Journal of Sport & Exercise Psychology, 2021, 43, 450-458
https://doi.org/10.1123/jsep.2020-0255

Human Kinetics
ORIGINAL RESEARCH

"You Kick Like A Girl!" The Effects of Gender Stereotypes on Motor Skill Learning in Young Adolescents

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This study investigated the effect of gender stereotypes on (a) a soccer learning task based on accuracy (i.e., shooting on different size targets) among young adolescents and (b) the strategy used to score as many points as possible. After performing 10 baseline trials, 45 young adolescents were randomly divided into three groups: positive stereotype, negative stereotype, and control. Then, they performed five blocks of 10 trials and two retention tests, 1 and 3 days after the stereotype manipulation to assess the relatively permanent consequences of stereotype effects. Results showed that when the negative stereotype was induced, participants performed worse during the acquisition phase and the first retention test. The positive stereotype only had a positive effect on performance during the second retention test. These findings provide the first evidence of the effect of gender stereotypes on motor learning tasks requiring accuracy among young adolescents.

Keywords: prevention focus, promotion focus, soccer, stereotype boost, stereotype threat

Sociocultural institutions such as school, family, and church have a profound effect on the formation of conventional attitudes and perceptions about gender roles (Gill, 2002). These institutions actually shape the duties, behaviors, and beliefs associated with men and women in a society (Oglesby & Hill, 1993). For example, traditional conceptions about women include traits such as grace, beauty, passivity, and obedience. Concepts such as power, courage, and aggression, which are influential in most sports, are attributed to men (Solmon et al., 2003). These stereotypical beliefs and the impact of these beliefs on human performance have been of interest to researchers for the last two decades, especially through the stereotype threat theory (Steele, 1997). According to this theory, negative stereotypes (NSs) make people expect to perform poorly, and consequently, it affects the performance of those who belong to the stereotyped group (Steele & Aronson, 1995). In fact, stereotype threat is a situational phenomenon that either refers to the concerns that people experience due to being a member of a particular group or refers to worrying about proving stereotype beliefs related to the group to which they belong (Steele & Aronson, 1995). Numerous studies have shown the negative impact of gender stereotype induction on performance in various domains such as, the math domain (e.g., O'Brien & Crandall, 2003), memory performance (e.g., Mazerolle et al., 2012), safe driving (e.g., Moè et al., 2015), and performance in online games (e.g., Kaye & Pennington, 2016). It should be noted that recently there have been doubts about the existence and magnitude of the impact of stereotype threat on performance (e.g., Flore et al., 2018). For example, in a large-scale study, Flore et al. (2018) attempted to investigate the effect of NSs on the performance of Dutch high school students on mathematical tests. They showed that NSs had no overall effect on the mathematical performance of adolescent girls. However, these doubts concerning the effect of stereotype threat mainly referred to the cognitive domain (Flore et al., 2018; Flore & Wicherts, 2015).

Recently, research has examined the effect of this sociocognitive-affective variable on motor performance using soccer dribbling tasks (Chalabaev, Sarrazin, et al., 2008; Heidrich & Chiviacowsky, 2015; Hermann & Vollmeyer, 2016), a soccer shooting task (Grabow & Kühl, 2019), ball bouncing tasks (Huber et al., 2015), basketball shooting tasks (Hively & El-Alayli, 2014; Laurin, 2013), a tennis serving task (Hively & El-Alayli, 2014), or a jumping stride task (Laurin, 2017). Most of these studies exploring the effects of negative gender stereotypes on motor performance revealed a performance decrease for threatened women (for a meta-analysis, see Gentile et al., 2018). For example, in Hermann and Vollmeyer's (2016) study, women assigned to a NS group, based on the inferiority of women in sports, took more time to perform a soccer dribbling task than women in the control condition. The performance impairment observed was mostly attributed to the explicit monitoring hypothesis (Beilock & Carr, 2001). According to this hypothesis, expertise in tasks that require coordination, such as soccer dribbling, depends on proceduralized skills that run relatively automatically with minimal intervention from the working memory system. Under negative stereotyping, targeted individuals are likely to isolate and focus on specific components of task execution. This results in a breakdown of the integrated control structure into a sequence of smaller independent units, each unit being activated and run separately. Thus, the probability of making errors is likely to increase, resulting in a decrease in performance (Beilock & Carr, 2001).

Another explanation has been put forward to explain the negative effect of a stereotype threat situation, based on the Regulatory Fit Framework (Higgins, 2000). In short, according to the Regulatory Fit Framework, the effects of a NS would depend on participants' goal pursuits (i.e., promotion focus: sensitive to gains and nongains vs. prevention focus: sensitive to losses and nonlosses). In other words, if there is a "fit" between the reward structure (i.e., gains vs. losses) and the regulatory focus adopted (i.e., promotion vs. prevention), performance after inducing a NS would increase; conversely, if there is no "fit," performance would

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decrease. In addition, Seibt and Förster (2004) found, for example, that NSs incite a prevention focus. As in most studies evaluating the effect of stereotype threat, the experimenter asked participants to perform their best on the task (e.g., perform a soccer dribbling task as fast as possible; Chalabaev, Sarrazin, et al., 2008) and hereby oriented participants to gains and nongains, creating a no "fit" condition and possibly explaining why a performance impairment is mostly observed. A few studies have attempted to corroborate this assumption in the motor domain. Overall, when participants focused on losses (rather than on gains) during a stereotype threat situation, a performance improvement was mostly observed (e.g., Chalabaev et al., 2014; Grimm et al., 2016), which is in line with the regulatory fit theory. In the present research, we did not directly test this theory but we explored if inducing a negative or positive stereotype (PS) would instigate a prevention or promotion focus (i.e., Seibt & Förster, 2004), which has been less explored in the motor domain. Even though most studies in the motor domain found a negative effect on performance, this investigation appears pertinent, as the underlying psychological mechanisms remain unclear.

Also, most studies examining the effect of gender NSs recruited only adult women (e.g., Chalabaev et al., 2013; Deshayes et al., 2019; Heidrich & Chiviacowsky, 2015). To the best of our knowledge, only two studies have attempted to explore stereotype threat effects on adolescents aged 14–18 years (Laurin, 2013, 2017), replicating the classical stereotype threat effect. However, no studies have examined the effect of stereotype threat on younger adolescents. This investigation appears relevant as physical education is compulsory in schools in the majority of countries; if stereotypes impact young adolescents' physical performance, this could have detrimental repercussions on their academic success. Thus, the present research examined the effect of stereotype threat on young adolescents' motor performance.

In spite of various studies investigating the effect of stereotype threat on performance, only a few studies have investigated the effect of stereotype threat on learning (for a review, see Rydell & Boucher, 2017). For example, Rydell, Rydell, and Boucher (2010) were the first to report the learning disadvantages in mathematical rules and operations necessary to solve mathematical problems following stereotype threat. The authors conducted three studies to show that stereotype threat prevents the encryption of mathematical information and rules in memory (Rydell et al., 2010). In recent years, research has been conducted to investigate the effect of stereotype threat on motor learning (e.g., Cardozo & Chiviacowsky, 2015; Chiviacowsky et al., 2018; Heidrich & Chiviacowsky, 2015). As an example, in a study by Heidrich and Chiviacowsky (2015), participants were asked to perform 15 trials of a soccer dribbling task after NSs were induced. The results showed that the performance and learning of the stereotype threat group were lower than the control (C) group. In addition, Cardozo and Chiviacowsky (2015) showed that the perceived competence, performance, and learning of the stereotype threat group were lower than the C group on a balance task. In both of these studies (Cardozo & Chiviacowsky, 2015; Heidrich & Chiviacowsky, 2015), stereotype threat affected participants on both performance and motor learning. Consequently, in the present research, we explored the effect of stereotypes on motor learning directly after the stereotype manipulation, the day after the manipulation, and 3 days after the induction to investigate the potential permanent effect of stereotypes, which is currently unexplored.

Another stereotype-related theory is the stereotype boost theory, which examines how PSs affect the performance of individuals (for a review, see Shih et al., 2012). Most studies conducted to explore the impact of PSs have reported that PSs improve participant's performance, in various domains (e.g., Johnson et al., 2012; Krendl et al., 2012), even though a performance decrement (Cheryan & Bodenhausen, 2000) or a neutral effect sometimes emerged (Keller, 2002). For example, in the motor domain, Krendl et al. (2012) investigated the effects of stereotypes on a basketball shooting task. Specifically, White males watched a video either depicting Black basketball players as the best free throwers in the NBA (NS), White basketball players as the best free throwers in the NBA (PS), or a neutral sports video (C). Participants then shot a set of free throws, during which half the participants were also videotaped (observer condition), whereas the other half were not (no observer condition). Results showed that the performance of the PS group who were not videotaped was significantly better than the NS and C groups as well as the observer condition. Interestingly, results revealed that observer pressure interacted with PSs to lead to performance decrements (Krendl et al., 2012). In fact, these, and similar findings suggest that people may "choke under pressure" when exposed to PSs (Beilock & Carr, 2001; Cheryan & Bodenhausen, 2000). Researchers suggested that when there are high expectations of individuals' performance (e.g., PS), they are more likely to be overwhelmed by the pressure to meet these expectations, and this pressure may cause choking and poorer performance (Smith & Johnson, 2006). A PS can create one of the situations in which there are high-performance expectations, these stereotypes may make an individual think that he/she "should" perform well because similar individuals (i.e., individuals who are in the same group; of the same age, gender, or race) performed well on the task. Though most studies related to PSs in motor domain have reported performance improvements (Shih et al., 2012), it cannot be said that the possibility of choking is "frequent" after PS induction. However, no studies have attempted to explore the effect of a positive gender stereotype on motor learning, especially in young age groups.

Accordingly, the first aim of the present study was to investigate the influence of inducing a positive and a NS toward girls on the performance and learning of a soccer-accuracy task among young adolescents (10–14 years old). We suggested that inducing a NS would impair participants' performances immediately after the manipulation and the day after. This assumption is based on the stereotype threat theory (Steele, 1997), on past research examining the effect of gender stereotypes on motor performance (for a meta-analysis, see Gentile et al., 2018), and on past studies exploring the effect of stereotype threat on motor learning (Cardozo & Chiviacowsky, 2015; Chiviacowsky et al., 2018; Heidrich & Chiviacowsky, 2015). It should be noted that in the mentioned studies, the researchers reported the deterioration of performance and learning not only immediately after the stereotype induction but also the day after. We also suggested that inducing a PS would increase participants' performances immediately after the stereotype manipulation, as observed in previous studies (e.g., Krendl et al., 2012). Concerning the influence of the NS 3 days after the stereotype manipulation and the effect of the PS during the two retention tests, we did not formulate specific hypotheses since, to date, there is no theoretical rational. The second aim of the present research was to determine the possible mechanisms responsible for any stereotype effects focusing on the influence of induced stereotypes on the regulatory focus adopted by the participants during an athletic task. In line with previous studies (Chalabaev, Sarrazin, et al., 2008; Seibt & Förster, 2004), we hypothesized that inducing a NS would prompt a prevention focus while a PS would lead to a promotion focus being prompted.

Method

Participants

Forty-five young adolescents (all girls) between 10 and 14 years old ($M = 11.8$ years, $SD = 1.4$), took part in this study. Forty-two participants were right-foot dominant and three were left-foot dominant. All were naïve as to the specific purpose of the experiment. Informed consents were obtained from the parents/guardians and verbal informed consents were obtained from the participants. Approval of the study protocol was obtained from the ethics committee of the university. A sensitivity power analysis assuming an α of .05 and power of .80 indicated that our sample size would allow to detect moderate-to-large effects of $f = .37$, in line with the effect sizes obtained in previous studies investigating the effect of stereotype induction on motor learning (Cardozo & Chiviacowsky, 2015; Heidrich & Chiviacowsky, 2015). To be susceptible to stereotype threat effects, individuals need to identify with the studied domain (Steele, 1997). The girls had already enrolled in beginner soccer training sessions but their training sessions had not started yet. Nevertheless, to ensure that participants considered soccer important, prior to the experiment, the potential participants completed two 7-point items (i.e., "My sporting performance within the field of soccer is very important to me," and "soccer is very important to me," with responses ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). A mean score of 4 or higher was required for participation. All participants had a mean score higher than 4 and were consequently all included in the present study. The female experimenter talked to the participants and their parents but she did not tell them that the activity would be part of their training sessions. In fact, we communicated directly to the participants and their parents, and the soccer clubs had no role in selecting, contacting, and coordinating the participants. We did not want participants to consider the task as merely educational or a part of their training classes because in this case, the induction of NSs might be ineffective (Alter et al., 2010).

Task and Tools

Manipulation Check

To evaluate the effectiveness of the stereotype manipulations, participants were requested to answer these two questions: "To what extent are there gender differences in performance on the task that you performed?" with (1) corresponding to "no gender differences" and 7 "gender differences" and "Who do you believe performs better on this task?" with (1) referring to "boys perform better" and 7 "girls perform better." The first question was used to find out whether gender has an effect on the task or not, from the adolescents' perspective. The second question was used to understand whether boys or girls perform better on this task, from the adolescents' perspective.

Accuracy Performance

The task in the present study was based on the one used in Chiviacowsky and Drews's (2014) study but was modified in order to investigate participants' regulatory focus. Before implementing the task, the researchers consulted seven experts in the field (four soccer coaches and three motor learning experts) to confirm task suitability. Soccer coaches and motor learning experts confirmed that the task is appropriate for 10- to 14-year-old adolescent girls. A standard, leather soccer ball (size: 4, circumference: 66 cm; and weight: 370 g) was used. The task required participants to perform inside kicks at target areas attached to a wall and touching the ground (Figure 1). The participant's goal was to kick the soccer ball so that it hits the target to yield the highest number of points. All participants were informed that: "dimensions of areas one, two and three are 50×150, 50×100, 50×50 cm, respectively. If the ball hits area 3, you will be awarded three points. If the ball hits areas 1, 2, or off target, scores of 1, 2, and 0 will be given, respectively. Also, if the ball hits any spot between the two areas (e.g., if it hits a spot between Areas 1 and 2), you will be given zero points. The objective is to perform the best on the task; you could use your favorite strategy to

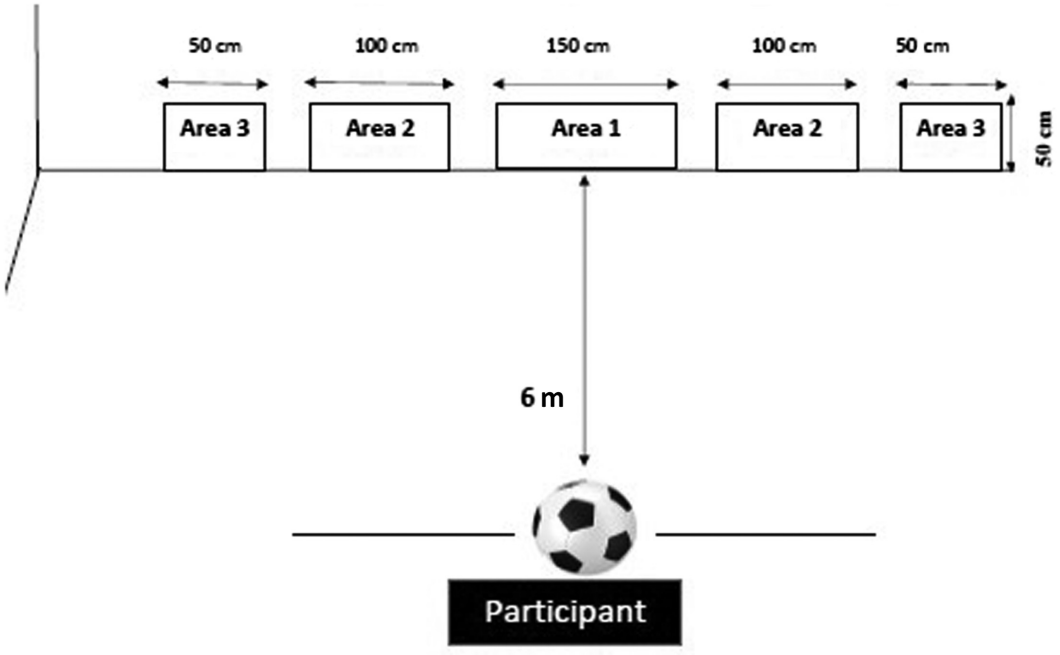

Figure 1 — Experimental setup.

get the most points." The ball was placed at a distance of 6 m from the target during pretest, acquisition phase, and retention tests. Given that some studies have reported that the effect of stereotypes is seen only on difficult tasks (Hively & El-Alayli, 2014; O'Brien & Crandall, 2003), the participants in the present study were requested to answer the following question after the acquisition phase "How do you assess the difficulty of the task?" on a Likert scale ranging from 1 (*very easy*) to 7 (*very difficult*). Results also showed that participants perceived the task as difficult ($ME = 5.1$, $SD = 0.8$). Participants' scores were recorded by a female experimenter who was blind to the group conditions. The experiment was conducted in an indoor gym.

Regulatory Foci

To review the strategy adopted by the participants, they were asked to answer the four following questions: (a) "During the task, I was taking many risks to score the highest number of points for each shot (e.g., aim mainly area 3)," (b) "During the task, I was taking few risks to ensure scoring points for each shot (e.g., aim mainly areas 1 or 2)," (c) "During the task, my objective was to score the highest number of points for each shot, even if the probability of missing the targets was increased (e.g., aim mainly area 3)," and (d) "During the task, my objective was to always hit the targets, even if it did not allow me to score the highest number of points for each shot (e.g., aim mainly areas 1 or 2)." A 7-point Likert scale ranging from 1 (*totally disagree*) to 7 (*totally agree*) was used to answer these four questions. The first and third questions referred to the intention to assign a promotion focus and were averaged for data analyses (Cronbach $\alpha = .84$), whereas the second and fourth questions measured the intention to take on a prevention focus and were averaged for data analyses (Cronbach $\alpha = .87$).

Procedure

After a 10-min warm-up period, the voluntary participants met individually with a female experimenter. Participants received basic instructions about the inside kick task and how they could perform an accurate inside kick. Also, the experimenter demonstrated the basic inside kick movement to each participant. Afterward, participants were randomly assigned to three groups (PS, NS, and C). Before experimental manipulations, the participants were invited to perform 10 trials (pretest), each one performing the task individually (see Figure 2 for research design).

After conducting the pretest and before the acquisition phase, the PS group participants received the following instruction: "You are going to perform an accuracy ability task that has been shown to produce gender differences; girls have been shown to perform better than boys on this task." The NS group participants received the following instruction: "You are going to perform a natural athletic ability task that has been shown to produce gender differences; boys have been shown to perform better on this task." The presumption is that the explanation of the task as assessing "natural athletic ability" would provoke female athletes to automatically think about gender stereotypes regarding women's athleticism. This explains that female athletes may be more threatened by the conceptualization of athletics as demanding natural athletic ability; one reason may be the less perceived flexibility of natural athletic prowess (Hively & El-Alayli, 2014). Finally, C group received the following instruction: "You are going to perform a task measuring psychological factors that have been shown to produce no gender differences; boys and girls perform the same on this task." These inductions have previously been used when investigating gender stereotypes (Chalabaev, Sarrazin, et al., 2008; Deshayes et al., 2019; Deshayes et al., 2020; Hively & El-Alayli, 2014). Also, before the acquisition phase, participants watched one of the three different videos (each video lasts 30 s) depending on the stereotype condition to which they were randomly assigned. The video for the PS condition contained several short clips of female players making accurate inside kicks. The video for the NS condition contained several short clips of male players making accurate inside kicks. The video in the third condition (C) contained clips of basketball players making free throws. The gender was counterbalanced in the video related to basketball players in the C group. The videos in all conditions were matched for camera quality, video length, and video format. To the best of our knowledge, only Krendl et al. (2012) used videos to induce stereotypes. According to that research, the videos were accompanied by additional information related to the observed content—at the end of the video, a sentence appeared on the screen to confirm the observed content. In the same vein, in the present study, each group received the verbal instructions mentioned earlier after watching the relevant videos. The acquisition phase consisted of 50 trials (five blocks of 10 trials), with a 10-s rest interval between trials. It should be noted that before the beginning of the acquisition phase, participants were not informed that it was is only a "practice" or "acquisition" phase. After the acquisition phase, participants were asked to answer the manipulation check, to evaluate the effectiveness of stereotype manipulations, the task difficulty item, and the regulatory focus questionnaire. Two retention tests of 10 trials each, without feedback, were conducted 1 and 3 days later to assess the relatively permanent effects. Participants also answered the regulatory focus questionnaire at the end of each retention test.

Data Analysis

For the accuracy performance variable, pretest scores were averaged across all 10 trials and analyzed in a one-way analysis of

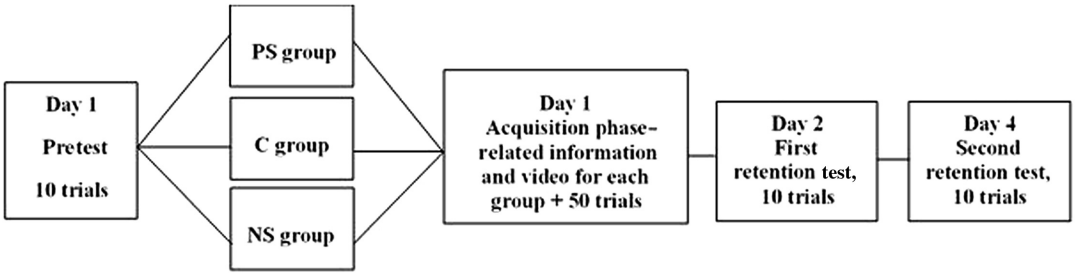

Figure 2 — Research design. PS = positive stereotype; NS = negative stereotype; C = control.

variance (ANOVA). In the practice phase, scores were averaged across blocks of 10 trials and were analyzed in a 3 (groups: ST, PS, C) × 5 (block) ANOVA with repeated measures on the last factor. Greenhouse–Geisser corrected degrees of freedom were used whenever the sphericity assumption was violated. The first and second retention tests were analyzed using univariate ANOVAs. Regulatory foci scores were analyzed using a 3 (groups: ST, PS, C) × 4 (test phases: pretest, acquisition, Retention 1, Retention 2) × 2 (regulatory foci: promotion focus, prevention focus) mixed ANOVA with repeated measures on the last two factors to understand the participant's preferred strategy at each stage. Paired sample *t* tests were used for comparison within groups and Bonferroni correction was used to adjust for multiple comparisons. Alphas were set at .05 for all analyses.

Results

Manipulation Check

Results showed that both the NS group ($ME = 5.33$, $SD = 1.48$) and the PS group ($ME = 5.67$, $SD = .90$) reported that gender differences existed in this task to a greater extent than the C group ($ME = 2.20$, $SD = .86$), $F(2, 42) = 45.12$; $p < .05$; $\eta_p^2 = .68$. Considering the average of the groups, results indicated that both the negative and PS groups believed that gender could affect performance. In addition, the results from the second question showed that there was a significant difference in participants responses, $F(2, 42) = 15.91$; $p < .01$; $\eta_p^2 = .43$. The PS group ($M = 6.00$, $SD = 1.31$) reported that they believed that girls performed the task better than boys. This belief was significantly different from both C ($M = 4.06$, $SD = .70$) and NS ($M = 3.20$, $SD = 1.80$) groups, $p < .05$. Considering the average of the groups, it appears that the NS group, more than the C group, tended to report that boys perform the tasks better than girls, but this difference failed to reach statistical significance $p > .05$. Overall, these results suggested that our stereotype manipulations were successful.

Accuracy Performance

In the pretest, there were no significant performance differences between groups, $F(2, 42) = .382$; $p > .05$. The groups tended to increase their scores during the practice phase, and the PS group tended to have the highest accuracy scores (Figure 3, middle). The main effect of the practice phase (acquisition) on performance was significant, $F(3.29, 138.18) = 73.44$; $p < .01$; $\eta_p^2 = .63$. The main effect of the group was significant, $F(2, 42) = 8.01$; $p < .01$; $\eta_p^2 = .27$. The C group outperformed the negative group in this stage $p < .05$; however, there was no significant difference between the C group and PS group in this stage $p > .05$. The interaction of group and block, $F(6.58, 138.18) = 4.36$; $p < .01$; $\eta_p^2 = .17$ was also significant. Bonferroni post hoc tests revealed that the C group outperformed the NS group on Blocks 3 ($p < .01$), 4, and 5 ($ps < .05$).

Significant differences existed between the performances of the groups on the first retention test, $F(2, 42) = 22.17$; $p < .01$; $\eta_p^2 = .51$. The participants in the C group ($ME = 1.72$, $SD = .19$) scored more points than the participants in the NS group ($ME = 1.40$, $SD = .17$), $p < .01$. However, there was no significant difference between the PS group and the C group.

The main group effect on the second retention test was also significant, $F(2, 42) = 9.14$; $p < .01$; $\eta_p^2 = .30$. The performance of the PS group ($ME = 1.49$, $SD = .24$) was significantly better than the C group ($ME = 1.27$, $SD = .24$), $p < .05$. However, there was no significant difference between the performances of the NS group and the C group on the second retention test $p > .05$.

Regulatory Foci

A 3 (groups: ST, PS, C) × 4 (test phases: pretest, acquisition, Retention 1, Retention 2) × 2 (regulatory foci: promotion focus, prevention focus) mixed ANOVA revealed a main group effect, $F(2, 42) = 4.57$; $p = .016$; $\eta_p^2 = 0.18$, a main effect of test phases, $F(3, 126) = 2.94$; $p = .03$; $\eta_p^2 = 0.07$, and no main effect of regulatory foci, $F(1, 42) = 1.7$; $p = .20$. The researchers' hypothesized interaction effects including the three-way interaction, $F(6, 126) = 3.95$; $p = .001$; $\eta_p^2 = .16$, and the two-way interaction between regulatory foci and test phases, $F(3, 126) = 4.12$; $p = .008$; $\eta_p^2 = .09$, were statistically significant. Furthermore, to understand participant's preferred strategy at each stage, the comparisons were made for each of the strategies among test phases in each group using paired samples *t* test and Type I error correction via Bonferroni correction. The Bonferroni corrected paired *t* tests revealed that the NS group, the PS group, and the C group did not use a specific strategy in the pretest and the acquisition phase, $ps > .05$. In the first retention test, the NS group adopted the prevention focus ($ME = 5.30$, $SD = .80$) more than the promotion

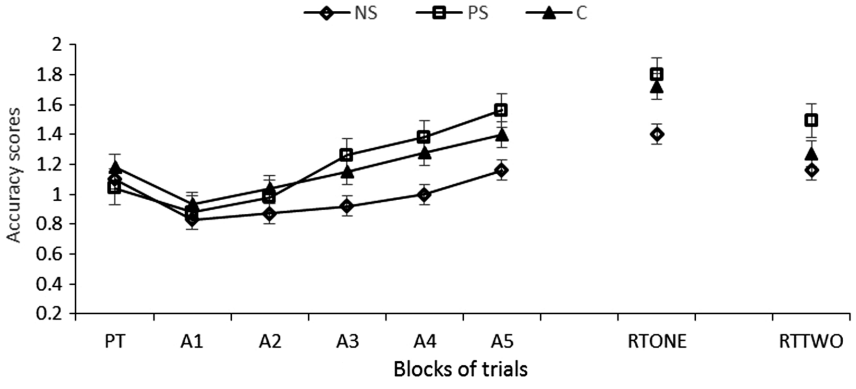

Figure 3 — Accuracy scores of the PS, NS, and C groups during PT, acquisition phase (A1–A5), RTONE, and RTTWO. *Note.* Error bars represent *SE*s. PS = positive stereotype; NS = negative stereotype; C = control; PT = pretest; RTONE = Retention 1; RTTWO = Retention 2.

focus ($ME = 4.40$, $SD = 1.00$), $t_{14} = 3.603$; $p = .003$. The C group and the PS group did not adopt a specific strategy in this stage, $ps > .05$. In the second retention test, the NS and the C groups did not adopt a specific strategy $ps > .05$, but the PS group adopted a promotion focus ($ME = 6.37$, $SD = .67$), more than a prevention focus ($ME = 5.0$, $SD = 1.05$), $t_{14} = 5.095$; $p = .001$.

Discussion

The present study was designed to investigate the effects of inducing a positive and a NS on the learning of an accuracy demanding task in young adolescents as well as the mechanisms responsible for potential performance modifications. We predicted that young adolescents assigned to the NS group would underperform compared with young adolescents from the C group during the acquisition phase and the first retention test and, contrarily, that those assigned to the PS group would perform better than participants in the C group, especially during the acquisition phase. Overall, our results confirmed our hypotheses.

Effects of NSs on Kicking Accuracy

Results showed that participants assigned to the NS group performed worse as compared with young adolescents assigned to the C group in the acquisition phase. This finding is consistent with the prediction of the stereotype threat theory (Steele, 1997) and is in line with most studies evaluating the effects of gender stereotypes on motor performance (for a meta-analysis, see Gentile et al., 2018). This result is, for example, in line with Grabow and Kühl's (2019) study showing that accuracy performance is reduced after a NS was induced during a soccer shooting task. According to the results of Grabow and Kühl's (2019) study, and the results of the present study, it can be inferred that stereotype threat can have a detrimental effect on the performance of women and adolescent girls on accuracy-based tasks. This finding also increases our knowledge of the effect of NSs on the motor performance of young adolescents. To our best knowledge, a few studies explored the effect of NSs on motor performance in older adolescents between 14 and 18 years old (e.g., Laurin, 2013, 2017). Here the author found a performance decrease for women assigned to the NS condition as compared with women in the C group during a stride jumping task (Laurin, 2017) and a basketball shooting task (Laurin, 2013), in line with Heidrich and Chiviacowsky's (2015) research. In the latter study, results showed that the performance of the NS group was significantly lower than the C group in the acquisition phase during a soccer dribbling task.

Interestingly, and in line with previous research examining the effect of stereotype threat on motor skill learning (e.g., Cardozo & Chiviacowsky, 2015; Chiviacowsky et al., 2018; Heidrich & Chiviacowsky, 2015), it appeared that threatened adolescents scored less points than adolescents in the C group on the first retention test, revealing an impaired learning. Various mechanisms have emerged to explain the performance decline in a stereotype threat situation (Beilock & Carr, 2001; Beilock et al., 2006; Schmader et al., 2008; Seibt & Förster, 2004). Among the possible mechanisms (e.g, active monitoring of performance, physical stress, and self-regulation efforts), Schmader et al. (2008) argued that one of the factors influencing performance could be the adoption of self-regulatory defensive strategies (see also Seibt & Förster, 2004). We provide evidence for this hypothesis. Indeed, in the present study, young adolescents who received NS information reported that they tried to take less risks and to aim for areas that were larger and more likely to score points during their performance on the first retention test suggesting that they adopted a prevention focus to a greater extent. Moreover, the descriptive analysis of the NS groups' kicks on the first retention test showed that 74% of the shots hit areas 1 and 2. In fact, the pattern associated with the distribution of kicks clearly indicated the tendency of the girls to adopt a vigilant/risk-averse strategy in the NS group. This result is in line with past research (Chalabaev, Sarrazin, et al., 2008; Seibt & Förster, 2004) and may explain, in part, why a performance decrement emerged.

The present research also examined the permanent effects of the negative outcomes observed for the first time. These permanent effects were measured 3 days after the stereotype threat manipulation. Interestingly, there were no significant differences in accuracy performance between the NS group and the C group, meaning that the negative effect observed immediately after the induction and one day after the stereotype manipulation disappeared after 2 days. This finding provides the first evidence for the unsustainability of the effect of stereotype threat on motor learning. It is noteworthy that the young adolescents in the NS group did not use a specific strategy in the second retention test, contrary to the first retention test where they used a prevention focus to a greater extent. This may potentially explain why there was no significant effect 3 days after the stereotype manipulation.

In sum, this study revealed that young adolescents were immediately affected by the induction of a NS toward them on a soccer accuracy task, in accordance with the prediction of the stereotype threat theory (Steele, 1997). Furthermore, these same adolescents had lower performances as compared with adolescents in the C group the day after the stereotype threat manipulation, in accordance with previous studies observing a delayed effect of the induction of a NS (e.g., Chiviacowsky et al., 2018; Heidrich & Chiviacowsky, 2015). This negative effect could partially be due to the adoption of a prevention regulatory focus. Finally, we observed for the first time, that this negative effect is not permanent, outlined by the annihilation of a negative effect 3 days after the stereotype threat manipulation.

Effects of PSs on Kicking Accuracy

In the motor domain, very few studies have attempted to explore the effect of inducing a PS (i.e., stereotype boost) on performance (e.g., Krendl et al., 2012). Some studies have examined the stereotype lift effect, consisting in inducing a NS toward one group and observing the positive effect on performance in the nontargeted group (e.g., Chalabaev, Stone, et al., 2008; Deshayes et al., 2019; Laurin, 2013, 2017). For example, Chalabaev, Stone, et al. (2008) found that when a NS toward men was induced during a balance task, women performed better than when no stereotype was induced (see also Laurin, 2013, 2017). However, to the best of our knowledge, no studies have explored the effect of a PS on adolescents' motor performance and learning (i.e., stereotype boost).

First, findings showed that inducing PSs among young adolescents did not lead to different performances in the acquisition phase and on the first retention test in comparison to the C group participants. This result is contrary to our hypothesis and to past research exploring the stereotype boost effect in the motor domain, conducted in another population (i.e., White men; Krendl et al., 2012) and observing a positive effect of the induction of a PS. Nevertheless, the effect of inducing a PS on performance in various domains is still debated as some studies found a positive effect (Krendl et al., 2012), a negative effect (e.g., Cheryan & Bodenhausen, 2000), as well as no effect (e.g., Keller, 2002). It

could therefore be possible that PSs do not impact motor performance in young adolescents during a soccer accuracy task. In addition, participants did not use a specific strategy during the acquisition phase and the first retention test, as in the pretest, potentially explaining why we did not observe any performance modifications. Another explanation could be participants "choked under pressure." Indeed, as previously evoked, PSs may lead participants to think that they "should" perform well because their group performed well (i.e., pressure induced) and consequently, participants failed to perform well (e.g., Beilock & Carr, 2001; Cheryan & Bodenhausen, 2000). To corroborate this assumption, future studies should focus on the mechanisms explaining this absence of a positive effect. Also, further studies should investigate when and why a performance improvement is observed when PSs are investigated.

Interestingly, young adolescents in the PS group performed better than the C group adolescents on the second retention test, performed 3 days after the stereotype manipulations. In addition, contrary to the acquisition phase and the first retention test where participants in the positive group did not use any specific strategy, they preferentially adopted a promotion focus during the second retention test. In other words, participants took more risks and tried to score the highest number of points for each shot. Interestingly, the descriptive analysis of the girls in the PS groups' kicks showed that only eight balls (out of 150 kicks on the second retention test) hit area 1 and 63% of the shots hit areas 2 and 3. As adopting a promotion focus has been shown to be beneficial for performance, this could explain, in part, why a positive effect emerged during this delayed test. In fact, adopting a promotion focus in the PS condition is a confirmation of the findings of Seibt and Förster (2004). These researchers argued that providing positive information about people in a group could lead them to achieve maximum goals. In other words, PSs about a determined group (e.g., girls are better at inside kicks compared with boys) creates a positive outcome and the individuals will strive to achieve it. In addition, people in the PS group often use approach strategies to achieve their goals (Seibt & Förster, 2004). These strategies allow people to use risky styles to achieve maximum results and not to think about failure or making mistakes, something that people are sensitive to in stereotype threat situations (Seibt & Förster, 2004). Through the current study, we found that PSs had longer effects compared with NSs. Apparently, and specifically among young adolescents, experiencing a PS is accompanied by the pressure of expecting to deliver superior performances. However, the present study revealed that the induced pressure decreased over time and only the positive effects of PSs remained. Future research should aim to replicate the present findings and investigate the underlying mechanisms associated with this delayed effect.

In sum, this study revealed that, contrary to what we predicted, young adolescents are not immediately affected by the induction of a PS on a soccer accuracy task. However, the performance of the PS group was better than the other groups 3 days after the stereotype manipulation, revealing a relatively permanent effect of a PS induction. This positive effect would partly be due to the adoption of a promotion regulatory focus. It could be of interest to observe if this positive effect would still be present 1 week after the stereotype manipulation in a future study.

Limitations and Future Directions

Despite several strengths, the present research also presents some limitations. First, even though our sample size is consistent with those of previous research (Cardozo & Chiviacowsky, 2015; Chiviacowsky et al., 2018; Deshayes et al., 2019; Heidrich & Chiviacowsky, 2015; Hermann & Vollmeyer, 2016), and that the effect sizes observed are similar to those found in previous studies investigating motor learning (Cardozo & ChiAviacowsky, 2015; Heidrich & Chiviacowsky, 2015), it could be wise to recruit more participants in order to increase the statistical power, to detect smaller effects, and to determine through which mechanisms positive and NSs operate. Second, the present research was carried out by a female experimenter for all groups. Some research has shown that if the sex of the experimenter and the learner are not the same, this may implicitly activate the NS and consequently impair individuals' performance (Cardozo et al., 2021). It is possible that the sameness of the learner and experimenter's sex creates a PS and consequently improves the performance of the C group. Thus, one of the possible reasons for the lack of differences in the performance of the girls in the C group and the PS group in the acquisition and first retention phase is that both groups performed in the presence of a female experimenter and received some implicit reinforcement. Therefore, it could be interesting to replicate this study with a male experimenter, or with both male and female experimenters, to validate or refute these assumptions. Third, in the present research, we explored the positive effect of inducing a PS through the stereotype boost phenomenon. There is another mechanism that could lead to a positive effect: the stereotype lift phenomenon (Walton & Cohen, 2003). Stereotype lift suggests that, when a NS is made salient, as in the present research, outgroup participants improve their performance. The difference is indeed that stereotype performance boosts result from exposure to PSs, whereas stereotype lift results from exposure to NSs about another group. For example, Deshayes et al. (2019) found that when a NS toward women was induced, men performed better than when they were exposed to a nullified-stereotype condition (see also Chalabaev, Stone, et al., 2008; Laurin, 2013, 2017). Therefore, it could be of interest to observe how men would react when a NS toward women is induced during a soccer-accuracy task and conversely, how women would react when a NS toward men is induced. Fourth, another limiting aspect of the present research is the fact that an accuracy task captures only one aspect of soccer, which is essentially a team sport. It could therefore be necessary to investigate other aspects of soccer such as dribbling or shooting, which is unexplored in this population, or measuring performance at the team level or in a realistic soccer match. Fifth, we observed that inducing a NS instigated a prevention focus, and as the instructions given by the experimenter were "to perform the best on the task" (i.e., reward based on gains/nongains), this result could also be explained by the regulatory fit theory (Higgins, 2000). However, to corroborate and validate this theory, it could be interesting to observe if a positive effect could appear after inducing a NS when the reward structure is based on losses/nonlosses, as expected by this theory. Finally, it appears that the groups all continued to improve at the same rates between the last acquisition trial and the first retention test. Given that we placed the manipulation check after the acquisition phase, this likely reinforced the stereotype manipulation, which may explain why the groups continued to improve at the same rates.

In conclusion, the findings of the present study allow us to infer that gender stereotypes can affect young adolescents' performance and learning on a task with an accuracy demand. Findings from the present study could have a significant implication on adolescents' motor skill learning. Teachers and coaches can lead adolescents to make more efforts and improve learning by

emphasizing the positive characteristics of the group. Future research should use longer acquisition phases in motor learning protocols, as the impact of stereotype threat may have more sustainability in longer acquisition phases, to increase our knowledge of the basic mechanisms of gender stereotypes. Also, future studies should focus on participants with higher expertise as this is an important variable to consider (Kay & Grimm, 2017). To generalize these findings, more studies in this field, taking into account different tasks and different practice contexts, are necessary.

Acknowledgments

The authors would like to thank Dr. Hamid Salehi (University of Isfahan) and Dr. Rasool Abedanzadeh (Shahid Chamran University of Ahvaz) for their helpful comments and suggestions.

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