

# A burden for the boys: Evidence of stereotype threat in boys' reading performance

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#### Abstract

There is ample evidence that Stereotype Threat (ST) contributes to gender differences favoring males on standardized math tests; however, whether ST also contributes to gender differences favoring females in reading remains unanswered. This is surprising as the gender gap in reading is three times bigger than the gender gap in math (OECD, 2014). In this study, we examined whether ST may explain gender differences favoring schoolgirls in reading, assuming that boys are negatively stereotyped in this domain. Eighty students (3rd grade) took a reading test while being assigned to either a threat or a reduced-threat condition (test presented as diagnostic of reading abilities versus as a game, respectively). Boys underperformed girls in the threat condition, whereas they outperformed girls in the reduced-threat condition. Consistent with ST theory, this pattern was obtained only among highly-identified students. These findings offer another explanation for the well-known gender gap favoring girls in reading.

Key words: Stereotype threat; children; reading performance; gender differences

### A Burden for the Boys:

Evidence of Stereotype Threat in Boys' Reading Performance

Data collected by the Organisation for Economic Co-operation and Development (OECD)'s (2014) Program for International Student Assessment—PISA<sup>1</sup> (children from 34 OECD countries plus 41 partner countries), show that boys outperformed girls in math by an average of 11 points. Girls, however, outperformed boys in reading in every participating country and by an average of 38 points, the equivalent of an average school year's progress (See also Retelsdorf, Schwartz, & Asbrock, 2015; Stoet & Geary, 2013). Girls also read more frequently than boys, they have more positive attitudes about reading, higher reading motivation, and greater self-assurance about their reading skills than boys have (McGeown, Goodwin, Henderson & Wright, 2012; Hedges & Nowell, 1995; Logan & Johnston, 2009; Reilly, 2012; Stoet & Geary, 2013). Although one may assume there to be intrinsic gender differences favoring females in reading ability and motivation, such intuitive accounts can be challenged by the role of the negative stereotype targeting boys in reading (Frome & Eccles, 1998; Hyde & Kling, 2001; Martinot, Bagès, & Désert, 2012; Retelsdorf et al., 2015).

Considerable research indicates that the threat of confirming a negative stereotype about one's group interferes with cognitive processes and leads to underperformance and stereotype confirmation (Régner, Smeding, Gimmig, Thinus-Blanc, Monteil, & Huguet, 2010; Steele, 1997; Steele & Aronson, 1995; Schmader, Johns, & Forbes, 2008). Nevertheless, most stereotype threat (ST) studies have addressed the gender gap in math favoring males, leaving the gender gap in reading favoring females unexplored. This is surprising because the gender gap in *reading* is three times the size of the gender gap in math. Some studies have examined the impact of the verbal-gender or academic achievement stereotypes, which both favor females, using explicit, if not directional, activation of those stereotypes. For example, participants were told that "gender differences are expected" or "girls are expected to do better than boys" (Hartley & Sutton, 2013; Keller, 2007; Seibt & Foster, 2004). No study has examined the specific impact of the reading-gender stereotype using subtle/implicit and nondirectional activation.

Here, we examine this impact in children, a population who have not received sufficient attention in ST research (with exceptions in the math domain, see Ambady, Shih, Kim, & Pittinsky, 2001; Huguet & Régner, 2007, 2009; for a review see Régner et al., 2014), and we took into account their level of identification to reading. In adults, ST effects are typically stronger among individuals who highly identify with a subject matter, those who have much to lose in the event of poor performance (Steele, 1997; Walton & Cohen, 2003). Whether this also applies to children remains an unanswered question. Assuming that children may identify more or less with basic academic subjects such as reading, we expected 1) boys to underperform relative to girls under ST, while performing equally well in a reduced-threat condition; and 2) highly-identified students to be the most susceptible to ST effects.

#### Method

## **Participants**

Participants were 80 third graders (9 years old, 48 boys) from four classes across three public elementary schools. All were French native speakers and were normal-readers, as assessed by the Alouette standard reading test (Lefavrais, 1967), with normal nonverbal intelligence, as assessed by Raven's Progressive Matrices (Raven, Raven, & Court, 1998). All children, parents, and teachers were given the opportunity not to participate (none refused). Consent and permission from all appropriate authorities were obtained.

### Procedure

Children first took a standard reading test ("la pipe et le rat"; Lefavrais, 1986) designed to measure the recognition and comprehension of written words in children aged 6 to 20 years. This test is one of the few French tests assessing silent reading that can be administered in classroom settings (Colé, Blaye & Duncan, 2014). Children took the test in their ordinary classroom setting. The experimental conditions were implemented at the classroom level, so that all the students in a specific class were randomly assigned to either the ST or reduced-threat condition. There were two classes in each condition. In the stereotype-threat condition, children were told by the experimenter (supposedly a reading teacher) that the task was a reading test designed to evaluate their "ability in reading". In the reduced-threat condition, children were told by the experimenter (supposedly a game designer) that the task was a new game called "the animal-fishing game" designed for a fun magazine. In both conditions, the test consisted of a silent reading task in which children had to underline under time pressure (3 min) as many animal names as possible in a list of 486 words half of which were animal names. Following the standard scoring system for this silent reading test (Lefavrais, 1986, p.18), children's performance was the number of animal names correctly underlined within 3-min, minus the total number of errors (words wrongly underlined and animals' names not underlined).<sup>2</sup>

After the reading test, children answered a series of questions about the test, including how important reading was to them (self-identification). All responses were made using 5-point scales with endpoints labeled strongly disagree (1) and strongly agree (5). Children indicated how interesting and difficult the test was ("I found this activity very interesting", "I found this activity difficult") and they evaluated their performance ("I did well in this activity"). To measure children's identification with reading, they answered two questions "Doing well on reading tasks is very important to me" and "I think it's very important to be good at reading" (r(75) = .46, p < .001). The mean response to these two items was computed, and higher scores indicated higher identification to reading. Descriptive statistics for all variables are presented in Table 1.

#### **Analytical strategy**

Although conceptually, the present data constituted a multilevel data structure (students nested within classrooms), we used Ordinary Least Squares regression analyses in which students were the unit of analysis. The primary reason for this was that four classes were not enough to estimate the parameters of the multilevel models that would be needed to test our hypotheses of interest using multilevel modeling (Nezlek, 2011, pp. 64-65). That being said, the means for the prime individual difference measures did not vary meaningfully across the classes (see text S1).

In our analyses, children's performance was regressed on gender (male= 1, female= -1), condition (reduced-threat = 1, threat = -1), identification to reading (mean-centered), and their interactions. This model was tested while controlling for children's level in reading (mean-centered) as assessed by the Alouette test, and its interaction with condition (Yzerbyt, Muller, & Judd, 2004). Our hypotheses led us to expect a Gender by Condition interaction, itself moderated by students' level of identification to reading. Testing this 3-way interaction implied that identification to reading (the moderator) was unaffected by Gender, Condition, and their interaction, which was indeed the case (Fs < 1; ps > .25).

Three participants were removed from this analysis, two with missing data (on either the covariates or the moderator) and one outlier (standardized residual exceeding +2.5), resulting in a sample of 77 participants. This sample size was adequate for the present analysis. It was determined a priori, as recommended by Tabachnick and Fidell (2007), on the basis of the desired power (.80), alpha level (.05), number of predictors (9 in the main analysis using covariates, 7 without), and anticipated size of the ST effect. Since the size of the ST effect was unknown in the reading domain, we used that found in math by Walton and Cohen's meta-analysis (2003) where  $f^2$  is around .25 in highly identified participants. Soper's sample size calculator (Soper, 2013) indicated that the minimum required sample size for our multiple regression analysis was 72 (our initial sample size was slightly higher).

#### Results

## **Task performance**

As expected, the Gender by Condition interaction was significant, b = 4.12, t(67) = 2.81, p = .006 (95% CI = [1.20, 7.05]), which was due to a ST effect unfavorable to boys. Boys underperformed relative to girls under threat condition ("reading test"), b = -4.87, t(67) = -2.63, p = .011, whereas they performed as well as girls in reduced-threat condition ("game"), b = 3.37, t(67) = 1.48, p = .143. It is noteworthy that girls' performance was not significantly higher in the Threat condition than in the Reduced-Threat condition, b = -2.53, t(67) = -1.14, p = .258, indicating the absence of stereotype lift effect (a performance boost caused by the awareness that an outgroup is negatively stereotyped; Walton & Cohen, 2003).

More importantly, as expected, the 2-way interaction was moderated by children's level of identification to reading, b = 3.62, t(67) = 2.24, p = .028 (95% CI = [.40, 6.85]) (see Figure 1). This 3-way interaction was examined by estimating simple slopes for children low (-1 SD) and high (+1 SD) on the moderator, identification to reading (Preacher, Curran, & Bauer, 2006). As expected, only highly-identified children experienced ST: whereas boys underperformed relative to girls under threat condition, b = -6.70, t(67) = -2.36, p = .021, the reverse pattern occurred in the reduced-threat condition where boys performed better than girls, b = 8.17, t(67) = 2.87, p = .006 (Panel A). This crossover interaction also revealed a significant stereotype lift effect for highly identified girls, who performed better in the Threat condition than in the Reduced-threat condition, b = -6.01, t(67) = -2.18, p = .033. No significant differences were found for low-identified children, ps > .25 (Panel B). All these findings remained after controlling for children's level in reading and its interaction with condition.<sup>3</sup>

#### Perceptions of the task and self-evaluations of performance

Children's perceptions of the tasks and self-evaluations of performance were analyzed with a series of 2 (Gender) x 2 (Condition) ANOVAs. No significant effects were found for children's interest in the task and their perception of task difficulty. On average, children reported that the task was very interesting (M = 4.48; SE = .11) and relatively easy (M = 1.65; SE = .16). A significant Gender by Condition interaction occurred in the analyses of children's self-evaluation of performance, F(1, 73) = 14. 15, p < .001,  $\eta_p^2 = .16$  (See Figure 2). Although both boys and girls evaluated their performance positively, consistent with previous research, in the threat condition boys evaluated their performance less positively than girls did, F(1, 73) = 4.35, p < .04,  $\eta_p^2 = .06$  (boys: M = 4.15; SE = .19; girls: M = 4.71; SE = .18). In contrast, in the reduced threat condition, boys evaluated their performance *more* positively than girls did, F(1, 73) = 10.08, p < .01,  $\eta_p^2 = .12$  (boys: M = 4.96; SE = .16; girls M = 4.00; SE = .25).<sup>5</sup>

#### Discussion

The present findings are the first to show that in children stereotypes about gender differences in reading may impair boys' reading performance. One may argue that boys' lower reading performance in the threat condition simply reflected lower motivation; however, such an explanation cannot be reconciled with the fact that boys' underperformance was restricted to those highly motivated by reading activities. These findings offer a new explanation for the well-documented gender gap favoring girls in reading (OECD, 2014), suggesting that this gap may reflect boys' fear of confirming the negative stereotype about their gender group in reading, rather than intrinsic gender differences favoring females in reading ability and motivation.

It is noteworthy that when looking at the whole sample (without taking into account students' level of reading identification), the reduced-threat condition appeared to cancel the gender gap. Boys and girls performed similarly in the reduced threat condition. Nevertheless,

when level of reading identification was taken into account, in the reduced-threat condition highly identified boys outperformed highly identified girls, whereas in the threat condition highly identified girls outperformed highly identified boys. This crossover interaction reflects the presence of both ST in boys and stereotype lift in girls. Moreover, there were no effects (threat or lift) for children who were not highly identified. These findings support previous research showing that stereotype lift effects, although typically lower in magnitude than ST effects (Walton & Cohen, 2003) are more likely (just as ST effects are) among individuals highly identified to the domain (Aronson et al., 1999; Walton & Cohen, 2003).

Of particular interest was that both ST and lift effects were obtained using a subtle/implicit (rather than explicit and directional) activation of the reading gender stereotype, suggesting how powerful this stereotype can be. This lends further support to the conclusion that the prominent gender gap in reading is at least partially rooted in a negative stereotype targeting boys in reading. Our findings for elementary school children suggests that this stereotype operates at the early stages of students' academic life during which learning to read is critical.

One potential limitation of the present study is that were not able to take into account possible classroom level effects. With only four classes, we were not able to conduct the types of multilevel analyses that could have examined such possibilities. To do this we would have had to have many more individual classes, perhaps 50 to 100, that were randomly assigned to the Threat *vs*. Reduced threat conditions. Nevertheless, ST effects have proved to be powerful influences on students, and although ST effects may be stronger in some classes than in others, it seems likely that they exist to some extent, probably a meaningful extent, in all or most classes.

Of course, the present findings do not address all facets of reading literacy, but invite further research in this direction. Such research could help to understand which of the dimensions typically investigated by PISA (e.g., interpret and integrate texts, reflect and evaluate texts) are affected by the reading-gender stereotype. Similarly, our findings suggest that it would be useful to conduct longitudinal studies to identify the time-course of ST effects from the first to the last stages of learning to read. For example, it is not known if ST effects persist after reading is mastered. Given the importance of reading literacy in modern society, answering such questions is critical. Understanding, using, and reflecting on written texts is crucial to developing one's knowledge and potential and to participating in society. Further research focusing on the effects of ST on reading literacy therefore merits attention.

#### Footnotes

<sup>1</sup>Every three years since 2000, the Programme for International Student Assessment (PISA) has tested fifteen-year-old students from randomly selected schools worldwide in reading, mathematics, and science, with a focus on one subject each year. PISA is unique as it provides internationally comparable measures of student achievement.

<sup>2</sup> Students made very few errors (M = .87, SD = 1.04). Analyses of the number of items correct provided the same results as those we report.

<sup>3</sup> Simple slope analysis also indicated that in the reduced-threat condition highly readingidentified girls significantly underperformed relative to low identified girls, b = -7.71, t(67) = -2.19, p = .032.

<sup>4</sup> In contrast to the ST effect on performance, the ST effect on self-evaluation was not moderated by identification to reading. In addition, self-evaluation did not mediate the ST effect on performance, because the relationship between self-evaluation and performance was not significant.

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	Girls	Boys	1	2	3	4	5	6
1-Reading performance	41.91 (16.45)	38.60 (12.79)		.06	36*	11	03	.33*
2-Task interest	4.31 (1.03)	4.67 (.80)	.29		.19	.20	.45**	06
3-Task difficulty	1.58 (1.36)	1.78 (1.31)	06	.09		.10	03	25
4-Self-evaluation	4.47 (.95)	4.62 (.89)	01	.67***	.08		.36*	23
5-Reading identification	4.47 (1.14)	4.47 (.73)	25	.09	.11	.27		15
6-Reading level <sup>†</sup> (covariate)	102.94 (13.89)	98.29 (10.77)	.66***	.18	23	.04	17	

Table 1. Summary of Means (Standard Deviations) and Intercorrelations for Girls (below the diagonal) and Boys (above the diagonal)

Note: \*p < .05. \*\*p < .01. \*\*\*p < .001. <sup>†</sup> Lexical age in months.

# **Figure Captions**

*Figure 1*. Reading scores as a function of Threat condition and Gender, for children with a low (left panel) and high (right panel) level of Identification to reading.

Figure 2. Self-evaluation scores as a function of Threat condition and Gender.

Note: Error bars represent standard errors.



