E-Risk Study Concept Paper Form

Response was completed on 04-09-2025 10:10.

Record ID	57

1. Collaborating researchers

Please note:

Once approved, a formal data use agreement will be required between King's College London and the university or research organisation that employs any collaborator having access to the data if they are not a member of staff, a student or affiliate of King's College London. This needs to be signed by both universities/organisations before data access can be granted.

For projects carried out by a student (e.g., MSc/MA, MPhil/PhD, clinical doctorate), the lead applicant should be the student's supervisor at the same university, and the student should be named as the student collaborator requiring access to the data.

If you have additional collaborators, please name them below and indicate whether they need to have access to the data. It would be common, for instance, for other researchers to see summary results of analyses and act as co-authors on your paper without having access to the data. You will not be permitted to share the dataset except with those indicated in the table as requiring access.

Applicable?	**Category**	**Name**	**Email address**	**University/organisation**	**Needs access to data for analysis?**
	Applicant **(lead researcher)**	Sophie von Stumm	sophie.von stumm@y ork.ac.uk	University of York	◉ Yes ○ No
○ Applicable ◉ Not applicable	**Student collaborator** ***(if data is for their dissertation/thesis)***				
◉ Applicable ○ Not applicable	**E-Risk Sponsor** ***(if applicant is not an E-Risk investigator)***	Helen Fisher	helen.2.fis her@kcl.ac .uk	King's College London	○ Yes ◉ No

Are there additional collaborators to add?	◉ Yes ○ No
If yes, how many additional collaborators would you like to add?	1

Category	Name	Email address	University/organisation	Needs access to data for analysis?
Other collaborator #1	Anna Brown	Anna.Brown@northampton.ac.uk	University of Northampton	◉ Yes ○ No

Applicants: If you would like to continue your application later, please press the "Save and return later" button below. Please copy or write down the Return code provided.

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2. The project proposal

Note: *Please provide sufficient detail to enable the committee to review your proposal. Please be as specific as possible about the project aims and analysis methods as once approved this concept paper will be posted publicly and thus will act as a form of pre-registration of your project. Expand boxes as required.*

Title of project	Do gender biases in mothers' language predict children's differences in socio-emotional development and personality?
Background and rationale for project ***(approx. 300 - 1000 words)***	Gender socialization is an early developmental influence that children experience through interactions with their parents (Eagly & Wood, 1999; Lippa, 2010; Brown et al., 2020). Gendered parenting refers to the parental messages and behaviours that inform children about how boys and girls are supposed to feel, think, and behave (Mesman & Groeneveld, 2018; Morawska, 2020). Examples of gendered parenting include gender stereotypical toy selections (e.g., dolls for girls, trucks for boys; Kollmayer et al., 2018), rewarding gender stereotype conformant behaviours (e.g., being more accepting of boy's disruptive behaviours than of girls'; Morrongiello & Dawber, 2000), and encouraging sex-typed activities (e.g., outdoor sports for boys, indoor tasks for girls; Lytten & Romney, 1991; Power & Parke, 1986). Yet, gendered parenting is rarely reflected in broad parenting styles or overt parenting practices, especially in societies that value gender equality (Endendijk et al., 2016; Mesman & Groeneveld, 2012). Instead, gendered parenting tends to be subtle, implicit, and difficult to observe, akin to gender stereotypes that are deeply embedded in society and mostly implicit and unconscious (Charlesworth & Banaji, 2022; Mesman & Groeneveld, 2018). Gendered parenting contributes to the perpetuation of gender stereotypes and cisgender identities (Cook et al., 2022; Morawska, 2020; Spears Brown et al., 2020). Gender is one of the first labels that children learn: Infants can discern gender in others from around three months of age (e.g., Quinn et al. 2002; Ramsey-Rennels & Langlois, 2006), and they verbalize their own gender identity, such as "I am a boy" or "I am a girl", at about 19 months of age (Zosuls et al., 2009). By the time they are three years old, children have developed basic gender stereotypes themselves (Signorella et al., 1993). For example, preschool children attribute appearance stereotypes, such as being pretty, having long hair, wearing dresses, jewellery, and make-up, to girls and associate boys with being active, liking sports, and playing rough (Miller et al. 2009). Parents' gender stereotypes beget their children's gender stereotypes in general, but mothers' gender stereotypes are even stronger predictors than fathers' (Endendijk et al., 2013; Kulik, 2005). This is likely due to mothers serving as primary caregivers during the early years in most families and spending more time with their children than other adults. Beyond its role for children's gender identities and gender stereotypes, little is known

	about the long-term influence that gendered parenting may have on child development. Most notably, no study has tested whether gendered parenting may encourage the development of salient psychological gender differences, such as socio-emotional development and personality (Bando et al., 2024; Eagly & Wood, 1999; Lippa, 2010). This is a striking omission, because gender differences in socio-emotional development and personality forecast persistent inequalities across life domains, including education, income, and health (Platt, 2024; Satz & White, 2024). For example, men's tendency to be on average less agreeable than women partly accounts for the gender wage gap (e.g., Mueller & Plug, 2006). Understanding the origins of gender differences in socio-emotional development and personality will help mitigate the rise and adverse impact of inequalities between men and women. Here, we will study the long-term influence of gendered parenting on children's socio-emotional development and personality. We will infer gendered parenting from words that mothers used to describe their children, when they were 5 years old. We will test whether (a) mothers of sons used more male- versus female-associated trait adjectives than mothers of daughters to describe their children and vice versa, (b) gender biases in mothers' language predict gender differences in children's socio-emotional development (as rated by the children's teachers) and personality (rated by interviewers), and these predictions are (c) independent of children's actual trait differences, (d) robust against confounding, and (e) likely to reflect causal influences.
Project aims / objectives	The long-term consequences of gendered parenting on children's socio-emotional development and personality have not been studied before. Here, we seek to address this gap by testing whether (a) mothers used more male- versus female-associated trait adjectives to describe sons versus daughters and vice versa, (b) gender biases in mothers' language predict children's developmental differences, and these predictions are (c) explained by children's actual trait differences, (e) robust against confounding, and (d) likely to reflect causal influences. Data will come from mothers and their twin children who participated in E-Risk, a longitudinal cohort study of families who had same-sex twins born in the mid-90s. No data were collected from fathers or from families with opposite-sex twins for E-Risk. We were therefore unable to explore fathers' gendered parenting or to conduct within-family comparisons between boys and girls. When their twin children were 5 years, mothers completed a five-minute speech sample with extensively-trained researchers, during which they were asked to freely describe and speak about each of their twin children, with approximately 90 minutes break between the two twins. The transcripts of these interviews form the basis for quantifying gender biases in mothers' speech. To this end, we will apply two top-down approaches (i.e., scoring trait adjectives whose gender association was quantified by Charlesworth et al. (2021) or scoring trait adjectives from psychometric scales that assess masculinity versus femininity) and one bottom-up approach (i.e., probability index scoring). We will address the following research questions (RQ): RQ 1: Do mothers of daughters differ in the use of trait adjectives to describe their children compared to mothers of sons? RQ 2: Are mothers' gender biases in language concurrently associated with children's differences in socio-emotional development, and do they predict these differences across childhood? RQ 3: Do mothers' gender biases in language predict children's differences in personality? RQ 4: Do mothers' gender biases in language likely have causal influences on children's

	socio-emotional development and personality?
Brief statement of your hypothesis	Hypothesis 1a: Mothers of daughters use more female-associated and less male-associated trait adjectives than mothers of sons when describing their children. Hypothesis 1b: Mothers of sons use more male-associated than female-associated trait adjectives when describing their children. Hypothesis 1c: Mothers' use of male- versus female-associated trait adjectives for sons versus daughters is robust against confounding from (a) affectionate parenting (cf. Wertz et al., 2025), and (b) family socioeconomic status. Hypothesis 2a: Children, whose mothers use more female-associated trait adjectives to describe them, will score higher on internalizing problems and prosocial behaviours, but lower on externalizing behaviour problems at age 5 years. Hypothesis 2b: Children whose mothers use more male-associated trait adjectives in their descriptions will score higher on externalizing behaviours but lower on internalizing problems and prosocial behaviours at age 5 years. Hypothesis 2c: Predictions of socio-emotional development from mothers' use of male- and female-associated trait adjectives remain significant after taking direct and moderation effects of children's gender into consideration. We make no predictions about the significance or direction of moderation effects by gender. We will test whether the effects of mothers' use of male- and female-associated trait adjectives on socio-emotional development from Hypothesis 2a-c are also observable beyond age 5 years (i.e., at ages 7, 10, and 12 years after controlling for socio-emotional development at age 5 years). Hypothesis 3a: Children, whose mothers use more female-associated trait adjectives to describe them, will score higher on Agreeableness and Neuroticism at age 10, 12, and 18 years (De Bolle et al., 2015; Lippa, 2010; Schmitt et al., 2008). Hypothesis 3b: Children, whose mothers use more male-associated trait adjectives in their descriptions, will score lower on Agreeableness and Neuroticism at age 10, 12, and 18 years. We make no predictions about the other Five Factor Model traits, because the previous literature on their gender differences is inconclusive. Hypothesis 3c: Predictions of personality traits from mothers' use of male- and female-associated trait adjectives remain significant after taking direct and moderation effects of children's gender into consideration.
Data analysis methods to be used ***(approx. 100 - 500 words)***	For Hypothesis 1, we will perform a MANOVA with two dependent variables (i.e., male- and female-associated trait words), with mothers of sons versus mothers of daughters as grouping variable. All measures will be at the family level (i.e., per mother); thus, the issue of non-independence of twin observations does not apply. Post hoc tests (univariate ANOVAs) will be performed to determine where the significant differences lie. We will adjust the p-values of the ANOVAs using false discovery rates (FDR) to adjust for multiple comparisons. We will then build a MANCOVA model to include our covariates (i.e., maternal affection, and family SES). We will test whether the main effect of our grouping variable remains statistically significant. For Hypothesis 2 and 3, we will fit three-level linear mixed-effects models to examine whether mothers' use of male- and female-associated trait adjectives are associated with socio-emotional development and personality. Our models' level 1 will represent the repeated measurements of socio-emotional development/ personality within each child, level 2 will account for the nested family structure of our data (i.e., two children per family), and level 3 will represent families. The models will include fixed effects for time (of assessment), mothers' use of male- and female-associated trait adjectives, children's gender, and the corresponding interaction terms (e.g., male-associated trait adjectives ×gender, female-associated trait adjectives × gender, time of assessment × male-associated trait adjectives, time of assessment× male-associated trait adjectives × gender, etc.). We also will also include maternal affection and family SES (see above) as covariates to ensure robustness of the estimated effects. To test whether associations between gender biases in mothers' language and child outcomes are likely causal, we will follow Wertz and colleagues (2025) approach: We will produce monozygotic twins' difference scores in mothers' use of male- and female-

	associated trait adjectives and test if they predict monozygotic twins' differences in socio-emotional development (i.e., 3 domains and 5 subscales) and personality (i.e., five traits) using linear mixed models. Each model will include time (i.e., assessment ages 5, 7, 10, 12, and 18 years), MZ twins' differences in mothers' use of male- and female-associated trait adjectives, gender, and their interactions as fixed effects.
Significance for theory, research methods, or clinical practice	This research will (a) quantify gender biases in the language that mothers use to describe their children when they were 5 years old and (b) test whether gender biases in mothers' language predicts children's socio-emotional development and personality. The research addresses a critical gap in existing literature, because the long-term influence of gendered parenting on child development has not been tested. Our approach to inferring gendered parenting is novel and unprecedented. Our approach bears risk, in the way that if Hypothesis 1 is rejected, testing for Hypothesis 2, 3, and 4 will be pointless.
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Are there any files you would like to upload to support your concept paper?	○ Yes ◉ No

Applicants: If you would like to continue your application later, please press the "Save and return later" button below. Please copy or write down the Return code provided.

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3. Expected project outcomes

Please note:

The stated end date must be within 24 months of the date when this form is submitted. This end date will form part of the formal data use agreement and on this date you should delete the dataset. Therefore, it must be a realistic date for completion of the project including all analysis, writing a manuscript, review of the manuscript by all collaborators, submission, revisions, and acceptance of a paper for publication.

If you require an extension to the end date of the project, then you should contact Prof Fisher (helen.2.fisher@kcl.ac.uk) to discuss this. If you have signed a formal data use agreement, you will need to complete a form to request a licence extension. In some cases, we may also ask you to complete a new concept paper form if there have been substantial changes to the project or a long period of time has elapsed (e.g., greater than a year since the end date of the original project).

If the objective of the project is not a journal publication, please suggest an end date within 12 months instead of 24 months, and state a measurable, concrete outcome. If the objective of the project is a student dissertation, then the expected end date should be the deadline for submission of the dissertation; dissertation projects will only be accepted on agreement that they are strictly not for publication.

Date form submitted	04-09-2025 *DD-MM-YYYY*
End date for the project	03-09-2027 D-M-Y *DD-MM-YYYY*
Do you expect to publish your results in a journal?	(•) Yes ( ) No
If yes, please provide a provisional list of author names	**von Stumm, S; Brown, A; Fisher, HL; Arseneault, L; Wertz J; + other interested E-Risk investigators**
If yes, please provide a provisional list of journals	**Target journal is JPSP**

Applicants: If you would like to continue your application later, please press the "Save and return later" button below. Please copy or write down the Return code provided.

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4. List of variables required

Please note:

When specifying variables, please be unambiguous. For each variable, specify the name of the measure, twin age, informant, and if you want specific subscales/derived categories (e.g., Depression from interview with twin at age 18; both number of symptoms and DSM-IV diagnosis). Alternatively, for maximum clarity, give actual variable names (e.g., MDESXE18 - MDE Symptom scale - P18 - Elder; DXMDEE18 - Major depressive episode, dsm4 - P18 - Elder).

By default, the dataset will usually include twin and family IDs, the "random" and "true" twin order variables, the cohort the twin is from (1994 or 1995), twin sex, ethnicity and zygosity variables, and family socioeconomic status at age 5. These routine background variables are listed in the table below. If you require further background variables, please specify them in your list.

Access to some parts of the dataset are restricted, namely identifiable data (e.g., postcodes, video recordings, individual-level genotypic and epigenetic data) which will not be shared outside King's College London, and linked administrative data which is only accessible via the UK Longitudinal Linkage Collaboration's Trusted Research Environment (this requires a separate formal data access agreement).

Background variables that will be included by default:

Variable name	Description
FAMILYID	Unique family identifier
ATWINID	Twin A ID (ex chkdg)
BTWINID	Twin B ID (ex chkdg)
RORDERP5	Random Twin Order
TORDER	True Twin Order
RISKS	Sample Groups
COHORT	Cohort
SAMPSEX	Sex of Twins
ZYGOSITY	Zygosity
SETHNIC	Ethnicity of Twins
SESWQ35	Social Class Composite

Please select the variables that will be requested	☑ Age 5 variables ☑ Age 7 variables ☑ Age 10 variables ☑ Age 12 variables ☑ Age 18 variables ☐ Age 26 variables ☐ Age 30* variables

Age 5 variables	**AGGET5 - Aggression Subscale - Elder** **AGGYT5 - Aggression Subscale - Younger** **DELET5 - Delinquency Subscale - Elder** **DELYT5 - Delinquency Subscale - Younger** **EXTET5 - TRF Externalising Scale - Elder** **EXTYT5 - TRF Externalising Scale - Younger** **ANXET5 - Anxiety Subscale - Elder** **ANXYT5 - Anxiety Subscale - Younger** **WDET5 - Withdrawn Subscale - Elder** **WDYT5 - Withdrawn Subscale - Younger** **EMOET5 - TRF Emotional Scale (Ex Somatic) - Elder** **EMOYT5 - TRF Emotional Scale (Ex Somatic) - Younger** **PROET5 - Prosocial Subscale - Elder** **PROYT5 - Prosocial Subscale - Younger** **WARME5 - Warmth towards elder twin**

Age 7 variables	**AGGET7 - Aggression Subscale - Elder** **AGGYT7 - Aggression Subscale - Younger** **DELET7 - Delinquency Subscale - Elder** **DELYT7 - Delinquency Subscale - Younger** **EXTET7 - TRF Externalising Scale - Elder** **EXTYT7 - TRF Externalising Scale - Younger** **ANXET7 - Anxiety Subscale - Elder** **ANXYT7 - Anxiety Subscale - Younger** **WDET7 - Withdrawn Subscale - Elder** **WDYT7 - Withdrawn Subscale - Younger** **EMOET7 - TRF Emotional Scale (Ex Somatic) - Elder** **EMOYT7 - TRF Emotional Scale (Ex Somatic) - Younger** **PROET7 - Prosocial Subscale - Elder** **PROYT7 - Prosocial Subscale - Younger**

Age 10 variables	**AGGET10 - Aggression Subscale - Elder** **AGGYT10 - Aggression Subscale - Younger** **DELET10 - Delinquency Subscale - Elder** **DELYT10 - Delinquency Subscale - Younger** **EXTET10 - TRF Externalising Scale - Elder** **EXTYT10 - TRF Externalising Scale - Younger** **ANXET10 - Anxiety Subscale - Elder** **ANXYT10 - Anxiety Subscale - Younger** **WDET10 - Withdrawn Subscale - Elder** **WDYT10 - Withdrawn Subscale - Younger** **EMOET10 - TRF Emotional Scale (Ex Somatic) - Elder** **EMOYT10 - TRF Emotional Scale (Ex Somatic) - Younger** **PROET10 - Prosocial Subscale - Elder** **PROYT10 - Prosocial Subscale - Younger** **BFIOE10 - Openness to Experience Subscale (BFI) - Elder Twin** **BFIOY10 - Openness to Experience Subscale (BFI) - Younger Twin** **BFICE10 - Conscientiousness Subscale (BFI) - Elder Twin** **BFICY10 - Conscientiousness Subscale (BFI) - Younger Twin** **BFIEE10 - Extroversion Subscale (BFI) - Elder Twin** **BFIEY10 - Extroversion Subscale (BFI) - Younger Twin** **BFIAE10 - Agreeableness Subscale (BFI) - Elder Twin** **BFIAY10 - Agreeableness Subscale (BFI) - Younger Twin** **BFINE10 - Neuroticism Subscale (BFI) - Elder Twin** **BFINY10 - Neuroticism Subscale (BFI) - Younger Twin**
Age 12 variables	**AGGET12 - Aggression Subscale - Elder** **AGGYT12 - Aggression Subscale - Younger** **DELET12 - Delinquency Subscale - Elder** **DELYT12 - Delinquency Subscale - Younger** **EXTET12 - TRF Externalising Scale - Elder** **EXTYT12 - TRF Externalising Scale - Younger** **ANXET12 - Anxiety Subscale - Elder** **ANXYT12 - Anxiety Subscale - Younger** **WDET12 - Withdrawn Subscale - Elder** **WDYT12 - Withdrawn Subscale - Younger** **EMOET12 - TRF Emotional Scale (Ex Somatic) - Elder** **EMOYT12 - TRF Emotional Scale (Ex Somatic) - Younger** **PROET12 - Prosocial Subscale - Elder** **PROYT12 - Prosocial Subscale - Younger** **BFIOE12 - Openness to Experience Subscale (BFI) - Elder Twin** **BFIOY12 - Openness to Experience Subscale (BFI) - Younger Twin** **BFICE12 - Conscientiousness Subscale (BFI) - Elder Twin** **BFICY12 - Conscientiousness Subscale (BFI) - Younger Twin** **BFIEE12 - Extroversion Subscale (BFI) - Elder Twin** **BFIEY12 - Extroversion Subscale (BFI) - Younger Twin** **BFIAE12 - Agreeableness Subscale (BFI) - Elder Twin** **BFIAY12 - Agreeableness Subscale (BFI) - Younger Twin** **BFINE12 - Neuroticism Subscale (BFI) - Elder Twin** **BFINY12 - Neuroticism Subscale (BFI) - Younger Twin**
Age 18 variables	**BFIOE18 - Openness to Experience Subscale (BFI) - Elder Twin** **BFIOY18 - Openness to Experience Subscale (BFI) - Younger Twin** **BFICE18 - Conscientiousness Subscale (BFI) - Elder Twin** **BFICY18 - Conscientiousness Subscale (BFI) - Younger Twin** **BFIEE18 - Extroversion Subscale (BFI) - Elder Twin** **BFIEY18 - Extroversion Subscale (BFI) - Younger Twin**

	BFIAE18 - Agreeableness Subscale (BFI) - Elder Twin **BFIAY18 - Agreeableness Subscale (BFI) - Younger Twin** **BFINE18 - Neuroticism Subscale (BFI) - Elder Twin** **BFINY18 - Neuroticism Subscale (BFI) - Younger Twin**

Are you requesting access to identifiable or linked data?	○ Yes ◉ No

Which format(s) do you require the data in?	☐ CSV ☑ Excel ☑ SPSS ☐ STATA ☐ Other

Applicants: If you would like to continue your application later, please press the "Save and return later" button below. Please copy or write down the Return code provided.

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5. Data security agreement and signature

Please click in each box to indicate that you will adhere to each of the points listed below.

◉ I adhere	**I am current on Human Subjects Training (CITI (www.citiprogram.org) or equivalent)**
◉ I adhere	**My project is covered by the King's ethics committee OR I have /will obtain ethical approval from my home institution.**
◉ I adhere	**I will treat all data as "restricted" and store in a secure fashion.** **My computer or laptop is:** **a) encrypted (recommended programmes are FileVault2 for Macs, and Bitlocker for Windows machines)** **b) password-protected** **c) configured to lock-out after 15 minutes of inactivity AND** **d) has an antivirus client installed as well as being patched regularly.**
◉ I adhere	**I will not "sync" the data to a mobile device.**
◉ I adhere	**In the event that my laptop with data on it is lost, stolen or hacked, I will immediately contact Prof Helen Fisher (helen.2.fisher@kcl.ac.uk), PI of the E-Risk Study.**
◉ I adhere	**I will not share the data with anyone, including my students or other collaborators not specifically listed on this concept paper as requiring access to the data.**
◉ I adhere	**I will not post data online or submit the data file to a journal for them to post.** ***Some journals are now requesting the data file as part of the manuscript submission process. Study participants have not given informed consent for unrestricted open access, so we have a managed-access process. Speak to Prof Helen Fisher (helen.2.fisher@kcl.ac.uk) for strategies for achieving compliance with data-sharing policies of journals.***