Received: 10 April 2019 | Revised: 14 April 2020 | Accepted: 26 April 2020

DOI: 10.1002/pits.22413

WILEY

RESEARCH ARTICLE

Stereotype threat is linked to language achievement and domain identification in young males: Working memory and intellectual helplessness as mediators

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Funding information

European Social Fund (Human Capital Operational Programme 2007–2013, Priority III High quality of the education system)

Abstract

In the present paper, we investigated the link between stereotype threat, school achievement, and domain identification in language arts. We hypothesized that stereotype threat may lead to higher intellectual helplessness, lower working memory capacity, lower achievement, and domain identification but only in young men highly identified with their gender group. To test these assumptions we used self-descriptive measures of stereotype threat, intellectual helplessness, gender identification, and domain identification. We also evaluated working memory capacity by working memory test and school achievement using grade point average. Our predictions were tested in structural equation modeling on a nationwide sample of 319 young men from coeducational schools, aged 14–16 years. The results revealed that working memory was a mediator of achievement ($\gamma = 0.45$, 95% confidence interval [CI] = [0.34, 0.55]), while intellectual helplessness was related to both domain identification ($\gamma = -0.13$, 95% CI = [−0.22, −0.04]) and achievement ($\gamma = -0.13$, 95% CI = [−0.21, −0.06]). The proposed model extends our previous work on the role of intellectual helplessness in mathematics by testing the same intervening variable in a different domain, that is, in language arts. We discuss these results in light of previous

research on stereotype threat and present practical implications.

KEYWORDS
domain identification, intellectual helplessness, language achievement, stereotype threat, working memory

1 | INTRODUCTION

Nearly every type of educational process requires some degree of language skills. Acquiring information through language is important in all academic domains, even in Science, Technology, Engineering, and Mathematics (STEM) which are stereotypically perceived as being based on numbers. In comparison to an extensive debate on gender differences in mathematics (Geary, 2010; Halpern, 2012), research on gender differences in language arts may seem neglected. Given that differences in reading are three times larger than gender differences in mathematics (Stoet & Geary, 2013), understanding psychological factors explaining such findings seems to be of great importance for teachers and policy-makers.

One of the existing explanations of the gender gap in different domains is the stereotype threat theory (Aronson et al., 1999; Spencer, Steele, & Quinn, 1999; Steele & Aronson, 1995; for a review Schmader, Johns, & Forbes, 2008). According to this theory, when a stereotype about lower verbal abilities of boys is activated in a testing situation, boys may perform worse in verbal tests than girls. These differences are better explained with situational factors of testing rather than differences in language skills. When a stereotype is not made salient, the results of verbal tests could be similar for boys and girls. The research showed that situational cues leading to stereotype threat may be very subtle (for a review Schmader et al., 2008). Even a typical test instruction informing about the type of ability being tested may induce stereotype threat (Steele & Aronson, 1995). Therefore, we may assume that stereotype threat may be a common experience of boys during language arts lessons.

Building upon prior research, in the current paper we focused on the association between stereotype threat and language achievement and domain identification among secondary school boys. Additionally, our aim was to understand the role of two intervening variables: working memory and intellectual helplessness. We state our hypotheses after a brief review of relevant literature.

2 | ACUTE AND CHRONIC STEREOTYPE THREAT

Over 30 years of research on stereotype threat has revealed that negative stereotypes affect test performance in minority groups with a long history of discrimination, for example, Afroamericans or women (Steele & Aronson, 1995; for a meta-analysis see Nguyen & Ryan, 2008; for review see Schmader et al., 2008). Detrimental effects of negative stereotype activation on performance were documented across a wide range of cognitive tasks. Stereotype threat affected performance on standardized tests such as the verbal part of the Graduate Record Examination (GRE) in African American samples (Steele & Aronson, 1995), the mathematical part of the GRE in women samples (Spencer et al., 1999). Its effects were also reported in complex cognitive tasks such as spatial-orientation test in women (Tarampi, Heydari, & Hegarty, 2016), women's driving performance in a simulator (Yeung & von Hippel, 2008), and memory free-recall tasks in older participants (Hess, Auman, Colcombe, & Rahhal, 2003).

Numerous experimental studies have demonstrated performance deficits under acute stereotype threat (for a review, see Schmader et al., 2008). However, little is known about the consequences of repeated experiences of stereotype threat (chronic stereotype threat). In real settings, at school, university, or at work, individuals

experience stereotype threat repeatedly. Steele and Aronson (1995) were the first who assumed that stereotype threat persists over time and may lead to disidentification with the stereotyped domain. Consistent with this notion, Schmader, Johns, and Barquissau (2004) reported that stereotype threat changed women's self-perception and career intentions by evoking doubts in their abilities and lowering the self-esteem and confidence in their performance. Similarly, Kalokerinos, Kjelsaas, Bennetts, and von Hippel (2017) described correlates of chronic stereotype threat in male employees working in a counter stereotypical profession as primary school teachers. They demonstrated that a higher level of chronic stereotype threat at work was related to negative job attitudes and a lower emotional commitment of male teachers. To conclude, stereotype threat may be associated with a relatively stable decrease in achievement and lower domain identification (Bedyńska, Krejtz, & Sedek, 2018; Schmader et al., 2004; Woodcock, Hernandez, Estrada, & Schultz, 2012). Achievement and lower domain identification were dependent variables in our model.

2.1 | Working memory and intellectual helplessness as mediators of stereotype threat

Stereotype threat not only decreases cognitive performance but also affects working memory capacity (e.g., Rydell, McConnell, & Beilock, 2009; Schmader & Johns, 2003; Spencer, Logel, & Davies, 2016); the ability to hold information in mind and process it when it is no longer perceptually available (Diamond, 2013). For example, working memory deficits induced by stereotype threat have been documented in an operation span task, which requires simultaneous storage and processing of information (Schmader & Johns, 2003). Similarly, lower performance as an effect of experimental stereotype activation was observed in other executive functions measures such as the Stroop-color naming task (Richeson & Shelton, 2003), GO/NO-GO task (Mrazek et al., 2011), or antisaccade task (Jamieson & Harkins, 2007). Working memory was also a significant mediator linking stereotype threat and test performance (Schmader & Johns, 2003; Spencer et al., 2016). It was evidenced that stereotype threat decreased test performance due to lower working memory capacity required to solve a task at hand. Therefore, in our model, we included working memory as an intervening variable between stereotype threat and achievement.

Stereotype threat may be also considered as a dynamic process. Given that experiences of stereotype threat repeat over time, we assume that stereotype threat may cause quantitative changes in psychological functioning. These changes can be described similarly to the stages of coping with stress (Block, Koch, Liberman, Merriweather, & Roberson, 2011), with mobilization at the first stage followed by a demobilization stage. This dynamic approach to stereotype threat provides a rationale for the hypothesis that chronic stereotype threat may be related to both cognitive and motivational factors. Additionally, we suggest that prolonged mobilization of cognitive resources at the first stage of coping with stereotype threat may lead to their exhaustion, observed at the second stage of coping. Our reasoning was supported by Ståhl, Van Laar, and Ellemers (2012), who demonstrated that the mobilization resulting from stereotype threat is followed by cognitive depletion. These two stages of reaction to chronic stereotype threat are similar to the mechanism of intellectual helplessness.

Intellectual helplessness theory posits that in task-solving situations, people spontaneously engage in active processing of information, for example, they extract diagnostic pieces of information to solve the task (Kofta & Sedek, 1998; Sedek & Kofta, 1990). However, such cognitive effort without noticeable progress may lead to cognitive exhaustion and in consequence to intellectual helplessness (e.g., Kofta & Sedek, 1998; von Hecker & Sedek, 1999). Although the cognitive consequences of intellectual helplessness have been mostly demonstrated at a higher level of cognitive functions, for example, reasoning (von Hecker & Sedek, 1999), it may be hypothesized that core executive functions of working memory, may be also impaired in participants in the state of cognitive exhaustion.

The consequences of intellectual helplessness can be cognitive (e.g., decreased performance in new or complex problems, lower school achievement), but also motivational (e.g., lack of motivation to learning the subject; Rydzewska, Rusanowska, Krejtz, & Sedek, 2017; Sedek & McIntosh, 1998). Lack of progress in learning may

demotivate students and lead to more stable decrease in domain identification. Student may not develop situational interest in the subject, and may not value the domain as an important for their later academic and work career.

To summarize, the review of literature on intellectual helplessness suggests that experiencing stereotype threat may lead to cognitive exhaustion and can develop symptoms of intellectual helplessness. Intellectual helplessness may be a significant predictor of school performance but also working memory capacity. This hypothesis was supported in our previous study in a secondary school girls' sample (Bedyńska et al., 2018). In the study, intellectual helplessness and working memory were identified as mediators of the relationship between stereotype threat and school achievement. Moreover, intellectual helplessness may be a mediator of the association of stereotype threat and domain identification. This very assumption is further tested in a boys' sample in the present study.

2.2 | Gender identity as a moderator of stereotype threat

Although potentially everyone can face a psychological threat of confirming a negative stereotype about one's group (Steele, Spencer, & Aronson, 2002), some individuals are more vulnerable to the negative effects of stereotype threat than others. By and large, research has demonstrated several individual characteristics that may strengthen stereotype threat consequences such as a high level of stereotype endorsement (Schmader et al., 2004), stigma consciousness (Brown & Pinel, 2003) or strong group identification (Rydell et al., 2009; Schmader, 2002; Tempel & Neumann, 2015).

The role of identification with gender group in explaining the school achievement of girls and boys has been of concern recently. Even though the gender gap in mathematics is closing (Lindberg, Hyde, Petersen, & Linn, 2010), the differences in competence beliefs and domain identification are still substantial. These beliefs seem to be more related to gender identification and stereotypes than to gender per se. Moreover, they may shape student academic trajectories (Stoet & Geary, 2015). Therefore, these social factors have recently attracted more attention in the research on school achievement of girls and boys.

In stereotype threat research gender identity was examined as a moderator in a female-student sample solving math tasks (Schmader, 2002). Women highly identified with their gender group solved less tasks compared to women less identified with their gender group. Additionally, in our previous study (Bedyńska et al., 2018), we demonstrated that chronic stereotype threat was linked to a higher intellectual helplessness in mathematics and to a lower mathematical achievement in girls who were highly identified with their gender group. The question arises if a similar pattern of associations between achievement, group identification, and stereotype threat can be observed in the context of the language domain among boys. Since there is some empirical support for treating group identification as a moderator of stereotype threat effects, we also examined the role of this factor in the present study.

2.3 | Aims of the present research

Chronic stereotype threat may be linked to lower achievement (e.g., Bedyńska et al., 2018) and lower domain identification (e.g., Woodcock et al., 2012). However, to the best of our knowledge, no research examined in one study cognitive (achievement) and motivational (domain identification) effects of chronic stereotype threat. Consequently, this study tested the associations of chronic stereotype threat to language achievement and domain identification. On the basis of previous studies, we predicted that higher chronic stereotype threat correlates with lower language achievement and lower domain identification. Our study also tested two intervening variables: working memory and intellectual helplessness. We assumed that working memory should be linked to language

achievement. We also predicted that intellectual helplessness, due to its motivational component, would mediate the link between chronic stereotype threat and domain identification as well as language achievement. Furthermore, for boys highly identified with their gender group, we expected to observe stronger relationships between chronic stereotype threat and the dependent variables: language achievement and identification. Therefore, we entered gender identification as a moderator in the model.

The current study is conceptually similar to Bedyńska and collaborators' research (2018) showing significant associations between stereotype threat and achievement in mathematics. However, it offers three advancements. First, this is the first study which examines the relation of chronic stereotype threat with achievement and domain identification in a boys' sample. Corroborating previous results from a minority group (girls) in a majority group (boys) will allow to generalize the effects of chronic stereotype threat. Using this sample of boys has also important practical implications. Although a gender gap has been systematically documented in this domain (Hyde & Linn, 1988; Stoet & Geary, 2015), none of the previous studies tested the consequences of chronic stereotype threat regarding boys' lower achievement in language arts.

Second, previous studies have examined the relation of chronic stereotype threat to school achievement (Bedyńska et al., 2018; Bedyńska, Krejtz, & Sedek, 2019) but not to domain identification. The latter factor is perceived as an important predictor of domain interest and academic trajectories of girls and boys (Stoet & Geary, 2015). We believe that our study provides an important contribution to the understanding of the academic choices of students in the stereotyped domains.

Third, our study is a conceptual replication of Bedyńska et al. (2018) previous research which showed that intellectual helplessness was a significant mediator of the link between chronic stereotype threat and lower achievement. Therefore, the present research aims to demonstrate that intellectual helplessness not only mediates the link between chronic stereotype threat and achievement but it is also significant intervening variable of the association between stereotype threat and domain identification.

3 | METHOD

3.1 | Participants and procedure

Data from 635 male youth (M_{age} = 14.53, *SD* = 0.91) from 24 coeducational secondary schools were collected in the study. Final sample consisted of 319 youths. There were 231 first-class students (*M* = 14.55 years, *SD* = 0.42), 204 second-class students (*M* = 15.5 years, *SD* = 0.37), and 184 third-class students (*M* = 16.54 years, *SD* = 0.38). Language achievement as measured by the Grade Point Average (GPA) with 1 meaning “not passing” and 6 “excellent” was close to the middle point (*M* = 2.81, *SD* = 0.89).

Participants were selected using the sampling procedure with stratification. In the first step, schools were randomly selected within two strata: based on region (in two regions of Poland, and based on three school locations (cottage, small city, medium city). In the second step, 1–2 classes from each of the three class grades were randomly selected in each school. Although all boys from the selected classes were invited to participate in the study, around 5% of them were absent at the time of the study and therefore were not able to participate. As the study was presented as a pilot study of an online educational game, all pupils present at school agreed to participate (0% dropout rate).

To conduct the study in compliance with ethical standards recommended by the American Psychological Association (2017) both parents and boys provided a written consent form. Before the study, boys were informed by the experimenter about the general aim of the research and were reassured that their data were anonymous and their participation was voluntary. Boys did not receive any compensation for their participation in the study.

Pupils participated in the study during regular school hours. Data were collected during a single meeting that lasted 45 min. After describing the purpose of the study and explaining the procedure, children opened a web

browser to solve a working memory test and fill out online questionnaires. Scales of chronic stereotype threat, intellectual helplessness, gender identity, language achievement, and domain identification were mixed with other self-descriptive measures of learning motivation and attitudes toward school and learning used in the study. These additional scales were presented before the stereotype threat scale to avoid any potential influence of stereotype activation.

3.2 | Measures

3.2.1 | Chronic stereotype threat in language

The scale to measure chronic stereotype threat in language was constructed using items from Bedyńska et al. (2018). The items were rephrased into a masculine form and with respect to the language arts domain. There were two items measuring specific stereotype threat of being judged by other students (e.g., "Other students in my class feel that I have lower language ability because of my gender") and two items of being judged by teachers (e.g., "I worry that if I fail my teacher will attribute my poor performance to my gender"), as well as three items referring to generalized stereotype threat (e.g., "I worry that if I fail during test, it will prove that all boys are poor at language"). Participants responded to these questions on a Likert type scale, ranging from 1 (*strongly disagree*) to 6 (*strongly agree*) and their responses were averaged into a chronic stereotype threat index. The reliability of the scale calculated in the sample of youth men was high (Cronbach's $\alpha = .88$). As predicted, confirmatory factor analysis used to test the construct validity showed that all items form one factor, $\chi^2(12) = 60.85$, $p < .001$, Comparative Fit Index (CFI) = 0.98, Tucker-Lewis Index (TLI) = 0.96, standardized root mean square residual (SRMR) = 0.03, root mean square error approximation (RMSEA) = 0.08, 90% confidence interval (CI) = (0.06, 0.10), $p = .01$.

3.2.2 | Language achievement

We used actual GPA values in language from two semesters before the study to measure achievement in language. GPA's were averaged and higher values reflect better achievement, with 1 meaning "not passing" and 6 "excellent."

3.2.3 | Intellectual helplessness

The 9-item measure with six-point Likert type scale ranging from 1 (*never*) to 6 (*always*) was used to assess intellectual helplessness during language lessons. Items were selected from the Intellectual Helplessness Scale (IHS; Sedek & McIntosh, 1998). Such items as for instance "I find I don't understand what I'm writing in my notes," "I feel helpless" were used. Similarly to the original IHS, the reliability of the short version of the scale was high (Cronbach's $\alpha = .90$). Items were averaged to form an intellectual helplessness index that ranged from 1 to 6.

3.2.4 | Working memory capacity

Working memory was measured with the functional aspects of working memory test (Sedek, Krejtz, Rydzewska, Kaczan, & Rycielski, 2016). The test consists of three tasks: a counting span task, a set switching task, and a spatial location memory task. For all working memory tasks, we calculated the percentage of correct responses. The performance on working memory tasks was used to create a latent variable of

working memory. Such an approach let us examine whether all three functions were similarly affected by chronic stereotype threat.

3.2.5 | Gender identity

One-item measure was used to measure gender identity: "Being a boy is important to me" (Leach et al., 2008). Pupils provided their answer on a 6-point Likert type scale ranging from 1 (*strongly disagree*) to 6 (*strongly agree*) to rate to what an extent they agreed with the statement. Reasons for using a single-item measure of gender identity were twofold. First, single-item measure was used due to practical reasons to avoid tiredness of participants. Second, most research operationalizes group identification as a unitary scale (for review, see Ashmore, Deaux, & McLaughlin-Volpe, 2004). As Postmes, Haslam, and Jans (2013) suggested in their work comparing the reliability of single-item measures, these types of measurement tools are quite reliable.

3.2.6 | Domain identification

Similarly to gender identity, we used a single-item measure of domain identification ("It is important to me to be good at language") adopted from the work of Aronson et al. (1999). Pupils used a 6-point Likert type scale ranging from 1 (*strongly disagree*) to 6 (*strongly agree*) to rate the importance of the subject.

3.3 | Data preparation and analytical approach

We used maximum likelihood robust estimation in structural equation modeling in Mplus 7.3 (L. K. Muthén & Muthén, 2015) for conducting all analyses. Because of data being clustered (students nested in classes), complex sampling approach (ANALYSIS = COMPLEX setting in Mplus) with class membership as a cluster variable was implemented in all models. An advantage of this approach is that it allows to deal with the nonindependence of observations due to cluster sampling when computing both standard errors of the model parameters and a χ^2 model fit (B. O. Muthén & Satorra, 1995).

In the first step of the analysis, all classes smaller than three students were excluded from the data sets (four classes and seven participants). In the second step, we examined a preliminary model with two mediators—working memory as a latent variable (loaded by three task of working memory), and an indicator of intellectual helplessness—as well as two dependent variables—achievement and domain identification in language.

To investigate indirect effects, 95% CI method was used. Following standard recommendations, it was assumed that the indirect effect is significant if the CI does not include zero (Preacher & Hayes, 2008). This approach was described as less conservative compared to the Sobel test and therefore lacking in power (MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002). Additionally, gender identification was entered as a moderator of the relationship between chronic stereotype threat and dependent variables. Finally, to eliminate alternative explanations, the reversed models with language achievement and language identification as predictors and stereotype threat as the dependent variable were tested.

We used specific fit indices recommended by Kline (2011) to evaluate the model: RMSEA, SRMR, CFI, and TLI and the general fit indicator based on χ^2 test of model fit and its associated probability (p). Most widely recommended cut-off values were applied respectively: RMSEA and SRMR lower than 0.06, CFI and TFI higher than 0.95 (Lance, Butts, & Michels, 2006).

4 | RESULTS

4.1 | Descriptive statistics

Descriptive statistics and correlation coefficients describing the correlations between variables entered to the model are shown in Table 1. An inspection of the means calculated for the sample (see Table 1) showed that the level of stereotype threat was relatively low, while intellectual helplessness was rather high. Language achievement in the entire sample was moderate, with the mean GPA around three in the grading scale from 1 "not passing" to 6 "excellent." Additionally, in line with our predictions, language achievement was negatively correlated with stereotype threat and intellectual helplessness, and positively correlated with all three working memory tasks. Stereotype threat was only moderately ($r = .32$) correlated with intellectual helplessness and working memory.

4.2 | Moderated model with working memory and intellectual helplessness as mediators

We proposed a model with two outcome variables, domain identification and language achievement. Gender identity was tested as a moderator of the link between chronic stereotype threat and outcome variables; consequently chronic stereotype threat, gender identity, and the interaction term of these two variables were entered to the model as exogenous variables. Two parallel indirect effects were evaluated, a one involving working memory and the other involving intellectual helplessness. Results indicated that the model with intellectual helplessness and working memory as mediators (see Figure 1) achieved a good fit to the data. The general test of fit was nonsignificant, showing a good general fit: $\chi^2(17) = 19.00$, $p = .33$. The inspection of the fit values supported the good fit: CFI = 0.99, TLI = 0.99, SRMR = 0.02, RMSEA = 0.01, 90% CI = [0.01, 0.04], $p = .99$. The model explained a substantial percentage of variability of domain identification (18%, $R^2 = .18$), language achievement (23.1%, $R^2 = .23$), working memory effectiveness (16.5%, $R^2 = .17$), and intellectual helplessness (11.5%, $R^2 = .12$). All standardized factor loadings for working memory were moderate to strong (ranging from 0.59 to 0.67).

TABLE 1 Means, standard deviations, and Pearson's *r* correlation coefficients for study variables

	1.	2.	3.	4.	5.	6.	7.	8.
1. Stereotype threat	–							
2. Gender identity	−.16**	–						
3. Intellectual helplessness	.32**	−.03	–					
4. Storage and processing	−.21**	.14**	−.07	–				
5. Supervision	−.20**	.16**	−.10*	.45**	–			
6. Coordination	−.21**	.12**	−.03	.44**	.39**	–		
7. Language achievement	−.26**	.16**	−.16**	.29**	.30**	.23**	–	
8. Domain identification	−.05	.38**	−.13**	.07	.11**	.01	.12**	–
Mean	2.31	4.44	4.75	0.65	0.71	0.96	2.81	3.80
Standard deviation	1.17	1.79	0.50	0.21	0.16	0.03	0.89	1.66
Range (potential)	1–6	1–6	1–6	0–1	0–1	0–1	1–6	1–6

*$p < .05$.

**$p < .01$.

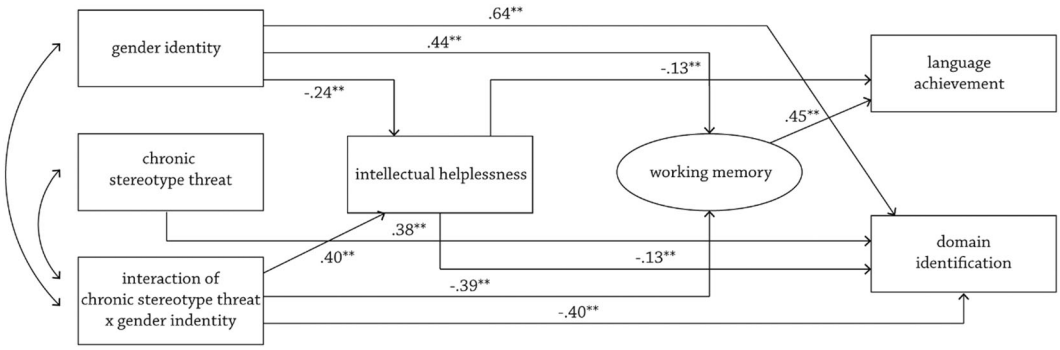

FIGURE 1 The full mediational model predicting language achievement and identification by chronic stereotype threat with two mediators: working memory and intellectual helplessness with gender identity as a moderator. All coefficients are standardized. $^{**}p < .05$

Unstandardized and standardized path coefficients as well as standard errors, critical values of Student's *t* tests, and confidence intervals are presented in Table 2.

The results indicated that the majority of significant relationships between the variables were consistent with our predictions. First, domain identification was significantly related with the interaction of stereotype threat and gender identity, strongly positively related with gender identity, negatively, and weakly related with intellectual helplessness, and positively and moderately related with stereotype threat. Second, intellectual helplessness was negatively associated with gender identity and significantly associated with the interaction of gender identity and stereotype threat. This finding provides a preliminary support that intellectual helplessness is a significant mediator of the relationship between stereotype threat and domain identification. Third, language achievement was negatively predicted by intellectual helplessness and positively and strongly predicted by working memory.

TABLE 2 Path coefficients in the model linking stereotype threat to domain identification and language achievement with working memory and intellectual helplessness as mediators and gender identity as a moderator

	b^a	b^b	SE	CR	*p*	95% CI
Gender Identity → Working Memory	0.03	0.44	0.05	8.12	.001	[0.330, 0.541]
Stereotype Threat by Gender Identity → Working Memory	−.01	−0.39	0.07	5.99	.001	[−0.515, −0.261]
Working Memory → Language Achievement	2.81	0.45	0.06	8.13	.001	[0.338, 0.553]
Intellectual Helplessness → Language Achievement	−0.26	−0.13	0.04	3.34	.001	[−0.212, −0.055]
Gender Identity → Intellectual Helplessness	−0.06	−0.24	0.04	5.47	.001	[−0.323, −0.153]
Stereotype Threat by Gender Identity → Intellectual Helplessness	0.03	0.40	0.06	6.27	.001	[0.272, 0.520]
Intellectual Helplessness → Domain Identification	−0.46	−0.13	0.05	2.81	.005	[−0.215, −0.038]
Stereotype Threat → Domain Identification	0.55	0.38	0.08	4.55	.001	[0.217, 0.546]
Gender Identity → Domain Identification	0.59	0.64	0.07	8.65	.001	[0.495, 0.785]
Stereotype Threat by Gender Identity → Domain Identification	−0.10	−0.40	0.11	3.75	.001	[−0.603, −0.189]

Abbreviations: CR, critical ratio; CI, confidence interval; *p*, significance value.

[a]Nonstandardized path coefficients.

[b]Standardized path coefficients.

There was also a correlation between working memory and its predictors: there was a positive correlation between working memory and gender identity as well as between working memory and the interaction of chronic stereotype threat and gender identity. We also observed interesting but not predicted links between gender identity and working memory, and domain identification. Stronger gender identity was associated with higher effectiveness of working memory and higher domain identification.

The results also revealed three separate moderated mediations: (1) from stereotype threat via intellectual helplessness to achievement, (2) from stereotype threat via working memory to achievement, and (3) from stereotype threat via learned helplessness to domain identification.

Next, the indirect effects of the interaction between stereotype threat and gender identity on language achievement mediated by helplessness and working memory performance were assessed (Preacher & Hayes, 2008). All indirect effects were calculated for low (-3 SD), medium (0 SD), and high (3 SD) values of gender identity, and they were significant only when gender identity was high: mediation on domain identification via intellectual helplessness ($\beta = -0.04$, $SE = 0.02$, $p = .01$, 95% CI [−0.08, −0.01]), mediation on achievement via intellectual helplessness ($\beta = -0.02$, $SE = 0.01$, $p = .07$, 95% CI [−0.04, −0.01]), and mediation on achievement via working memory ($\beta = -0.08$, $SE = 0.03$, $p = .001$, 95% CI [−0.14, −0.003]). None of the mediations were significant when gender identity was medium or low.

4.3 | Reversed model

The general test of the reversed model fit was significant and showed no general fit to the data: χ^2 (21) = 855.15, $p < .001$. The inspection of the fit indices confirmed the poor fit: CFI = 0.35, TLI = −0.08, SRMR = 0.23, RMSEA = 0.26, $p < .001$, 90% CI = [0.24, 0.27]. Therefore, there is rather strong evidence that reversed relations between variables, with chronic stereotype threat as a dependent variable and language achievement and identification as predictors, are not plausible.

In summary, our findings indicated that for boys with a high level of gender identification, a higher level of chronic stereotype threat was associated with a higher level of intellectual helplessness, lower language achievement, and lower domain identification with the language. Similarly, higher chronic stereotype threat was related to a lower effectiveness of working memory and lower language achievement, but it was not related with domain identification. Therefore, intellectual helplessness mediated between stereotype threat and both dependent variables (i.e., achievement and domain identification), while working memory effectiveness only mediated the link between stereotype threat and language achievement.

5 | DISCUSSION

Language skills are essential in a modern society. Accordingly, predicting the level of achievement and domain identification in the native language is an important aim of educational research. However, despite the importance of this topic, little is known about the mechanisms explaining the differences between boys and girls in language arts. This imbalance of scientific interest is also present in the extent of research on stereotype threat, with only a few studies presenting consequences of this phenomenon in boys and men in the language (Aronson et al., 1999; Pansu et al., 2016). We believe that the very phenomenon of stereotype threat, among others, may help to explain the gender gap in language skills.

In the present study, we investigated the relation of chronic stereotype threat to achievement and domain identification in boys in the native language. We assumed that repeated experiences of stereotype threat in school settings may accumulate as chronic stereotype threat and be related to a lower achievement in the native language and a lower identification with language domain. We also tested two intervening variables postulated by cognitive

and motivational mechanisms described in the literature (Bedyńska et al., 2018; Schmader et al., 2008), namely working memory and intellectual helplessness. We invited secondary school boys to answer questions about their experiences of stereotype threat, intellectual helplessness at language lessons as well as about their GPA, identification with language, gender identification, and to solve working memory tasks.

Consistent with previous studies (Schmader & Johns, 2003), our results demonstrated that working memory was a significant intervening variable linking chronic stereotype threat and language achievement. A higher level of stereotype threat reported by boys was related to lower efficiency of working memory and lower language achievement, measured by GPA. A similar pattern of results was also obtained in a correlational study in girls' sample (Bedyńska et al., 2018).

Interestingly, the indirect effect via working memory did not work in the case of domain identification. Domain identification was indirectly linked with chronic stereotype threat through intellectual helplessness. Thus, boys who experienced stereotype threat more often during language lessons felt more intellectually helpless and they rated the importance of learning the native language as lower than boys who experienced less stereotype threat in language.

In line with expectations, the proposed model linking chronic stereotype threat with achievement and identification with the native language was significant only in a subsample of boys with a higher level of gender identification. Only among boys for whom being a boy was an important part of their self-esteem, a higher level of chronic stereotype threat was related to lower achievement in language, and lower domain identification. The latter results are in line with several experimental studies suggesting that high group identification (e.g., Schmader, 2002) or a typical masculine or feminine gender role orientation (e.g., Tempel & Neumann, 2015) may intensify the effects of stereotype threat manipulation. Additionally, given that gender identification is likely to strengthen with age, we may assume that the magnitude of relations observed in this study may become stronger at further stages of education. This result is of particular importance for teachers and school psychologists as it may help them in addressing specific psychological interventions to these boys who may be prone to lower domain identification in language arts.

Surprisingly, gender identity was quite strongly and positively related to language achievement and working memory. This positive link between gender identity and cognitive performance may be interpreted as supportive of a general buffering role of group identity for psychological functioning postulated by social psychologists (see Haslam, Jetten, Postmes, & Haslam, 2009, for a review). According to these theories, positive and strong social bonds, leading to positive social identity, are an important source of positive self-esteem (Haslam et al., 2009) and as such they may be associated with higher school performance, and generally better cognitive functioning.

Additionally, it is worth remembering that high gender identity itself is not a factor increasing the risk of boys' lower achievement in language and therefore we did not observe a negative relation between gender identity and language achievement in our sample. As we mentioned above, only individuals who strongly identified with their gender group and often experienced stereotype threat would present lower achievement. It is also possible that in our study we observed two opposite mechanisms involving different gender identification. The first, a more general mechanism, which operates in situations when a negative stereotype about boys being bad at language is not apparent, promotes learning by positive self-esteem and self-efficacy which stems from group identity. The second, a more specific mechanism, which works when stereotype threat is activated, makes boys who are strongly identified with their gender less identified with the domain.

It is also possible that other moderators, such as stereotype endorsement (Schmader et al., 2004) or ability level (Régner, Selimbegović, Pansu, Monteil, & Huguet, 2016), would help to explain this inconsistency in our results. Maybe for boys who do not endorse stereotypes as true, higher gender identification is positively related to achievement, and for those who believe in stereotypes, a stronger identity is related to lower achievement. It would be worthwhile to validate these suggestions in longitudinal studies, in a sample of different age and with a much broader range of potential moderators.

Our study presents several advantages in comparison to other studies on acute and chronic stereotype threat. First, we used a carefully selected random sample of pupils from different regions of the country. Thus, this allows to perceive our study as possible to generalize to a polish sample of secondary school students. Second, we used statistical analyses including information about belonging to the class as a cluster variable to avoid possible inflation of significance due to clustering. It means that even moderately strong relations observed in our results are reliable. Although studies in different countries and at different levels of education are necessary to make more plausible conclusions about the proposed relations, we believe that our study provides suggestive insights into new mechanisms by which chronic stereotype threat may be translated into a lack of domain identification or a further motivational withdrawal.

5.1 | Study limitations

Although the findings supported our predictions, some limitations and suggestions for future research can be formulated. First, follow-up studies with other measures of language achievement (e.g., standardized final or semester tests) are highly recommended to fully replicate the results of the experimental studies on stereotype threat (for review, see Schmader et al., 2008). Second, to make a cause-effect relationship between chronic stereotype threat, intellectual helplessness and achievement a more plausible temporal sequence between variables should be explored. This is only possible in longitudinal studies with at least two measurement time points.

Third, a potential limitation of our study is that only one moderator (i.e., gender identification) was included. The stereotype threat literature posits several important moderators such as domain identification (Aronson et al., 1999; Keller, 2007), the level of achievement (Régner et al., 2016), and stereotype endorsement (Schmader et al., 2004). As Steele and Aronson (1995) stated the knowledge about moderators is important to explore the differences in the mechanism of stereotype threat in different subgroups—for example, high identifiers with the domain or with their own group. We demonstrated that stereotype threat was associated with domain identification via intellectual helplessness in participants who were highly identified with their gender group.

Additionally, we observed a strong positive correlation between gender identification and domain identification in this sample. This result suggests a protective role of positive group identity against negative outcomes of stereotype threat. Further exploration of the mechanisms of this link and its limitations is needed. Finally, it is possible that there were two subsamples of boys under stereotype threat in our sample—boys in the phase of cognitive mobilization and boys that reached the phase of cognitive exhaustion. Thus, the association between the social identity and domain engagement may be an effect of such bifurcation of our sample. Further studies should address this issue.

5.2 | Practical implications

Our results point to some practical implications for the field of educational psychology and for the teaching process. It is essential for teachers and school administrators to be sensitive not only to situational effects of stereotype threat (e.g., lower school performance) but also to possible consequences of chronic stereotype threat (e.g., lower domain identification steering academic trajectories into different domains). From a practical standpoint, it is important to notice that research on stereotype threat has shown that detrimental effects of stereotypes may occur even when learning environment is free of stereotyping and discrimination (e.g., Steele & Aronson, 1995). Cognitive activation of stereotypical content is automatic and may be evoked by very subtle cues, such as information about the type of abilities that are tested or a prime of group identification (Steele & Aronson, 1995).

As suggested by Cox, Abramson, Devine, and Hollon (2012), stereotypes and depression may be similar in their effect on cognitive functioning. This close similarity (at least at the theoretical level) may lead to a development of interventions focused on stereotype threat reduction which would be inspired by programs reducing depressive symptoms. For instance, mindfulness trainings (e.g., Weger, Hooper, Meier, & Hopthrow, 2012) among other cognitive-behavioral

techniques may also be effective in reducing the effects of chronic stereotype threat at schools or in academic settings. Therefore, practical interventions based on mechanisms referring to cognitive and behavioral therapy or mindfulness should be promoted as evidence-based instruments of dealing with stereotype threat at school (Weger et al., 2012).

Additionally, our work suggests that stereotype threat experiences may accumulate as they tend to repeat over time and through lower domain identification may shape students' academic and occupational choices. In light of our findings, the first signal of this process might be a higher level of intellectual helplessness which can be easily identified by a teacher in the classroom. Intellectual helplessness can be diagnosed when a student fails to use their common sense in solving tasks and gives without any hesitation a completely absurd response. For example, they are not able to tell in which country the French Revolution occurred when asked during history lessons. It is also important to bear in mind that the same student is perfectly able to correctly answer questions requiring complex reasoning and flexible thinking at a different school subject. Although research generally points out insufficient teacher's instructional skills as a source of intellectual helplessness (Sedek & McIntosh, 1998), our study suggests other possible origins of this phenomenon, namely stereotype threat. It means that even teachers offering high-quality instructions during lessons may observe the development of intellectual helplessness in students from stereotyped groups. We believe that to reduce intellectual helplessness teachers should take into account the origins of this state to maximize the effectiveness of their interventions.

The practical importance of our results is also visible with regard to the Programme for International Student Assessment (PISA) analysis showing that the gender gap in reading favoring girls is much bigger than in mathematics (Stoet & Geary, 2013). It is important to note that in some domains chronic stereotype threat can be observed not only in minority groups, such as women, but also in so-called majority groups—boys and men. Moreover, the effect can pertain also to skills other than language abilities (e.g., social abilities, empathy, understanding emotions of others) which are stereotypically ascribed to women. Unfortunately, despite its importance this topic seems to be neglected both in scientific and social discourse.

It may also be assumed that a lower perceived importance of learning a native language may affect boys' academic trajectories by shaping their interests in domains different than language and humanities. As previous studies showed (e.g., Woodcock et al., 2012), domain identification may be an important factor contributing to the underrepresentation of some group members (usually ethnic minorities or female students) in an academic pipeline. In African American and Latino samples, scientific identification was negatively related to an intention to persist in sciences and to continue pursuing a career in that domain (Woodcock et al., 2012).

6 | CONCLUSION

To conclude, we have contributed to previous studies on stereotype threat by showing that the conceptualization of stereotype threat as a chronic phenomenon has a predictive value to both school achievement and domain identification by two relatively separate mechanisms. The first mechanism is based on intellectual helplessness and leads to domain disengagement, the second involves working memory deficits and leads to lower language achievement. Although the present research was correlational, the examination of two mediational routes in one model—with a new mediator (i.e., intellectual helplessness)—offers an important contribution to understanding the long-term consequences of chronic stereotype threat in school settings. The value of this information can be seen in its potential for guiding interventions to reduce the chronic effects of stereotype threat.

ACKNOWLEDGMENTS

The presented study was part of the system-level project “Quality and effectiveness of education—strengthening institutional research capabilities” executed by the Educational Research Institute and co-financed by the European Social Fund (Human Capital Operational Programme 2007–2013, Priority III High quality of the education system).

CONFLICT OF INTERESTS

The authors declare that there are no conflict of interests.

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How to cite this article: Bedyńska S, Krejtz I, Rycielski P, Sedek G. Stereotype threat is linked to language achievement and domain identification in young males: Working memory and intellectual helplessness as mediators. *Psychol Schs*. 2020;57:1331–1346. https://doi.org/10.1002/pits.22413