Data Request form YOUth (version 6.0, February 2020)

Introduction
The information you provide here will be used by the YOUth Executive Board, the Data Manager, and the Data Management Committee to evaluate your data request. Details regarding this evaluation procedure can be found in the Data Access Protocol.

All data requests will be published on the YOUth researcher's website in order to provide a searchable overview of past, current, and pending data requests. By default, the publication of submitted and pending data requests includes he names and institutions of the contact person and participating researchers as well as a broad description of the research context.

After approval of a data request, the complete request (including hypotheses and proposed analyses) will be published. If an applicant has reasons to object to the publication of their complete data request, they should notify the Project Manager, who will evaluate the objection with the other members of the Executive Board and the Data Management Committee. If the objection is rejected, the researcher may decide to withdraw their data request.

Section 1: Researchers
In this section, please provide information about the researchers involved with this data request.
- Name, affiliation, and contact information of the contact person
- Name and details of participating researchers (e.g. intended co-authors)
- Name and details of the contact person within YOUth (if any)

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Section 2: Research context

In this section, please briefly describe the context for your research plans. This section should logically introduce the next section (hypotheses). As mentioned, please note that this section will be made publicly available on our researcher's website after submission of your request. Please provide:
- The title of your research plan
- A very brief background for the topic of your research plan
- The rationale for and relevance of your specific research plan
- The specific research question(s) or aim(s) of your research (Please also provide a brief specification)
- A short description of the data you request

References can be added at the end of this section (optional).

Title of the study
The role of gender in the neurophysiological processing of adult emotional faces in 3-year-olds.

Background of the topic of your research plan, rationale, relevance (max. 500 words)
Gender stereotypes are people's expectations about the behaviors, characteristics, and roles of men and women (Greenwald et al., 2002). One domain in which people hold gender stereotypes is the expression of emotions (Martin, 1995; Plant et al., 2000). For example, people associate emotions such as fear, sadness, and happiness more with women and emotions such as anger and pride more with men (Brody & Hall, 2008; Plant et al., 2000). Toddlers already possess knowledge about gender stereotypes, as evidenced by an increased time spend looking at gender-inconsistent activities, such as a woman putting on a tie (Hill & Flom, 2007; Poulin-Dubois et al., 2002; Serbin et al., 2002). According to the gender schema theory, this knowledge of gender stereotypes can be seen as early manifestations of gender schemas (Bem, 1981, 1983; Martin & Halverson, 1981). Gender

schemas are cognitive frameworks through which gender information is filtered and categorized, affecting the perception and processing of gender information in one's environment (Bem, 1981, 1983; Martin & Halverson, 1981). It seems likely that, when children hold different expectations about the expression of emotions in men and women, they would respond differently when these expectations are violated. In adults, such gender stereotype violations have elicited peaks in event-related potentials (ERPs) in components related to attention and conflict monitoring, such as the P1, N170, P2, N2, P3, N400, and the LPP (e.g., Dickter & Gyurovski, 2012; Liu et al, 2017). However, little is known about how gender stereotypes affect the neural processing of emotions in young children. Infants and toddlers already show differences in neural responses to fearful and happy faces (Nelson & De Haan, 1996). We extend this research by examining whether toddlers also show sensitivity to gender stereotype violations in emotional expressions at a neural level.

Gender might not only play a role in perception (in the form of gender expectations), but also at the subject level (i.e., the gender of the perceiver). Adult men and women differ in their neural responses towards happy, sad, and fearful responses in the N2, P300, and P450 (for an overview, see Kret & Gelder, 2012). Notably, only one study examined the differences between boys and girls in ERP latencies for emotions; this study found that boys have longer ERP latencies to all emotions except sadness and anger (Batty & Taylor, 2006). At the same time, girls appear to acquire gender stereotype knowledge at an earlier age than boys (Poulin-Dubois et al., 2002; Zosuls et al., 2009). However, it remains unclear whether this difference in the acquisition of gender-stereotyped knowledge is also reflected in the neural processing of gendered emotional faces in young children.

Therefore, this study aims to examine whether 3-year-olds differ in the neural processing of emotions that violate vs. confirm gender stereotypes, and whether there are differences between boys and girls in this neural processing. We define women displaying fear and happiness as the gender stereotype-confirming categories, and men displaying fear as gender stereotype-violating categories (Brody & Hall, 2008; Plant et al., 2000).

The specific research question(s) or aim(s) of your research
- Do children at 3 years respond differently when they are presented with emotional stimuli that confirm gender stereotypes (i.e., a female face with fearful/happy expression) than when gender stereotypes are violated (i.e., a male face with a fearful/happy expression)?   - Do boys and girls differ in the neural processing of emotional faces that confirm vs. violate gender stereotypes?

Summary of the data requested for your project: Please indicate which data you request to answer your research question.

EEG data
- We would like to use the ERP data from the face emotion task administered at the around 3 years wave.
- We would additionally like to use the ERP data from the face house task at around 3 years wave, and more specifically, the neural responses to neutral facial expressions.

Questionnaire data
- Demographic variables (age in months, gender of the child, ethnicity, and family composition)
- Labor and birth data (i.e., birth order, weeks of pregnancy).

References (optional)

Batty, M., & Taylor, M. J. (2006). The development of emotional face processing during childhood. *Developmental Science, 9*(2), 207-220. https://doi.org/10.1111/j.1467-7687.2006.00480.x

Bem, S. L. (1981). Gender schema theory: A cognitive account of sex typing. *Psychological Review, 88*(4), 354. https://doi.org/10.1037/0033-295X.88.4.354

Bem, S. L. (1983). Gender schema theory and its implications for child development: Raising gender-aschematic children in a gender-schematic society. *Signs: Journal of Women in Culture and Society, 8*(4), 598-616. https://doi.org/10.1086/493998

Brody, L. R., & Hall, J. A. (2008). Gender and emotion in context. *Handbook of emotions, 3*, 395-408.

Dickter, C., & Gyurovski, I. (2012). The effects of expectancy violations on early attention to race in an impression-formation paradigm. *Social Neuroscience, 7*(3), 240-251. https://doi.org/10.1080/17470919.2011.609906

Greenwald, A. G., Banaji, M. R., Rudman, L. A., Farnham, S. D., Nosek, B. A., & Mellott, D. S. (2002). A unified theory of implicit attitudes, stereotypes, self-esteem, and self-concept. *Psychological Review, 109*(1), 3. https://doi.org/10.1037/0033-295X.109.1.3

Hill, S. E., & Flom, R. (2007). 18- and 24-month-olds' discrimination of gender-consistent and inconsistent activities. *Infant Behavior and Development, 30*(1), 168-173. 10.1016/j.infbeh.2006.08.003

Liu, C., Liu, Y., Iqbal, Z., Li, W., Lv, B., & Jiang, Z. (2017). Symmetrical and asymmetrical interactions between facial expressions and gender information in face perception. *Frontiers in Psychology, 8*(1383). https://doi.org/10.3389/fpsyg.2017.01383

Di Lorenzo, R., van den Boomen, C., Kemner, C., & Junge, C. (2020). Charting development of ERP components on face-categorization: Results from a large longitudinal sample of infants. *Developmental Cognitive Neuroscience, 45*, 100840. https://doi.org/10.1016/j.dcn.2020.100840

Martin, C. L. (1995). Stereotypes about children with traditional and nontraditional gender roles. *Sex Roles, 33*(11-12), 727-751. https://doi.org/10.1007/bf01544776

Martin, C. L., & Halverson, C. F. (1981). A schematic processing model of sex typing and stereotyping in children. *Child Development*, 1119-1134. https://doi.org/10.2307/1129498

Nelson, C. A., & De Haan, M. (1996). Neural correlates of infants' visual responsiveness to facial expressions of emotion. *Developmental Psychobiology, 29*(7), 577-595.

Plant, E. A., Hyde, J. S., Keltner, D., & Devine, P. G. (2000. The gender stereotyping of emotions. *Psychology of Women Quarterly, 24*(1), 81-92. https://doi.org/10.1111/j.1471-6402.2000.tb01024.x

Poulin-Dubois, D., Serbin, L. A., Eichstedt, J. A., Sen, M. G., & Beissel, C. F. (2002). Men don't put on make-up: Toddlers' knowledge of the gender stereotyping of household activities. *Social Development, 11*(2), 166-181. https://doi.org/10.1111/1467-9507.00193

Quinn, P. C., Yahr, J., Kuhn, A., Slater, A. M., & Pascalis, O. (2002). Representation of the Gender of Human Faces by Infants: A Preference for Female. *Perception, 31*(9), 1109-1121. 10.1068/p3331

Serbin, L. A., Poulin-Dubois, D., & Eichstedt, J. A. (2002). Infants' responses to gender-inconsistent events. *Infancy, 3*(4), 531-542. 10.1207/S15327078IN0304_07

Zosuls, K. M., Ruble, D. N., Tamis-LeMonda, C. S., Shrout, P. E., Bornstein, M. H., & Greulich, F. K. (2009). The acquisition of gender labels in infancy: Implications for gender-typed play. *Developmental Psychology, 45*(3), 688. https://psycnet.apa.org/doi/10.1037/a0014053

Section 3: Hypotheses

In this section, please provide your research hypotheses. For each hypothesis:
-   Be as specific as possible
-   Provide the anticipated outcomes for accepting and/or rejecting the hypothesis

Hypotheses
Based on previous studies and theoretical literature, we hypothesize that: 1. At 3 years, toddlers respond differently to women versus men with fearful and happy facial expressions in ERPs that have been frequently implicated in research in both gender stereotypes and processing of emotional faces (P1, N170, P2, Nc, P300, and LPP). This gender difference is not expected in the neutral face condition. 2. At 3 years, we expect girls to respond more strongly at the neural level to the violation of gender stereotypes in emotion expression than boys, as girls acquire gender stereotype knowledge at an earlier age than boys (Poulin-Dubois et al., 2002; Zosuls et al., 2009).

Section 4: Methods

In this section, you should make clear how the hypotheses are tested. Be as specific as possible.
Please describe:
1) The study design and study population (Which data do you require from which subjects?)
a) The general processing steps (to prepare the data for analysis)
b) The analysis steps (How are the data analysed to address the hypotheses? If possible, link each description to a specific hypothesis)
c) Any additional aspects that need to be described to clarify the methodological approach (optional)

Study design, study population and sample size (e.g. cross-sectional or longitudinal; entire population or a subset; substantiate your choices)
Study population: Children from the YOUth baby & child cohort who participated at the around 3 years wave between the ages of 30 – 42 months.

Sample size: We would like to use all data from participants between 30 – 42 months of age that are collected thus far at the around 3 measurement. To examine small effect sizes in a within-subjects design with 2 groups (girls and boys), and to obtain a power of 0.8, we need a total 70 children in our final analyses. Since previous studies have encountered approximately 50% of data loss due to EEG artifacts in the around 10 months wave (Munsters et al., 2019), we aim to use a total sample of 140 children that completed the face house task and face emotion task during the EEG sessions.

Study design: The study design is cross-sectional

General processing steps to prepare the data for analysis

The EEG data will be preprocessed with the use of Brainvision Analyzer. Preprocessing will be done in the same way as a previous study that analyzed similar EEG data in young children from the same cohort (Di Lorenzo et al., 2020). Data will be downsampled to a 512Hz sampling rate. Data will be filtered at 0.1-30Hz with a notch filter of 50Hz. Data is then segmented into epochs of -200ms to 1000ms, time-locked to the onset of the stimuli. A baseline correction will be applied from -150 to 0 seconds. Since an eye-electrode was placed for some, but not all the children, eye movements will be detected and corrected with the use of an independent component analysis. To control for distractibility during the EEG sessions, videotapes will be coded per trial to note whether the child was looking at the screen or away from the screen during the stimulus presentation. Trials during which the child looked away from the screen will be manually excluded from further analysis. Artifacts will be rejected semi-automatically. Trials are marked as bad and manually inspected if the voltage step exceeds 50 uV/ms, with a maximum allowed difference of values in intervals of 200 uV within a 200ms window, or with a lower activity in intervals of 3 uV. An electrode will be rejected if there are less than 5 artifact-free trials. An entire trial will be discarded if artifacts are visible across more than 16% of the electrodes. Finally, a reference activity is created from the mean of all electrodes per child, to which the child's data is then re-referenced. Average waveform amplitudes will be visually inspected to select time windows and electrodes per block and imported into R.

We expect to identify the following ERPs (based on both child and adult ERP studies):

ERP	Electrodes of interest	Time window
P1	Oz, O1, O2, PO3, PO4	60 - 130ms
N170	Oz, O1, O2, PO3, PO4, P3, P4	165 - 180ms
P2	Oz, O1, O2	185 - 205ms
N2	Fz, Cz, FC1, FC2	285 - 340ms
LPP/P400	Oz, O1, O2, PO3, PO4, P3, P4, Pz	325 - 600ms
Nc	C3, C4, Cz, FC1, FC2, Fz	300 - 600ms

Contrasts will be made based on congruence, meaning that for each condition (happy face, sad face, and neutral face), average wave amplitudes will be compared between the congruent condition (i.e., a woman with a happy and sad facial expression is considered congruent with gender expectations) and incongruent conditions per facial expression (i.e., a man with a happy and sad facial expression is considered incongruent with gender

expectations). In the neutral condition, we expect no difference between the ERP latencies towards men and women with a neutral facial expression; this condition functions as a check to see if ERP peaks are different towards men and women irrespective of the emotion presented.

Specific processing and analysis steps to address the hypotheses
The data will be analyzed using multilevel modeling with the *lme4* package with maximum likelihood. Since we expect children to differ in their neural activation patterns irrespective of congruence, we allow intercepts to vary per child in our models (i.e., ID is a random factor in the models). Additionally, we expect to be using multiple electrodes to quantify each ERP component, and activity can be expected to vary across electrodes. We will therefore include electrode as an additional random factor in our models. The selected ERPs will outcome variables in the models, and congruence, child gender, gender of the face stimulus (stimulus gender) are the main variables of interest. Separate analyses will be performed for each selected ERP. To examine whether boys and girls differ in their neural responses to gendered emotions, interaction terms between congruence and child gender will be added for each ERP. If these interaction terms are significant, we will apply paired sample t-tests to examine the direction of effects.

Section 5: Data request

In this section, please specify as detailed as possible which data (and from which subjects) you request.

Data requested
We would like to receive the following data of the children between the ages 2.5 – 3.5 years from the YOUth baby & child cohort that participated at the around 3 years old wave: ▪ ERP data from the face emotion task ▪ ERP data from the face house task ▪ Demographic variables (age, gender, ethnicity, and family composition) of the eligible children. ▪ Labor and birth data (i.e., birth order, weeks of pregnancy).

Data request for the purpose of:

☒ Analyses in order to publish
☐ Analyses for data assessment only (results will not be published)

Publication type (in case of analyses in order to publish):
☐ Article or report
☐ PhD thesis
☒ Article that will also be part of a PhD thesis

Would you like to be notified when a new data lock is available?
☒ Yes
☐ No

Upon approval of a data request, the complete request will be made publicly available on our researcher's website by default.

Do you agree with publishing the complete request on our researcher's website after it is approved?
☒ Yes
☐ No. Please provide a rationale