictability of maternal behaviour or communal nesting are key factors.
Second, a model in which rodents are housed with 10 conspecifics in a challenging environment from adolescence onwards.

In the paper, we first describe the behavioural tests that we used to probe various domains; and next the models as well as preliminary results on the behavioural outcome. Finally, we speculate about the relevance for human cohorts.

More detailed content on the next page

Rodent model analogues for development in BC and SC, and choice of tasks

Brief content (continued)

Rodent behavioural tests in CID
- Behavioural control: 5-choice serial reaction time task (5CSRTT)
- Social competence: social play in adolescence, social approach and recognition, prosocial decision-making (2-choice sugar reward task), liberation task. All in rats (and why). Maternal competence in mice.
- In addition (since these elements also influence the above)
- Fear, anxiety: fear conditioning, elevated plus maze
- Memory formation: Object in location and object in context

Mother-offspring interactions
- Brief description of models in mice: limited nesting and bedding and communal nesting
- Brief description of model in rats: Maternal deprivation 24 hrs at postnatal day 3 (P3)
- Behavioural phenotype in adulthood, as far as investigated in CID
- Behavioural phenotype based on meta-analysis

Complex housing
- Brief description of model (in rats)
- Behavioural phenotype in adulthood, as far as investigated in CID (Jiska)
- Experimental considerations: reducing duration, shifting the time-window, which elements are most important etc.

Relevance for human investigations, link to other workpackages
- How relevant are tests? Rodent tests are rodent specific, what are the comparable constructs?
- How relevant are early life models? The relevance of unpredictability. Advantages, disadvantages.
- Match-mismatch / thrive-vulnerability to disease. Concluding remarks

Genetic and environmental influences on structure of the social brain in childhood

Authors

Mara van der Meulen(corresponding), Lara M. Wierenga, Michelle Achterberg, Nadieh Drenth, Marinus H. van IJzendoorn, Eveline A. Crone

Editor

TBD

Brief content

Prosocial behavior is an important aspect of developing and maintaining social relations in middle childhood. Prior studies showed protracted structural development of social brain regions that are associated with prosocial behavior. However, it remains unknown to what extent structure of the social brain is genetically driven or sensitive to environmental influences. In addition, it is unclear whether similar genetic factors account for variance in structure of the social brain and prosocial behavior.

In a large middle childhood sample (N = 512, age 7-9) we examined unique and overlapping genetic and environmental influences on structure of the social brain and prosocial behavior. Surface area and cortical thickness of the medial prefrontal cortex (mPFC), precuneus, temporo-parietal junction (TPJ) and posterior superior temporal sulcus (pSTS) were analyzed. Prosocial behavior was measured via parent report. In short, we found genetic contributions for all four brain regions (both in surface area and cortical thickness). Additionally, we found shared environmental influences for TPJ, suggesting that this region might be relatively more sensitive to social experiences. We also found strong evidence for genetic influences on parent-reported prosocial behavior. Interestingly, the precuneus shared genetically determined variance with the empathic component of prosocial behavior, suggesting that overlapping genetic factors account for variance in brain structure and prosocial behavior.

Together, these findings show that both structure of the social brain and empathic prosocial behavior are driven by a combination of genetic and unique environmental factors.

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Notes


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