

# Gravitation Consortium Individual Development (CID)

## Annual report - Definitive

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Sent to the Supervisory Board at March 25 2014

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### Why some children thrive, and others don't

Most children develop well and find their way into society without many problems, but not all children manage to do so. We know that this difference is related to a combination of the child's disposition and the environment in which he or she is raised. The CID aims to understand and predict how the interplay of child characteristics and environmental factors results in individual differences in the development of social competence and behavioral control of the child and to understand the role of brain development herein.

The CID brings together top researchers from several disciplines, with unique and relevant expertise involved in developmental research and has received a grant from the Dutch Science Foundation (NWO). The grant is part of the Gravity program, funded by the Ministry of Education, Culture and Science (OCW). The grant allows the CID to follow large samples of children in their development during a decade, integrating approaches from many different

disciplines. The CID joins one of the four strategic themes by which the Utrecht University profiles itself: Youth and Identity. Characteristic for the Utrecht approach is cooperation of six faculties in the Youth & Identity theme: Sciences, Humanities, Medicine, Social and Behavioral Sciences, and Law, Economics and Governance.

The CID consists of four work packages (WP's). Because the focus of the project is on development from birth to adolescence, the core of all work packages consists of large-scale longitudinal cohort studies. Two new children cohorts will be implemented: a longitudinal cohort (based in Utrecht, WP1) and an intervention cohort (based in Leiden; WP2). In addition, four existing cohorts are involved: Trails (Groningen), GenerationR (Rotterdam), RADAR (Utrecht), NTR (Amsterdam) (together WP3). WP4 provides a supportive basis using animal and mathematical models of development.

<b>WP0, general management</b>	Program Chair: Prof C. Kemner
<p>The consortium Individual Development (CID) set off in May 2013. A Consortium Agreement was formulated, specifying the governance structure, the aim of collaboration, the relationship among the parties, the management of the consortium and the rights and obligations of the parties concerning - the carrying out of - the research projects and project budgets.</p> <p>Conform the CA, a program support office (project manager, financial office, secretariat) and the following committees were composed:</p> <ul style="list-style-type: none"> <li>- a Scientific Advisory Board (6 members, possibly new members added);</li> <li>- a Supervisory board (8 members).</li> </ul> <p>Conform the CA, structures for meetings, documentation, administration and finance were set up in view of monitoring by NWO after 5 years. The financial office (manager and controller) set up a financial structure (control sheet, forms) and visited financial staff of all parties to explain procedures and structures. Each PI may use in the first 5 years a maximum of 50% of their budget: main applicants: 810.000 euro = 405.000 euro in first 5 years; PI's: 540.000 euro = 270.000 euro in first 5 years. PI budgets are applied for to the steering committee with the requirement of the cooperation between minimally 2 PI's. Cohort representatives receive a fixed amount for the cohorts quarterly. PhD and Postdoc staff on the cohort budget have to be justified in an application to the steering committee.</p> <p>Activities 2013:</p> <ul style="list-style-type: none"> <li>- 10 Oct: Scientific Advisory Board meeting, with SAB members and steering committee;</li> <li>- 11 Oct: Kick-off meeting CID: symposium with presentations by international experts (SAB members and PIs) and poster presentations by PhD-students and postdocs;</li> <li>- 30 Oct: First Core measurement meeting with all CID PI's: agreement on CID core measurements on Behavioral Control and Social competence</li> <li>- 26 Nov: Cohort expert meeting;</li> <li>- Every two months: Steering committee meeting.</li> </ul> <p>PR and branding:</p> <ul style="list-style-type: none"> <li>- Construction and maintenance of the CID website (<a href="http://www.individualdevelopment.nl">www.individualdevelopment.nl</a>), containing information and news about CID. It was developed for researchers working within the CID, but is open for everyone. A member area with login contains items specifically for PI's working within the consortium.</li> </ul> <p>Plans 2014:</p> <ul style="list-style-type: none"> <li>- Make an inventory of possibilities and needs for educational activities in close contact with parties;</li> <li>- Explore organization of activities, such as symposium, summer school, tutorial, master class, workshop;</li> </ul> <p>Ethical Committee will be formed in 2014.</p>	

<b>WP1</b>	WP-leader: Prof R.S. Kahn Cohort representative: Prof C. Kemner
<p><b>Introduction and rationale</b> The neurobiological developmental trajectory of newborns, children and adolescents is not well known. Particularly, the assessment of the extent to which genetic and environmental factors influence brain development and how these effects in turn influence behavior is only just emerging. CID focuses on brain development in relation to behavior, specifically on social competence and behavioral control and addresses questions regarding their interrelationships, how associations might develop as a function of age, sex, genetic influences and environmental exposures.</p> <p><b>Method</b> Two independent but related cohorts will be studied. The first cohort will be a birth cohort consisting between 2000-4000 babies who will be recruited through their pregnant mothers. Another cohort will consist of a similar number of 8-10 year olds who will be recruited from the general population. Genetic and environmental data will be obtained and functional and structural neuroimaging will be acquired every three years; in the babies EEG and possibly structural MRI will be obtained. In the 8 year olds structural MRI and functional MRI will be obtained.</p> <p><b>Project</b> Three projects have started: 1) The epigenome and brain development (leader prof Hulshoff Pol); 2) The effects of social stimulation/interaction on perceptual and social development (leader prof Kemner) and 3) Developmental trajectory of the human connectome in health and disease (leader prof Kahn).</p> <p><b>Update progress</b> Decisions have been made on the structural and functional imaging protocols. Also, specific tasks and measurements have been selected. The tasks have focused not only on the neuroimaging and the biological parameters but also measured are IQ, social competence, behavioral control, the use of media, parenteral interactions etc. Furthermore a protocol for a pilot study in 60 children and adolescents has been written and submitted to the IRB to test the recruitment, MRI facilities and the use of tasks and rating scales.</p> <p><b>Planning 2014</b> The pilot study will start in May of this year and will use the scanning protocol including rating scales as discussed above. Later in the year, the main study will commence using a new 3 Tesla MRI scanner that needs to be specifically tailored to the questions at hand. Furthermore decisions will have to be made on the exact number of subjects which will be included and how to recruit them. Also further decisions need to be made on the biological sample collection, such as DNA, epigenetic measures and possibly stem cells. Finally the definitive protocol will be written and submitted to the IRB later this year. Furthermore, discussions are on-going with the IRB to acquire permission to do an MRI scan in recently born infants. Probably a pilot study will be conducted to test the feasibility of this.</p>	

<b>WP2</b>	WP-leader and cohort representative: Prof M.H. van IJzendoorn
<p><b>Aim/objectives:</b> Children are not equally vulnerable to adverse rearing environments, and they do not equally profit from supportive environments. Differential susceptibility theory proposes that vulnerable children who suffer most from bad environments also are more susceptible to positive changes in the child-rearing and in the wider social environment. Central questions are: Who is most susceptible to the environment, and what are the neurobiological mechanisms of environmental influences on children's social competence and behavioral control? These questions are addressed experimentally in four longitudinal randomized control trials, using cognitive and behavioral interventions.</p> <p><b>Method:</b> the four intervention studies constitute an experimental cohort-sequential design. This implies a number of pre- and post-tests to examine the intervention effects with the added advantage that also the control groups of the four studies are partly overlapping in such a way that they can be combined in one series of quasi-longitudinal analyses from the first pretest in the youngest cohort to the last posttest in the oldest cohort. Based on discussions last year in the scientific board and in the team of researchers it was decided to recruit families with MZ and DZ twins as subjects for the studies. The advantages are: more efficient recruitment/data collection/implementation of the intervention, potential for behavior genetic modeling of intervention effects, observing differential intervention effects between siblings within the same family at the behavioral, (epi-)genetic, hormonal and neural level of functioning.</p>	

**Projects:** The four longitudinal experiments cover infancy, early childhood, pre-adolescence, and early adolescence respectively, and constitute 4 main projects.

**Update progress:** A working group has specified the overall design for the four intervention studies and decided on the main behavioral and biological measures to be included. Three pilots have been conducted. First is a pilot study on the association between behavior problems and tympanic membrane temperature (TMT) asymmetry (N = 92; poster presented at the CID kick-off meeting; paper in prep). Second, the VIPP intervention to be used in the RCTs has been revised to include 2 sessions through the internet instead of home visits to enhance efficiency. Third, two paradigms to assess the two central outcomes, namely prosociality (Prosocial Cyberball, PCB) and aggressive behavior (Social Network Aggression Task, SNAT), have been developed and tested behaviorally (N =136). PCB and SNAT were developed to be used in the MRI scanner and are currently being adapted for an ERP paradigm. Two papers are in preparation. In addition, pilots are currently being conducted on the Motionlogger (an actigraph to measure physical activity and sleep characteristics); on measurements of chaos in the home environment and the neighborhood; and on the use of the LENA (Language Environment Analysis), a small apparatus that records and analyses speech/language and other auditory components in the home environment.

**Planning 2014:** Study protocols for the early childhood and pre-adolescence RCTs have been submitted to the IRB of the Institute of Education and Child Studies, and will be revised and submitted to the METC of LUMC (obligatory for studies with a neurobiological component). Recruitment and data collection for the first pretest of the early childhood cohort will start in the summer if ethical permission has been granted in time.

<b>WP3</b>	<p>WP-leader: Prof W.H.J. Meeus</p> <p>Cohort representatives:</p> <p>NTR: Prof D.I. Boomsma</p> <p>Generation R: Prof F.C. Verhulst</p> <p>TRAILS: Prof A.J. Oldehinkel</p> <p>RADAR: Prof W.H.J. Meeus</p>
<p><b>Aim/objectives:</b> WP3 will study how characteristics of (grand)parents (Generation1) impact the development of adolescents and adults (Generation2) and, through them, the development of their children (Generation3). To do so, WP3 adopts a multi-generation design and establishes the extent to which genetic and non-genetic transmission between generations causes differences between children and adolescents in developmental outcomes.</p> <p><b>Method:</b> WP3 uses existing cohorts that collected G1 and G2 data (Gen-R, NTR, Radar, Trails) and will set up additional data-collection among generation 3.</p> <p><b>Projects:</b></p> <ul style="list-style-type: none"> <li>• Kretchmer (1-10-13), Postdoc RUG, 4 years, PI/Co-PI: Oldehinkel/Meeus, co-applicant: Dekovic (WP1), <i>Examining the complex interplay between relationship experiences and individual factors to understand adolescent development.</i></li> <li>• Laceulle (16-10-13), Postdoc RUG, 5 years, PI/Co-PI: Ormel/Meeus, co-applicant and co-financer: Van Aken, co-applicant: Van IJzendoorn, <i>Investigating developmental models of psychological distress: transactional processes and explanatory models of individual differences</i></li> </ul> <p><b>Update progress:</b> WP3 installed a working group for G3 measures across 4 studies (Bartels, Branje, Hartmann, Tiemeier). The working group made provisional choice of G3 measures across studies and wrote first draft of overview of measures. Two studies (Trails and Radar) made initial design for the period 2013-2022.</p> <p><b>Planning 2014:</b> Gen-R and NTR will set up and design new waves of data-collection. Trails and Radar will finalize designs and measures, submit protocols to ethical committees and start first waves of new data-collection in September 2014. We expect at least three PhD or postdoc projects to start during the year.</p>	

<b>WP4</b>	WP-leader and cohort representative: Prof M. Joëls
<p><b>Aim/objectives:</b> to run animal /modeling “experiments” in parallel with the human cohorts. In 2013, activities of WP4 were mostly geared to i) initiate new collaborations as part of the CID; ii) define the exact projects for the coming 2-3 years and hire new personnel; iii) set up new methods and experimental facilities.</p> <p><b>Ad i and ii):</b> On the subject of gene x environment interactions in rodent models, a new collaboration between Joëls (UMCU), van IJzendoorn and Bakermans (both UL) was started. As of fall 2013, a joined PhD and postdoc project are being supervised. With regard to the mathematical models, Hoijtink (UU) started a collaboration with van Berkum (UU), Oldehinkel (UMCG) and Joëls (UMCU), who will share supervision of 2 (part-time) PhD and 1 postdoc project, to be started in 2014.</p> <p><b>Ad iii):</b> In the collaborative project on gene x environment interactions in rodent models, relevant behavioral endpoints and environmental interventions were defined. Presently, two rodent models for behavioral control are up and running, i.e. a rat Iowa Gambling Task and the 5-Choice Serial Reaction Time task. Interventions are carried out at two time-points: 24 h maternal deprivation at postnatal day 3 model (a rodent for neglect), and potential ‘treatment’ interventions in early puberty, either pharmacologically or through environmental enrichment. A new task for social competence is now being implemented, in collaboration with a manufacturer of behavioral set-ups. The PhD student explored a set-up allowing 24/7 monitoring of social interaction, and developed techniques to test the contribution of epigenetics. Finally, collaborative efforts allowing network investigation in rodents with neuroimaging were set-up by another postdoc contracted to support the cohort work.</p> <p><b>Planning 2014:</b> As of summer 2014, a new collaborative project between Joëls / van IJzendoorn / Bakermans is envisioned, focusing on single-pup variations in mother-pup interactions, determining the critical window for intervention. The projects on mathematical formalization and evaluation of prior knowledge, based on prior/posterior predictive inference, will start as of summer 2014. Collaborative projects on bird-song are also expected to start in mid-2014.</p>	

ALLOCATION PI BUDGETS						
PI	Organization	2013	2014	Total allocated until May 2018	5 yr budget	10 yr budget
<b>WP1</b>						
Berkum, Jos van	UU GW				270.000	540.000
Deković, Maja	UU FSW				270.000	540.000
Durston, Sarah	UMCU				405.000	810.000
Hulshoff Pol, Hilleke	UMCU		62.917	270.000	270.000	540.000
Kahn, René	UMCU		59.434	268.061	270.000	540.000
Kemner, Chantal	UU FSW	3.750	52.470	167.613	405.000	810.000
Valkenburg, Patti	UvA				405.000	810.000
Vollebergh, Wilma	UU FSW				270.000	540.000
<b>Total WP1</b>		<b>3.750</b>	<b>174.821</b>	<b>705.674</b>	<b>2.565.000</b>	<b>5.130.000</b>
<b>WP2</b>						
Bakermans-Kranenburg, Marian	UL				270.000	540.000
Crone, Eveline	UL				270.000	540.000
Engels, Rutger	RUN				270.000	540.000
IJzendoorn, Rien van	UL				405.000	810.000
<b>Total WP2</b>					<b>1.215.000</b>	<b>2.430.000</b>
<b>WP3</b>						
Boomsma, Dorret	VU				405.000	810.000
Meeus, Wim	UU FSW				405.000	810.000
Oldehinkel, Tineke	UMCG	19.411	67.939	270.000	270.000	540.000
Ormel, Hans	UMCG	11.811	47.354	253.178	270.000	540.000
Verhulst, Frank	ErasmusMC		75.349	270.000	270.000	540.000
<b>Total WP3</b>		<b>31.222</b>	<b>190.642</b>	<b>793.178</b>	<b>1.620.000</b>	<b>3.240.000</b>
<b>WP4</b>						
Bolhuis, Johan	UU FSW				270.000	540.000
Hojtink, Herbert	UU FSW				270.000	540.000
Joëls, Marian	UMCU	14.500	53.000	107.000	405.000	810.000
<b>Total WP4</b>		<b>14.500</b>	<b>53.000</b>	<b>107.000</b>	<b>945.000</b>	<b>1.890.000</b>
<b>Total</b>		<b>49.472</b>	<b>418.464</b>	<b>1.605.852</b>	<b>6.345.000</b>	<b>12.690.000</b>

COHORT BUDGETS AND ACTUALS		2013		2014		Total Budget	
	Organization	Budget	Actual	Budget	Actual	5 yr budget	10 Yr budget
<b>WP0 Project Management</b>		UU FSW					
1. Project Management.1.01		104.400	93.273	156.600		779.850	1.559.700
2. General Project Costs.1.02		38.020	51.224	57.030		285.150	570.300
<b>Total WP0</b>		<b>142.420</b>	<b>144.496</b>	<b>213.630</b>		<b>1.065.000</b>	<b>2.130.000</b>
<b>WP1 Brain Development</b>		UU FSW UMCU					
1. Direct Costs.1.03		119.520	52.970	352.062		1.673.919	3.347.838
2. Marketing & Communication.1.04		27.240	0	66.150		318.105	636.210
3. Recruitment.1.05		67.488	0	163.350		785.691	1.571.382
4. Accommodation.1.06		6.780	0	22.500		106.335	212.670
5. ICT cost.1.07		43.080	0	127.800		607.410	1.214.820
6. Equipment.1.08		217.080	0	0		108.540	217.080
<b>Total WP1</b>		<b>481.188</b>	<b>52.970</b>	<b>731.862</b>		<b>3.600.000</b>	<b>7.200.000</b>
<b>WP2 Intervention</b>		UL					
1. Intervention		234.000	47.887	351.000		1.755.000	3.510.000
<b>Total WP2</b>		<b>234.000</b>	<b>47.887</b>	<b>351.000</b>		<b>1.755.000</b>	<b>3.510.000</b>
<b>WP3 Intergenerational</b>							
2. NTR	VU	24.000	11.807	36.000		180.000	360.000
3. Radar	UU	24.000	0	36.000		180.000	360.000
1. Trails	UMCG	24.000	0	36.000		180.000	360.000
4. Generation-R	ErasmusMC	6.000	0	9.000		45.000	90.000
<b>Total WP3</b>		<b>78.000</b>	<b>11.807</b>	<b>117.000</b>		<b>585.000</b>	<b>1.170.000</b>
<b>WP4 Animal and modeling</b>							
1. Animal costs	UMCU	60.000	11.722	90.000		450.000	900.000
<b>Total WP4</b>		<b>60.000</b>	<b>11.722</b>	<b>90.000</b>		<b>450.000</b>	<b>900.000</b>
<b>Total</b>		<b>995.608</b>	<b>268.883</b>	<b>1.503.492</b>		<b>7.455.000</b>	<b>14.910.000</b>

CO-FUNDING BUDGETS AND ACTUALS	2013		2014		Total	
	Budget	Actual	Budget	Actual	Budget	Actual
<b>UMCU</b>						
UMCU Contribution of strategic budget year 1 to 5	360.000	0	360.000		1.800.000	0
UMCU Intended contribution strategic budget year 6 to 10	0	0	0		1.800.000	0
UMCU Free MRI Scans	0	0	777.778		7.000.000	0
<b>Total UMCU</b>	<b>360.000</b>	<b>0</b>	<b>1.137.778</b>		<b>10.600.000</b>	<b>0</b>
<b>UU</b>						
UU Toparea Youth	1.000.000	0	1.000.000		4.000.000	0
UU Contribution FSW for additional postdocs	0	16.769	0		1.360.000	16.769
<b>Total UU</b>	<b>1.000.000</b>	<b>16.769</b>	<b>1.000.000</b>		<b>5.360.000</b>	<b>16.769</b>
<b>UvA</b>						
UvA Four additional PhDs	0	0	0		200.000	0
<b>Total UvA</b>	<b>0</b>	<b>0</b>	<b>0</b>		<b>200.000</b>	<b>0</b>
<b>UMCG</b>						
UMCG Additional PhDs infrastructure TRAILS and intended PhDs	200.000	0	200.000		800.000	
<b>Total UMCG</b>	<b>200.000</b>	<b>0</b>	<b>200.000</b>		<b>800.000</b>	
<b>UL</b>						
UL Free MRI-scans	0	0	20.000		200.000	
UL Additional PhDs	0	0	50.000		200.000	
<b>Total UL</b>	<b>0</b>	<b>0</b>	<b>70.000</b>		<b>400.000</b>	
<b>Total</b>	<b>1.560.000</b>	<b>16.769</b>	<b>2.407.778</b>		<b>17.360.000</b>	<b>16.769</b>