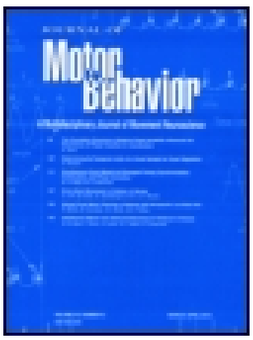

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*RESEARCH ARTICLE*

# Gender Stereotype Threat Undermines Dance Performance and Learning in Boys

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**ABSTRACT.** The objective of the present study was to examine the effects of gender stereotype on the performance and learning of a classical ballet pirouette in 11-year-old boys. Participants in the stereotype threat (ST) group were informed that, in general, boys tend to show worse results when completing the pirouette task in comparison to girls. Participants in the stereotype lift (SL) group were told that girls tend to show worse results in comparison to boys. The control group did not receive stereotype instructions. The results demonstrated worse performance during practice and retention (next day) for the ST group relative to the SL and control groups; the SL and control groups did not differ. The findings indicate that gender stereotype threat can undermine motor performance and learning in boys.

*Keywords:* stereotype threat, motor learning, competence, child, dance

## Introduction

Stereotypes are defined as beliefs about personal characteristics and behaviours of a group of people who share similar attributes (Chalabaev & Sarrazin, 2020). Studies in different contexts have shown that individuals who experience stereotype threat—a portending situation of being negatively stereotyped—show not only increased anxiety (Stone et al., 1999) but also reduced working memory (Beilock & Mcconnell, 2004), intrinsic motivation (Moè et al., 2015), and positive affect (Cardozo et al., 2021), thus resulting in a worsened performance (Chalabaev et al., 2013b; Chalabaev & Sarrazin, 2020) and learning (Cardozo & Chiviacowsky, 2015; Heidrich & Chiviacowsky, 2015). Conversely, other studies have shown positive effects in individuals experiencing stereotype lift (i.e., the awareness that an outside group is negatively stereotyped from social comparisons) while performing and learning different tasks such as vehicle driving (Moè et al., 2015, exp. 2), dynamic balance (Chalabaev et al., 2008b), basketball skills (Laurin, 2013), and tasks involving isometric quadriceps contractions (Chalabaev et al., 2013a).

Despite a large number of studies observing the effects of stereotype threat in different contexts and populations over the past 30 years (for reviews, see Chalabaev & Sarrazin, 2020; Lamont et al., 2015; Spencer et al., 2016), research looking the effects of stereotype in motor learning is limited. Notwithstanding, in agreement with the literature, such studies have demonstrated that motor learning can also be affected if instructions stereotypically refer to gender (Cardozo et al., 2021; Heidrich & Chiviacowsky, 2015), weight (Cardozo & Chiviacowsky, 2015; Rabeinia et al., 2021), or age (Chiviacowsky et al., 2018).

Regarding gender stereotypes, research has prioritised understanding the effects mainly in women, with few experiments examining the same effects in men. Women's motor performance and learning are, in fact, both negatively affected when threatened, with such phenomena observed in the performance or learning of tasks such as soccer dribbling (Chalabaev et al., 2008a; Heidrich & Chiviacowsky, 2015), golf putting (Stone & Mcwhinnie, 2008), car driving (Moè et al., 2015), basketball shooting (Hively & El-Alayli, 2014; Laurin, 2013), and tennis (Hively & El-Alayli, 2014). Heidrich and Chiviacowsky (2015), for example, found worsened motor performance and learning, and lower levels of self-efficacy when women practiced soccer dribbling after receiving an instruction stating that the task involved athletic abilities such as speed and power, and that women normally perform worse than men relative to a reduced stereotype condition. In a follow-up study, Cardozo et al. (2021) demonstrated that subtle or implicit gender threats (e.g., sex of the experimenter), as well as explicit gender stereotypes, can negatively impact women's soccer performance and learning.

Notably, the few studies looking at gender stereotype effects on the male populations have not found stereotype threat effects; on the contrary, stereotype lift was observed in men (Chalabaev et al., 2008b, 2013a; Laurin, 2013). Indeed, gender stereotypes linked to sports are shared across different cultures (Plaza et al., 2017), with the belief that men possess higher skill levels compared to women (Chalabaev et al., 2013b) being predominant. Although public policy strategies have more recently been used to increase the equity of participation in the sporting context across different countries, sporting environments are still considered to be a male domain (Chalabaev et al., 2013b). Nevertheless, there is a possibility that certain motor activities or sport modalities create a situation where men experience stereotype threat and have impaired motor performance and learning. Dance, for example, involves softness and lightness in movements, which could be considered by many as a

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female motor activity (Plaza et al., 2017). In this context, a specific look at negative gender stereotypes in the male population becomes relevant.

In addition, it is still unclear whether children's motor learning is affected by different stereotypes; to our knowledge, only one study has examined such effects on motor performance and learning in this population, specifically observing overweight stereotype effects in nine-year-old girls (Rabeinia et al., 2021). The results of this study confirmed the negative impact of an overweight stereotype threat in the performance and learning of children in a stabilometer balance task.

It is commonly held that boys are more confident, participate in more sports (Findlay & Coplan, 2008), and feel more competent while engaging in physical activities than girls throughout childhood (Boiché et al., 2014). However, children begin to incorporate abstract concepts such as masculinity and femininity around the age of eight and ten years old (Eisenberg et al., 1996); thus, they are considered susceptible to gender stereotypes even at very young ages (Ambady et al., 2001). Children and adolescents have been found to perceive dance motor skills (e.g., ballet) as more gender-segregated activities than football, leading boys to encounter more psychological barriers in terms of activity choices (Mulvey & Killen, 2015). In the present study, therefore, the potential effects of gender stereotypes on the performance and learning of dance skills (in this case, the pirouette) in 11-year-old boys were verified. Observing both motor performance and learning is important, since the former informs immediate changes occurring during practice, while the latter verifies more permanent effects in behaviour resulting from the different practice conditions.

Two groups of male participants received instructions inducing different stereotypes prior to practicing. In the stereotype threat (ST) condition, instructions stated that the performance of a pirouette by boys is generally inferior to that of girls, while in the stereotype lift (SL) condition the instructions stated that performance of a pirouette by girls is generally inferior to that of boys. A third control group did not receive stereotype-related instructions. The effects of the different manipulations on the pirouette performance and learning were measured respectively immediately after the induction of stereotypes; that is, during practice, and on the second experimental day, through a retention test. We expected that boys receiving ST instructions would show inferior dance performance and learning when compared to the SL and control conditions. It was also expected that the stereotype lift group would outperform the control group.

## Material and Methods

### Participants

Forty-two male children (mean age = 11.0 years, SD = 0.58), without experience with dance, participated in the study. Based on effect sizes previously reported in a study with a similar motor learning design (e.g., $n_p^2$ = .17; see Chiviacowsky et al., 2018), the calculation of the sample size was carried out using G*Power 3.1, designed with an $\alpha$ level of 5%, effect size ($f$) of .50, and power of 80% for three groups. All participants were partially informed about the objective of the study (they were informed it involved learning a dance pirouette), and none reported any previous experience with the task. The children were recruited from a public school, provided their own assent to participate, and informed consent was obtained from their parents or guardians. The institutional review board of the authors' university approved the study (CAAE: 95016418.3.0000.5313).

### Instruments and Task

Similar to previous studies (Harter et al., 2019; Silva et al., 2017), the task required the boys to learn a pirouette en dehors from the fourth position. This movement consists of a complete rotation of the body around the longitudinal axis on one foot. The participants were not constrained to regard the ballet aesthetic or the form of the movement as a determinant of success. The goal of the task was to rotate as far as possible in a circle divided into eight equal sections drawn on the floor, with the dependent variable being the number of sections rotated (Figure 1). Participants began the execution of the pirouette with the left foot positioned in the middle of a circle. Each section of the circle represented one point, and scores were summed continuously based on the extent of the clockwise rotation on each trial, including when they complete more than one entire turn (1, 2, 3, 4, 5, 6, 7, 8, 9, … ). The scores were assigned in real time by the experimenter, considering the extent of rotation in relation to the upper body's direction at the moment of completing the movement.

### Procedure

Participants were randomly assigned to one of three groups: stereotype threat (ST), stereotype lift (SL), or a control group. The three groups received general instructions about the task and were told to rotate as far as possible in each practice trial. The participants initially performed two pre-test trials. Before beginning the 15 practice trials, participants in the ST group were informed that: "The aim of this study involves investigating differences in performance between boys and girls, where in general, boys tend to present worse results compared to girls." Participants in the SL group were informed that: "The aim of this study involves investigating performance differences between boys and girls, where in general, girls tend to have worse results compared to boys." The control group did not receive instructions related to stereotypes. Immediately after the

instruction the participants observed a video of an expert female or male model (in slow motion and at normal speed) performing a complete pirouette in a classical ballet style twice. The ST group observed a female model performing the pirouette, while the SL group observed a male model. Participants in the control group observed a video of both models.

Reminders regarding experimental manipulation were provided to the participants after the fifth, tenth and fifteenth trials. Participants of the ST group received the following information: "Just to remember that boys tend to perform worse than girls in this dance pirouette task." Participants in the SL group received the following information: "Just to remember that girls tend to perform worse than boys in this dance pirouette task." The control group did not receive reminders regarding stereotypes.

On the second day, participants performed a retention test consisting of five trials, without instructions related to stereotypes. At the end of data collection, participants were thanked and debriefed.

### Data Analysis

The punctuation scores (one-eighth of rotation as the unit of analysis) of the practice trials were averaged and analysed in a 3 (group: ST, SL, control) x 3 (blocks of five trials) analysis of variance (ANOVA) with repeated measures on the last factor. The averaged pre-test and retention data were analysed in one-way separated ANOVAs. Fisher's LSD post hoc tests were used to analyse the comparisons between pairs of observations. The alpha level for significance was set at 0.05 for all analyses.

## Results

### Pre-Test

All groups showed similar performance in the pre-test (Figure 2). No significant differences were found between groups, $F$ (2, 39) = .494, $p$ = .614, $n_p^2$ = .025.

### Practice

The groups showed distinct behaviours across the practice blocks (Figure 2). The main effect of group was significant, $F$ (2, 39) = 7.972, $p$ = .001, $n_p^2$ = .290. Post-hoc tests showed worse performance for the ST group relative to the SL ($p$ < .001) and control ($p$ = .015) groups. The main effect of block was not significant, $F$ (2, 78) = 2.803, $p$ = .067, $n_p^2$ = .067, but there was an interaction among blocks and groups, $F$ (4, 78) = 4.470, $p$ = .003, $n_p^2$= .186; the SL and control groups increasing performance across the practice blocks while performance decreased in the ST group. The difference between groups, $F$ (2, 38) = 8.549, $p$ = .001, $n_p^2$ = .310, and the interaction of blocks and groups, $F$ (4, 76) = 4.733, $p$ = .015, $n_p^2$= .199, persisted when using the pre-test result as a covariate. Follow-up one-way ANOVAs for each group demonstrated a significant main effect of block for the control group, $F$ (2, 26) = 9.088, $p$ = .001, $\eta_p^2$ = .411, with block 1 differing from blocks 2 ($p$ = .001) and 3 ($p$ = .011), but not for the SL, $F$ (2, 26) = .577, $p$ = .569, $\eta_p^2$ = .043, or the ST group $F$ (2, 26) = 1.665, $p$ = .219, $\eta_p^2$ = .114.

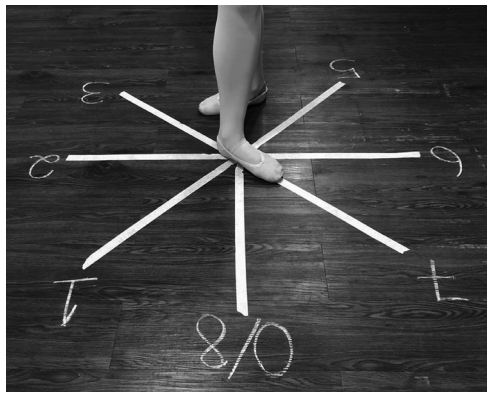

**FIGURE 1.** Participants' starting position, with the circle used for punctuation scores divided into the eight sections.

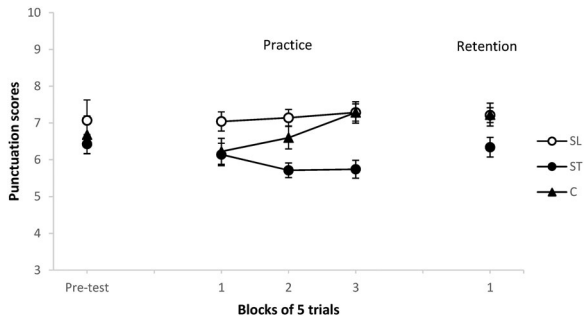


**FIGURE 2.** Punctuation scores of the stereotype threat (ST), stereotype lift (SL), and Control (C) groups during pre-test, practice, and retention. Error bars indicate standard errors.

### Retention

The main effect of group was significant, $F$ (2, 39) = 3.692, $p$ = .034, $n_p^2$ = .159 (Figure 1). The post-hoc test revealed that the ST group had lower pirouette scores than the SL ($p$ = .025) and the control ($p$ = .023)

groups. Differences were not observed between the SL and the control groups ($p = .97$).

## Discussion

In the present study, we aimed to verify the effects of gender stereotypes on the performance and learning of a ballet pirouette in 11-year-old boys. Previous research has investigated gender stereotype effects on motor learning in young adults (Cardozo et al., 2021; Heidrich & Chiviacowsky, 2015), and also overweight stereotype effects in motor learning in children (Rabeinia et al., 2021), but none have yet looked at the effects of gender stereotypes on skill acquisition in children.

The results revealed differences in performance after the stereotype manipulation between groups, indicating that boys who practiced in a stereotype threat (ST) condition performed worse in the pirouette task compared to the stereotype lift (SL) and the control conditions. The same effect was observed the next day in the retention test, showing learning disadvantages for the ST group relative to the SL and control groups. These findings on gender stereotype threats agree with experiments researching such effects in boys when performing cognitive tasks (e.g., Pansu et al., 2016) and in adult women learning soccer motor skills (Cardozo et al., 2021; Heidrich & Chiviacowsky, 2015), as well as with several other studies investigating the deleterious effects of race, age, and weight stereotypes in other populations and contexts (Liu et al., 2021).

Mechanisms involving motivational, affective, and cognitive processes have explained how stereotype threat negatively affects performance (Schmader et al., 2008). For instance, self-regulation efforts to suppress negative thoughts and emotions, active monitoring of performance, and physiological stress can be linked to disorganising performance (Schmader et al., 2008). Motivation to avoid failure (prevention-self-regulatory focus) instead of performance-approach (promotion-self-regulatory focus) can also occur (Chalabaev et al., 2008a). The performance of experts can deteriorate when attention is directed to processes that typically run automatically, thus increasing conscious monitoring (Beilock et al., 2006). On the contrary, beginners' performance can be degraded by decreased attention or monitoring activity to important aspects of the learning task in efforts to counteract pessimistic feelings resulting from practice under negative stereotyped conditions (Heidrich & Chiviacowsky, 2015).

Motor learning research has also directly demonstrated that stereotype threat negative effects are linked with individuals' decreased feelings of competence (Cardozo & Chiviacowsky, 2015; Heidrich & Chiviacowsky, 2015) and affective levels (Cardozo et al., 2021). Competence is a motivational factor and a basic psychological need; it refers to the ability to feel confident and to master challenges with skill (Ryan & Deci, 2000). Contexts supporting the need for competence increase intrinsic motivation, while environments thwarting the need for competence result in a decrease of motivation, with both respectively impacting motor performance and learning (Chiviacowsky, 2020; Wulf & Lewthwaite, 2016). The importance of protecting perceptions of competence in children's motor learning was observed in several experiments, for example the effects of positive feedback (e.g., Ávila et al., 2012; Gonçalves et al., 2018) or conceptions of ability (Chiviacowsky & Drews, 2014; Drews et al., 2013; Harter et al., 2019). Positive affect is another mechanism observed as being involved in gender stereotype effects on motor performance and learning (Cardozo et al., 2021). Positive affect is implicated in dopamine release, impacting cognitive performance (Ridderinkhof et al., 2012) and contributing to the consolidation of motor memories (Sugawara et al., 2012; Wise, 2004). Thus, the negative social belief induced through the stereotype threat manipulation in the current study may have decreased children's perceptions of competence, affective levels, and motivation, negatively affecting their motor performance and learning. It would be fruitful if follow-up studies could further test mediators or underlying mechanisms of gender stereotype threat effects on learning in different populations, including in children.

Differences between the SL and control groups, either in immediate performance or in learning, were not observed in the present study. One possibility for this lack of effect may be related to the control group having observed both male and female expert models in the video tutorial. This variable may have generated the interpretation that boys and girls perform the task equally well, thus decreasing any negative gender stereotypes related to the dance task, protecting boys' perceptions of competence, affective levels, and motivation in this control group.

In conclusion, the results show that negative gender stereotypes can impair the performance and learning of a pirouette in boys. It would be important to observe if such effect would also be observed in the learning of other kinds of tasks and contexts, especially in tasks where appropriation is considered feminine (e.g., gymnastics). Moreover, future studies could compare the effects of gender stereotypes on motor learning using different ways (e.g., video versus verbal instruction). The findings have important practical implications. Professionals in the field of human movement could use instructions or other tools to deconstruct negative stereotype beliefs, providing environments or conditions for equal participation and engagement of boys and girls in different activities. Other examples of interventions potentially able to counteract or moderate stereotype

threat negative effects on motor learning could be those that support learners' perceptions of competence (e.g., Chiviacowsky, 2014; Chiviacowsky et al., 2012) or social relatedness to increase affective levels (Gonzalez & Chiviacowsky, 2018; Kaefer & Chiviacowsky, 2021).

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