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Children's gender identification beyond binary categories predicts their prosocial behaviour

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ABSTRACT

Prosocial behaviour develops early in life yet also shows increasing gender differences over development, pointing to a role for learning and socialization connected to gender. Here, we examine prosocial behaviour in 5-year-old children ($N = 54$) in Sweden and how it relates to their binary gender as well as their self-rated gender identity, using two continuous scales. Prosocial behaviour was assessed using tasks for empathy, comforting, and anonymous costly sharing. We find that children are capable of identifying their gender beyond binary categories using continuous scales for identification with girls and with boys. Further, this variation in gender identity relates to their prosocial behaviour such that costly sharing is related to less identification with boys, particularly for boys. These findings shed light on the origins and development of gender differences in prosocial behaviour as well as children's gender identity.

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KEYWORDS Child development; gender identity; gender roles; prosocial behaviour

Prosocial behaviour – an action intended to benefit another person – is important for interpersonal relationships and for the functioning of society. In children, acting prosocially, for example, by helping others, is intrinsically rewarding and enhances children's well-being (Song et al., 2020). Longitudinal studies suggest that children's prosocial behaviour reduces the likelihood of adolescent psychopathological symptoms (Memmott-Elison & Toseeb, 2023) and also is predictive of their future academic achievements (Caprara et al., 2000). Prosocial behaviour develops early in life, suggesting an evolutionary basis for its origins (Warneken, 2015), yet also shows individual differences – including gender differences favouring girls that increase with age through childhood (Fabes & Eisenberg, 1998; Ickes et al., 2000; Kuhnert et al., 2017), suggesting a relation to children's developing

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gender identity as well. In the current study, we investigate nuances of gender differences in 5-year-olds' prosocial behaviour by examining the roles of children's binary gender and continuous gender identification on costly sharing, empathy, and comforting.

Gender differences in prosocial behaviour become apparent early in life, with a meta-analysis indicating effects from 2 years of age onwards, though the strength of these gender differences increases with age towards adolescence (Fabes & Eisenberg, 1998). Further, gender differences in prosociality have been shown to vary across the type of behaviour in question, at least for adults and adolescents. For most types of prosocial behaviour – care, comforting, compliance, generosity, and altruism – women and adolescent girls show more of these behaviours, while men and adolescent boys have sometimes been shown to engage in more instrumental helping or public prosocial behaviour (Andreoni & Vesterlund, 2001; Xiao et al., 2019). Research that has specifically sought to uncover aspects of prosocial behaviour that men are more likely to engage in still found either advantages for women or no difference between genders (e.g., for offering instrumental help to a stranger) (Nielson et al., 2017). The differentiations that have been found tend to follow socially constructed gender roles for women to be more relational and men to be more agentic (Eagly, 2009). This variation across ages and contexts suggests a role for conceptions of gender-typical behaviours and gender identification in the development of prosocial behaviour. As for potential mechanisms behind these developmental changes, theories of gender development can be informative. Social-cognitive theories of gender development emphasize the process of associating particular behaviours and traits with gender which then become an influential factor on one's own behaviour and traits and one's judgements of others (Bigler, 1995). Further, the Gender Self Socialization Model (Tobin et al., 2010) proposes that relationships between identity, beliefs, and behaviour are multidirectional over the course of development such that gender-typed behaviours, gender identification, and gender-typed beliefs about behaviours and traits can all be influenced by each other. For example, in the case of prosocial behaviour, knowledge of a stereotype that boys are less prosocial than girls could lead to 1) identifying less as a boy if one acts prosocially and/or 2) acting more prosocially if one identifies less as a boy.

Relationships between gender-typing and prosocial behaviour have been observed in childhood. For example, comforting behaviour in 6-year-old children is related to their earlier gender-typed play preferences more so than their binary gender or empathy (Li & Wong, 2016), highlighting the role of gendered aspects of socialization in that feminine gender-typed play likely allows children to practice nurturing skills, such as comforting. The connection between gender role expectations and prosocial behaviour is apparent in children's judgements of others' prosocial behaviour as well. By 5 years of

age, children have expectations about gender differences for others' prosocial behaviour. Specifically, when asked about giving, sharing, helping, and comforting, children from 5 to 15 years of age expected more of such behaviours among girls, particularly for comforting, and the degree of gender differences in their expectations increased with age (Hine & Leman, 2013). In another recent study, children from 6 years expected girls to have more communal (caring and social connection) values than boys (Block et al., 2025). With age, children also rate boys' prosocial behaviour less positively (Hine & Leman, 2013). Finally, school-aged children rated girls as more likely to behave prosocially overall, however boys were judged to be more likely than girls to engage in particularly masculine prosocial behaviours, such as rescuing a cat from a tree or being a 'good sport' (Hine, 2017; Zarbatany et al., 1985).

Importantly though, binary gender differences between girls and boys at the group level may not reveal the full picture for how gender and prosocial behaviour relate. Gender-typed behaviours and traits have a significant amount of within-gender variation and between-gender overlap, such that all children, regardless of binary gender identity, can take on masculine and feminine behaviours and traits to some degree. This variation was exemplified in the work of Bem (1974) who proposed that individuals tend to possess both masculine and feminine characteristics. Thus, examining the degree of masculinity or femininity in individuals rather than simply comparing them by binary gender groups could give additional insight into the role of gender in prosocial behaviour. Indeed, research using the Bem Sex Role Inventory (Bem, 1974) has found that adolescents' feminine orientation predicts their prosocial moral reasoning and behaviour (Eisenberg et al., 2001) and is a better predictor of empathy than binary gender is (Karniol et al., 1998). For adolescent boys, adherence to masculine norms is related to lower self-rated prosocial behaviour (Nielson et al., 2022). Further, teachers' ratings of their 10- to 14-year-old students' feminine gender orientation correlate with ratings of prosocial behaviour (Quenneville et al., 2022).

There are some indications that gender role conceptions and identification play a part in children's prosocial behaviour as well. Ten-year-old girls who rate themselves as low in gender conformity (i.e., less feminine than other girls) are also rated as less prosocial by their peers (Pauletti et al., 2014). Already by 3–5 years, boys with less rigid gender stereotypes are more likely to engage in prosocial behaviours, such as cooperating, sharing, and helping (Doescher & Sugawara, 1990), and boys from 6 years of age with stronger gender stereotypes about communal values being feminine endorse these values less themselves and are less interested in engaging in communal activities (Block et al., 2025). Further, an experimental study showed that preschool-aged boys engaged in more instrumental helping behaviour when they were assigned to wear a feminine-typed costume than

a masculine-typed costume, while costumes had no effect on girls' helping (Coyne et al., 2021). Together this suggests that children's expectations about gender-typed behaviour and roles likely feed into the gender differences in their behaviour, and could even influence how they think about their identity.

Current study

In the current study, we set out to investigate whether children's prosocial behaviour is related to nuances in their gender identification – over and above any effects of their categorical, binary gender – as a way of examining more closely the relationship between gender and prosocial behaviour in young children. To assess prosocial behaviour, we used behavioural tasks, rather than ratings, to remove the possibility for gender bias in how their behaviour is interpreted (e.g., by their parents or preschool teachers). Specifically, children participated in an anonymous costly sharing task and a task to elicit empathy and comforting. To assess gender identification, we built on previous research indicating that children can meaningfully express their gender identity using continuous scales. In one study, 5-to-9-year-olds selected between options of self-group overlap depicted with circles for multiple items tapping into similarity to own and other gender (e.g., behaviour, appearance, felt similarity) (Martin et al., 2017). The items were collapsed into factors for own- and other-gender similarity which were inferred to represent children's gender identification. A similar task was developed to be more appropriate for younger children with just one continuous scale from 'girl' to 'boy' for children to mark how they identified. In this one-dimensional task, children as young as 3 years were able to rate their identity in a way that was stable over time and which correlated with their gender-typed preferences and felt similarity to girls and boys (Gülgöz et al., 2022). Here, we combine aspects of these two methods to allow both boys and girls to express masculine and feminine identification using two continuous dimensions. Then, we examine whether these responses predict different aspects of prosocial behaviour. If so, this would indicate that preschool-aged children not only see prosocial behaviour as associated with gender, but also that their tendency to engage in prosocial behaviour is tied to their gender self-view, and further that these relations have nuance beyond a binary categorization of gender.

We focused on 5-year-olds because at this age children are likely to have a stable sense of their gender identity, yet their ideas about gender and gender roles are still developing and becoming stronger between 3 and 6 years (Martin & Ruble, 2010). The study was conducted in Sweden, a country with relatively high gender equality (2024) and where preschools (which nearly all children of this age attend) have explicit goals for gender-equal treatment of children in the national curriculum (2018). Yet, there are still

inequalities in Sweden and past research has shown levels of gender stereotype knowledge and preferences on par with other western countries (Shutts et al., 2017).

In sum, the current study's main research questions are first, whether children express gender identification beyond binary categories and second, whether children's continuous gender identification predicts their prosocial behaviour, as assessed in experimental tasks. We hypothesized that children would identify more strongly with the same gender than other gender (H1); and that, when controlling for binary gender, children's own continuous gender identification would predict their prosocial behaviour as assessed by costly sharing (H2); and empathic responses and comforting behaviours (H3), such that greater identification with girls or less identification with boys would be associated with greater prosocial behaviour.

Method

Participants

The sample included 54 5-year-old children (range = 4 years, 11 months to 5 years, 7 months, $M = 5$ years, 2 months; 28 girls, 26 boys). An a priori power analysis using G*power software (Faul et al., 2007) indicated that for linear regression models with three predictors and medium effect size ($f^2 = 0.2$ to 0.24) expected, a sample of 50 to 60 participants would be sufficient for power of 0.80. Participating parents and children were recruited from a database of families who previously reported interest in participating in research. We did not have ethical approval to collect data on children's race/ethnicity or socioeconomic status, but participating families were primarily White, educated, and residing in a medium-sized city in Sweden. Written informed consent was obtained from parents before the study and verbal assent was provided by children before participation. Before recruitment or data collection, the study was approved by the local ethical review board (Etikprovningsnämnden: Dnr 2018-494). Data was collected between April 2022 and November 2022.

Material and procedure

Children were tested individually in a university lab setting with one of the three women acting as the experimenter. After explaining the study and obtaining consent, the experimenter took the child and their accompanying parent to a quiet room where the child sat across from the experimenter at a table and the parent sat behind the child, so they would not be a distraction. The procedure took approximately 15 minutes.

Participants' *binary gender* was indicated by caregivers on the consent form for study participation. *Gender identification* was assessed using ratings from children on two continuous scales: one for identification with boys and one for identification with girls. To introduce and ensure that the participants understood the task, each testing began with establishing the paradigm using different types of birds (see Supplementary Methods for a detailed description of the training, https://osf.io/p9jbd/). A yellow circle with a diameter of 12 cm was placed on the table in front of the child and the experimenter explained 'imagine that this circle represents all birds'. Adjacent to the circle was a 50-cm-long scale marked subtly with numbers ranging from 0 to 10, and with the yellow circle placed at 10. The experimenter introduced three different birds (crow, penguin, and flamingo) one at a time, placing them on the scale to demonstrate how they identify (e.g., the crow identifies strongly with birds, while the penguin does not). The experimenter emphasized that there are no right or wrong answers, it is how one 'feels' that is important. As a test of the participants' understanding of the paradigm, the participants were given additional birds to place. All participants were able to reason hypothetically from the birds' point-of-view and motivate their placements. The experimenter then removed the bird pictures and said that the circle now represents 'all children', and presented the small green circle saying 'and this is you. How would you place yourself if the circle is all other children? Do you feel a lot like other children, not a lot, or somewhere in between' while gesturing to the scale. This question was used to familiarize children with placing themselves on the scale and to deemphasize binary gender as being the target of the task. The experimenter repeated the task for the two questions of interest: 'all boys' and 'all girls'. The child's response was coded from 0 to 10, depending on where they placed the green circle, with 0 representing the lowest possible identification and 10 representing the highest possible identification with the corresponding group. The scale that matched the child's binary gender was always presented before the other gender scale.

To assess *comforting* and *empathic responses*, the experimenter pretended to hurt her foot by bumping it into the table leg saying 'ouch, I hurt my foot', while holding her foot and not looking at the child. After 20 seconds, the experimenter declared that she was okay. A video recording of the participant during this 20-second episode was coded for comforting behaviour and empathic responses. Specifically, comforting was coded as in Paulus and Leitherer (2017) from 0 to 2 points, with 0 indicating no comforting behaviours, 1 indicating some attempt at comforting (e.g., responses such as 'it's okay', and 2 indicating more significant comforting (e.g., active behavioural response or verbalizations that offer help). Empathic emotional response was coded as in Sticker et al. (2021) from facial expressions and body language on a scale from 0 to 6 with 0 indicating that the child was not affected at all, 2

indicating a low level of response (e.g., freezing in body posture or facial expression), 4 indicating moderate response (e.g., a facial expression with open mouth and raised eyebrows), and 6 indicating a strong response (e.g., a very concerned facial expression). Twenty-four of the videos (44%) were coded by a second coder and intraclass correlation coefficients indicate good reliability for both comforting (*ICC* = .72) and empathic responses (*ICC* = .74). The main coder's scores were retained in cases of disagreement with the second coder.

To assess *costly sharing*, we used a task identical to the one described in Hellmer et al. (2022). The experimenter gave 10 marbles to the participant as a gift for participation. Marbles were selected for this task because of their lack of gender-stereotypical association and that they have been used successfully in similar studies (Atance et al., 2017; Hellmer et al., 2022; Martin-Ordas, 2018). The experimenter then pretended to realize that those were the last marbles and that she could not give any to the next participant who was described without gender cues (i.e., 'another child'). The participant was then told that they could donate some of their marbles to the next participant by placing them in a cardboard box with a lid while the experimenter and the caregiver went over some papers and were not looking. The experimenter explained that all the marbles were theirs to keep, that sharing was optional, and that neither the experimenter nor their caregiver would see their decision. Costly sharing was coded from 0 to 10 corresponding to the number of marbles left in the box.

Results

Descriptive statistics for gender identification and prosocial behaviours are displayed in Table 1. All raw data and analyses, based on jamovi software (The jamovi project, 2022), can be found in the supplementary materials on OSF (https://osf.io/p9jbd/).

We first examined how gender identification varied by children's binary gender to ensure that the measure was able to capture both group differences between boys and girls as well as variations within gender groups. A repeated measures ANOVA with identification response (0 to 10)

Table 1. Descriptive statistics.

	All children				Boys				Girls			
	Min	*Max*	*M*	*SD*	*Min*	*Max*	*M*	*SD*	*Min*	*Max*	*M*	*SD*
Identification with girls	0	10	5.48	3.33	0	10	4.42	3.71	1	10	6.39	2.73
Identification with boys	0	10	5.73	3.55	1	10	7.83	2.87	0	10	3.93	3.09
Comforting	0	2	0.33	0.59	0	2	0.39	0.70	0	1	0.27	0.45
Empathic response	0	6	2.88	1.29	0	6	2.88	1.34	1	6	2.88	1.28
Costly sharing	0	10	2.38	2.78	0	10	1.96	2.84	0	10	2.75	2.73

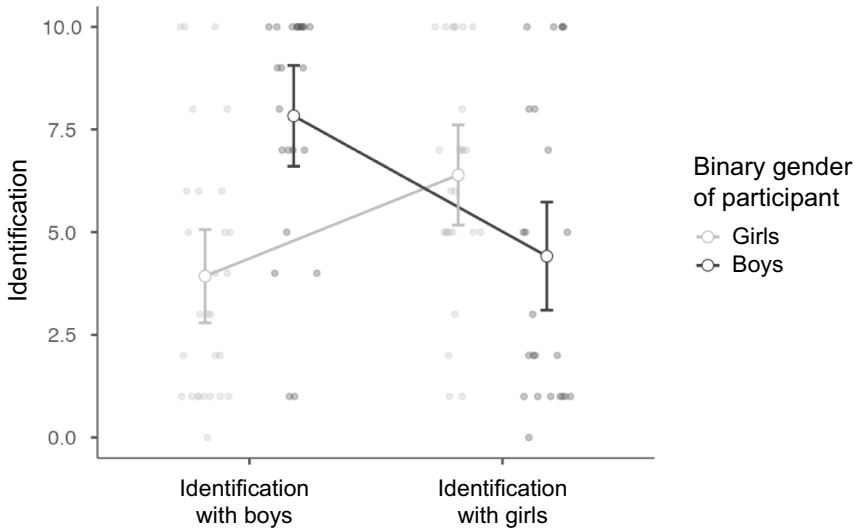

Figure 1. Girls' and boys' self-rated identification with girls and boys. Error bars indicate 95% confidence intervals and dots indicate individual children's responses.

as dependent variable, the scale children were responding to (identification with boys or with girls) as the repeated factor, and child's binary gender (between-subjects) revealed the expected interaction between binary gender and gender identification scale ($F(1,50) = 22.97$, $p < .001$, partial $\eta^2 = .31$; Figure 1). Bonferroni corrected post-hoc tests show that children's own-gender identification was stronger than their other-gender identification (boys: $t(50) = 3.79$; $SE = 0.90$; $p = .002$; girls: ($t(50) = -2.95$; $SE = 0.83$; $p = .029$), supporting our first hypothesis. Additionally, boys identified significantly more with boys than girls did ($t(50) = -4.69$; $SE = 0.83$; $p < .001$), but did not identify less with girls than girls did ($t(50) = 2.21$; $SE = 0.89$; $p = .190$). There were no group differences between boys and girls regarding levels of identification with same gender ($p = .604$) or other-gender children ($p = 1.000$).

To address our main research question about how gender relates to prosocial behaviours, we first examined correlations between children's gender identification responses and the prosocial measures for all children together (Table 2) and for girls and boys separately (Table 3). In the full sample, there was a negative correlation between identification with boys and costly sharing (Spearman's rho = −0.29, $p = .04$). There was also a positive correlation between costly sharing and comforting (Spearman's rho = 0.31, $p = .03$). For girls, there were no significant correlations, while for boys, there was a negative correlation between identification with boys and costly sharing (Spearman's rho = −0.44, $p = .04$, Figure 2).

Table 2. Spearman's rho correlations for all participants.

Correlation Matrix					
	1	2	3	4	5
1. Identification with boys	—				
2. Identification with girls	−0.15	—			
3. Comforting	0.07	−0.00	—		
4. Empathic response	0.03	0.02	0.13	—	
5. Anonymous sharing	−0.29*	−0.04	0.30*	0.15	—

*$p < .05$.

Table 3. Spearman's rho correlations for girls and boys separately.

	1	2	3	4	5
1. Identification with boys	—	0.23	0.07	−0.06	−0.44*
2. Identification with girls	−0.32	—	−0.18	−0.06	−0.12
3. Comforting	0.15	0.07	—	0.01	0.28
4. Empathic response	0.09	0.14	0.29	—	0.28
5. Anonymous sharing	0.03	−0.22	0.30	0.09	—

Correlations for girl participants are below the diagonal and those for boy participants are above the diagonal. *$p < .05$.

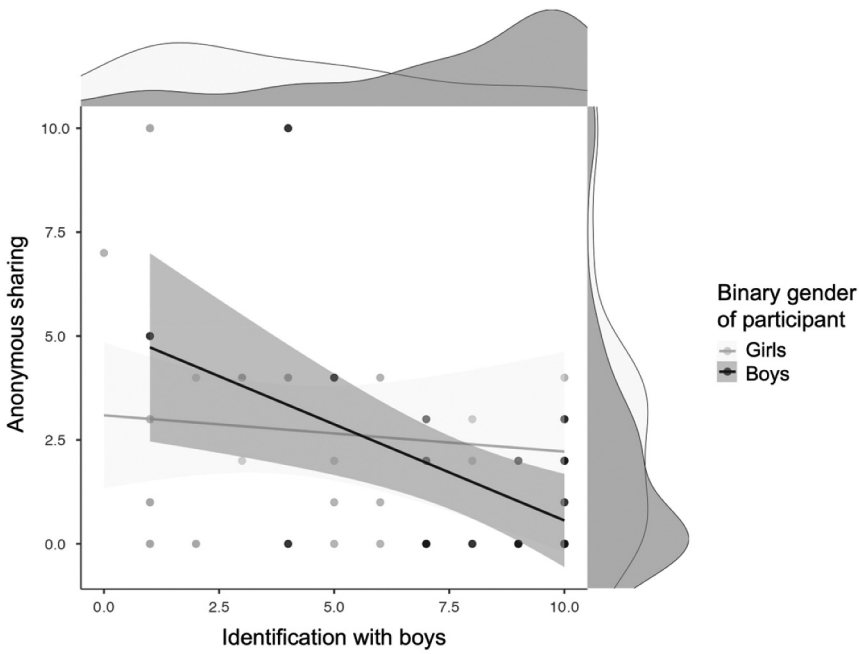

Figure 2. Correlations between anonymous sharing and identification with boys for boys and girls. Shaded regions around the regression line indicate standard error; densities for each variable are displayed on the top and right sides of the plot. Points indicate data for one or more participants.

Table 4. Bayesian model comparison for anonymous sharing.

Models	P(M)	P(M|data)	BF_M	BF_{10}	R^2
Identification with boys	0.13	0.42	5.02	1.00	0.12
Identification with boys + Identification with girls	0.13	0.15	1.23	0.36	0.13
Gender + Identification with boys	0.13	0.14	1.16	0.34	0.12
Null model	0.13	0.10	0.75	0.23	0.00
Gender	0.13	0.07	0.56	0.18	0.05
Gender + Identification with boys + Identification with girls	0.13	0.06	0.48	0.15	0.13
Gender + Identification with girls	0.13	0.03	0.21	0.07	0.05
Identification with girls	0.13	0.03	0.20	0.07	0.00

Models presented in order from most to least likely.

We followed the correlational analyses with Bayesian linear regression analyses that compute model comparisons to determine which possible model best explains the data. Bayesian model comparison differs from frequentist regression in that it evaluates the relative plausibility of multiple models rather than focusing solely on individual predictor estimates. Specifically, for each prosocial behaviour (costly sharing, comforting, empathic response), an analysis was run with the two continuous gender identification responses and binary gender included to determine which gender measures were most predictive of prosocial behaviour. The P(M) values were equal across models because we assigned equal prior probabilities, meaning no model was favoured before seeing the data.

For costly sharing, the most likely model was the one with only identification with boys as a predictor (P(M|data) = 0.42, $BF_M = 5.02$, $R^2 = 0.12$; Table 4 shows the full list of models). However, this does not mean other predictors have no relationship with sharing, only that they did not improve model fit enough to warrant inclusion. As in the correlational analyses, identification with boys was associated with less sharing ($M = -0.23$, $SD = 0.09$, *95% credible interval* = [−0.41, −0.04]), supporting our second hypothesis.

For children's comforting behaviour and their empathic response to the experimenter, our third hypothesis was not supported. That is, the null models, those with no predictors, were the most likely model in each case (Comforting: P(M|data) = 0.42, $BF_M = 5.05$, $R^2 = 0.00$; Empathic response: P(M|data) = 0.44, $BF_M = 5.57$, $R^2 = 0.00$), indicating that neither binary gender nor continuous gender identification was predictive of children's comforting behaviour or empathic response. Detailed model results are in the supplementary materials.

Discussion

In the current study, we examined whether Swedish 5-year-old children's prosocial behaviour in controlled tasks was predicted by their continuous gender identification with boys and girls, as well as their binary gender. The findings for costly sharing revealed that children's

identification with boys predicted how many of their marbles they shared, such that there was less generous sharing among children with greater identification with boys, supporting our second hypothesis. Importantly, this effect was significant despite the presence of binary gender as a potential predictor, indicating that the relationship cannot be explained by binary gender differences in costly sharing. We also observed in the correlation analyses that the relationship between identification with boys and costly sharing appeared stronger for boys than for girls.

For comforting and empathic emotional responses – we saw no differences for continuous gender identification or binary gender, thus our third hypothesis was not supported. It is a limitation, however, that children's responses on these tasks did not show a lot of variability, which could have made it more difficult to uncover potential relationships. Future research could use a broader range of prosocial behaviour tasks to try to obtain more robust findings.

In line with our first hypothesis, children in our study were able to express their gender identity on two independent scales for identification with boys and identification with girls, replicating and extending recent work that have also attempted to capture young children's gender identity beyond categories (Gülgöz et al., 2022; Martin et al., 2017). Overall, the pattern of responses was as expected, with girls rating themselves as higher on identification with girls than with boys and vice versa for boys. Interestingly, girls did not rate themselves as significantly higher on identification with girls than boys did, suggesting that girls may be somewhat reluctant to express a strong identification with other girls. While it is difficult to interpret a null result, this finding is in line with similar research on older children's ratings of same-gender similarity in which school-age girls tend to score lower than boys, i.e., they rate themselves as less similar to other girls than boys rate themselves as similar to other boys (Tam & Spears Brown, 2020; Xiao et al., 2022). Importantly, the development of these gender scales is a methodological advance which allows children to express gender identity beyond simple binary categories, with the possibility to add nuance to a categorically binary identity (e.g., rating higher on identification with girls than with boys, but not at the extremes of the scales), as well as to express a completely non-binary identity (e.g., by giving the same rating to both scales) or an agender identity (e.g., by rating 0 on both scales). Thus, the measure and has critical implications for developmental science to be able to more accurately represent children's gender in future research. That said, the scales are still based in a relatively normative view of gender being expressed in relation to the two genders of 'girls' and 'boys' and it is possible that there could be additional benefit to allowing children to express their identification with children who 'don't identify as boys or girls' as a third scale.

Given the meta-analytic results on gender differences in sharing (Fabes & Eisenberg, 1998), it is somewhat surprising that we did not find group-level differences by binary gender in our costly sharing task. However, it is perhaps more revealing and a greater novel contribution to uncover behavioural differences related to continuous gender identification as it gives more insight into the relationship between children's self-view and the gender-typed behaviours in which they engage. The results suggest that identity and behaviour could be closely linked and mutually influential through development, as proposed by the Gender Self Socialization Model (Tobin et al., 2010). That is, given that children of this age have some sense of gender stereotypes for prosocial behaviour, it could be that children's stronger or weaker identification with boys leads them to act in ways aligned with that identity and thus to give away fewer or more of the marbles they received. It could also be that children reflect on their own behaviour as a way of informing their identity, in that children who share more or less generously then think of themselves as less or more strongly identifying with boys.

The result for costly sharing and gender identification with boys also has an interesting parallel to the study revealing that adult men are less likely than women to show generosity when it is costly to themselves (Andreoni & Vesterlund, 2001). Given that sharing of marbles in our study involved sacrificing one's own reward for another, it follows that refusing to give up one's marbles in this situation would be associated negatively with identification with boys, yet it is not clear however why we did not observe the complementary positive relation with identification with girls. It could be that masculinity and not sharing has a stronger association for children of this age than femininity and sharing, particularly for boys, among whom the effect was stronger. However, it is also possible that the assessment of identification with girls did not have sufficient variability to reveal an effect, given that fewer children rated themselves as high on identification with girls than high on identification with boys.

The current study is limited somewhat by focusing only on one time point in development. Future studies could examine mechanisms behind gender identity development and prosocial behaviour using a longitudinal design to examine how gender identity and prosocial behaviour relate over time. A further point for future research would be to examine similar effects in different cultures. Since Sweden is known for having fairly progressive gender attitudes, greater gender differences could be observed in other cultures with stronger gender norms – though note that preschool-aged children in Sweden show gender stereotypes and gender-typed play preferences to a similar degree as children in the United States (e.g., Shutts et al., 2017). Finally, examining a broader range of prosocial behaviours and

including teacher reports of prosocial behaviour could also help create a more complete, robust picture of what aspects of prosocial behaviour are related to gender identity.

Another limitation is that we did not assess children's beliefs about prosocial behaviour being gender-typed. However, previous research suggests that children of this age do indeed hold such beliefs (Block et al., 2025; Hine & Leman, 2013) and theoretical accounts of gender development have suggested that such beliefs are developed in conjunction with developing identity and behavioural choices, such that it is possible to see connections between identity and behaviour before strong stereotypes have formed (Tobin et al., 2010).

Together, this study sheds new light on how nuances in children's gender identity relate to their gender-typed behaviour, in this case, anonymous, costly sharing. Children who identify more with boys show less generous sharing with an anonymous recipient, suggesting that internalized norms about sharing and gender are already apparent in children's behaviour and self-concept at 5 years of age. Future research can more fully explore the developmental trajectory of this relationship and prosocial behaviours more broadly.

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Data availability statement

All supplemental materials, raw data, and analyses can be found on OSF (https://osf.io/p9jbd/).

Open scholarship

This article has earned the Center for Open Science badges for Open Data and Open Materials through Open Practices Disclosure. The data and materials are openly accessible at (https://osf.io/p9jbd/).

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