Self-affirmation and test performance in ethnically diverse schools: A new dual-identity affirmation intervention

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Abstract

Ethnic minority underachievement remains a problem in many countries, and affirmation interventions offer a promising approach to help reduce the achievement gap. We compared the effects of a conventional self-affirmation intervention with a dual-identity affirmation on test performance in a minority-concentrated school (56% Black pupils), in London, UK (N=179, M_age=12.29). A randomized design consisted of a new dual-identity condition, a traditional self-affirmation condition, and two control conditions—a ‘one-group’ condition and a non-affirmation control condition. Teachers implemented the interventions in class, and test performance was the outcome measure. As expected, we found Black pupils outperformed non-Black pupils when they undertook a dual-identity affirmation exercise, while non-Black pupils outperformed Black pupils in the traditional self-affirmation condition. Stereotype threat partially mediated this effect: Dual-identity was less threatening for Black pupils than for non-Black pupils, increasing the test performance of Black pupils. We propose dual-identity affirmation as a promising affirmation intervention to reduce threat and improve performance for underachieving minorities in ethnically diverse settings. Implications for teachers as key players in affirmation interventions are discussed.

Key words: Dual-identity, Self-affirmation Intervention, Stereotype Threat, Minority Performance
Self-Affirmation and Test Performance in Ethnically Diverse Schools: A New Dual-Identity Affirmation Intervention

Ethnic minority underachievement remains a problem in many countries, such as the US, UK, and elsewhere (Appel, Weber, & Kronberger, 2015; Bohrnstedt et al., 2015). Students of color are especially vulnerable as they remain one of the lowest achieving ethnic groups where they form a sizable minority, for example in the UK (Department of Education, 2015), and the US (Bohrnstedt et al., 2015). While there are many factors that can contribute to this achievement gap, such as societal inequality, structural racism, and economic factors, there have been promising studies into the psychological factors that can be highly effective at narrowing the attainment gaps (Easterbrook & Hadden, 2020; Sherman et al., 2021). Studies have shown that one psychological reason for underperformance in such groups is the experience of stereotype threat—the fear of confirming a negative, performance-related group stereotype (e.g., “my group performs poorly in school”)—which can lead to a confirmation of such a stereotype and thus underperformance (Steele et al., 2002). Stereotype threat can be understood as a specific instance of the wider concept of social identity threat, which occurs when one’s (minority) identity is devalued in a given social context (Ellemers, Spears, & Doosje, 2002; Sherman et al., 2013). Both types of threat arising from any negative contingencies that are tied to one’s identity may lead to underperformance in immediate tests or in the long-term through disengagement or disidentification with the academic domain. For disadvantaged ethnic minorities, this experience of threat can be “in the air” in academic settings (Steele, 2011).

Promising solutions to ethnic minority underachievement are self-affirmation interventions. These have had remarkable success in improving minority students’ school achievement even two or three years later (Cohen et al., 2006; Cohen et al., 2009; Goyer et al., 2017; Sherman et al., 2013). The traditional self-affirmation exercise reminds minorities
of their core individual values; this seems to buffer stereotype threat as a source of identity threat, thus allowing pupils to sustain task engagement (Harris, Harris, & Miles, 2017) and perform to their potential (Cohen & Sherman, 2014; Steele et al., 2002).

We build upon previous research that focuses on an interpersonal solution to the effects of negative group stereotypes (i.e., via self-reflection on personal values), and explore an intergroup approach to the issue. In highly diverse contexts, where minorities’ group identities are salient, it may be more efficacious to use an identity affirmation exercise which communicates the value of minorities’ diverse social identities. This should counteract the chronic threat associated with one’s negatively stereotyped identity, allowing pupils to sustain engagement (Baysu et al., 2016) and reduce performance gaps between minority and majority youth (Celeste et al., 2019). In this study, we introduce a new dual-identity affirmation for use with disadvantaged minority pupils in highly diverse school contexts. In such situations, dual identities are potentially more relevant than one’s individual self and values. To this end, we combine the self-affirmation and stereotype threat literatures with social identity and acculturation research, which look at how minorities combine multiple social identities and cultures and what the most prevalent and beneficial identity strategies are (Brown & Zagefka, 2011; Sam & Berry, 2010). Particularly in a public domain such as the school context, it has been repeatedly shown that disadvantaged minorities prefer, and benefit more from, recognition of their minority culture and identity together with their connection to the majority identity and culture – that is, a dual identity strategy (Brown & Zagefka, 2011; Sam & Berry, 2010). We propose that affirming minorities’ dual-identity (their distinct ethnic minority identity and a common national identity) could counteract the chronic threat associated with their identity(ies), allowing them feel valued and engaged in school (Derks, Van Laar, & Ellemers, 2007; Glasford & Dovidio, 2011). We also bring forward the two important features of the social context of affirmation, as explained in the next section.
The Social Context of Affirmation

While the social context of self-affirmation interventions (such as the pedagogical climate in the classroom) has been central in theorizing the self-affirmation effects on performance (Cohen & Sherman, 2014), earlier affirmation studies (but see Borman et al., 2018; Hanselman et al., 2014) have not explicitly incorporated into the procedure the power of the social context in which the affirmation intervention is occurring. Previous research shows that self-affirmation is not effective if the students know that it is an intervention (Cohen & Sherman, 2014). Why? Because it is the role that the teachers play which has such an impact on self-affirmation exercises.

Cohen and Sherman (2014) recognize that the teacher’s involvement in the self-affirmation procedure provides institutional support. This recognition of teachers as institutional support, as contextual influencers, is the direct link from self-affirmation literature to the social identity literature. We know from the latter that what is communicated by the social context is key to understanding which identities are salient and which identities are valued, which then predict minorities’ experiences of inclusion and thus performance (Baysu, Phalet, & Brown, 2011). Moreover, previous research on contextual factors shows that classroom-level (Celeste et al., 2016) and school-level norms and policies (Celeste et al. 2019) can influence minority inclusion and thus achievement, particularly in highly diverse settings. Thus, in line with others, we argue that the mechanism that makes traditional self-affirmation durable is the teacher’s role (as a representative of the school) in creating an inclusive environment to tackle the chronic threat. We capitalize on this mechanism of traditional self-affirmation on the role of the teacher and purposefully introduce all intervention conditions (self-affirmation included) as a new school policy, endorsed by the teacher, aiming to facilitate a welcoming environment. Thus, with our procedure we bring the
affirmations to the school-level (not just individual) and therefore emphasize the impact teachers can have in creating a welcoming normative environment.

Another important feature of the social context of affirmation is the school-level diversity. Traditional self-affirmation studies have mostly been conducted in relatively homogeneous school environments where there was a clear advantaged White majority and a single disadvantaged minority group of color (e.g., Black students: Cohen et al. 2006; 2009; Latino students: Sherman et al., 2013). In the present research we adapt and extend these successful self-affirmation interventions to fit “majority-minority” school environments, where several ethnic minorities can make up the numerical majority and where there is no clear advantaged White majority. Such levels of minority concentration have increasingly become the reality in the UK and elsewhere (Vertovec, 2007) in which “traditional social, cultural and geographic boundaries have given way to increasingly complex representations of identity” (Crisp & Turner, 2011, p. 244). To the extent that multiple social identities are more salient in diverse contexts (Crisp & Turner, 2011), paying attention to those social identities through their valuation and affirmation might be more useful in diverse settings than traditional self-affirmation alone.

To this end, we conducted a field intervention in a diverse majority-minority (i.e., Black minorities as the numerical majority) secondary school in London, UK. Teachers implemented the intervention as an affirmation exercise for pupils, asking them to write about their values or views as part of a ‘new school policy’. The policies focus on students’ individual self or on their dual-identities as minorities in school. We tested a new dual-identity affirmation against a conventional self-affirmation intervention and two control conditions, with test performance as the outcome measure. In addition, while most affirmation research suggests that affirmations reduce chronic stereotype threat (of confirming negative stereotypes), thus improving performance (Steele, Spencer, & Aronson, 2002), no studies to
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our knowledge explicitly show the mediating role of perceived stereotype threat (although others have used indirect measures such as word-fragment completion tasks; Cohen et al., 2006; or have measured stereotype threat but not found mediation; Hadden et al., 2019). We follow up this previous research by testing one possible mechanism underlying the outcome of the intervention.

In sum, starting from the traditional self-affirmation as an established manipulation, we add our novel manipulation targeting minorities’ dual identities for affirmation to investigate possibly naturally occurring variants of affirmation processes in response to identity threat in one particular highly diverse intergroup setting. Accordingly, this paper sought to answer the following questions: Do the effects of self-affirmation interventions differ in a very diverse school setting? Given a multicultural context, where multiple social identities are salient, which identity is it best to affirm? Can perceived stereotype threat be an underlying mechanism for the intervention effects?

Self-Affirmation Interventions

To address underachievement of disadvantaged minority students, traditional self-affirmation interventions (Cohen et al., 2006; 2009; Sherman, 2013) employ a simple self-focused writing task: Students are given the chance to reaffirm their personal values in a writing exercise, choosing their most important value from a list (e.g., family, religion, creativity) and explaining why this is important to who they are. In the control condition, students write either about why their least important value might be important to others, or about a neutral topic (Cohen et al., 2009). Cohen and his colleagues (2006) showed that self-affirmed Black students’ school performance (course grades) improved compared to Black students in the control condition, reducing the achievement gap between Black and White students by 40%, while White students were not reliably affected by the self-affirmation manipulation (Cohen et al., 2006). Particularly for low-achieving Black students, these effects
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on school performance persisted for two years (Cohen et al., 2009). However, it should also be noted that others have not found such large effects and even reported a decrease in performance for some groups (e.g., female students, Dee, 2015).

This paper adds to existing self-affirmation research in four ways:

First, we test the effectiveness of a self-affirmation intervention in a minority-concentrated school context, an increasingly common yet under-researched educational setting. Traditionally affirmation interventions have been conducted in schools where there was a clearly advantaged White majority group outperforming their (Black or Latino) minority peers but, more recently, affirmation studies conducted in more diverse schools have yielded mixed results (Borman et al., 2018; Bratter, Rowley, & Chukhray, 2016; Dee, 2015; De Jong et al., 2016; Hanselman et al., 2014). For instance, Hanselman et al. (2014) found that in schools with low-minority group presence self-affirmation was effective in reducing the achievement gap, but in schools with “high”-minority group presence self-affirmation had no effects (although they note that these differences in minority presence are relative, since Whites were still the numerical majority in these schools, with an average of 25% Black students, and 20% Latino students). In contrast, Dee (2015) found that for Black students, self-affirmation was largely unsuccessful, except for in classrooms of over 70% Black peers, and suggested that this is because these classrooms create a supportive context necessary for these effects (Yeager & Walton, 2011). Moreover, De Jong et al. (2016) purposefully selected highly diverse schools in the Netherlands (ranging from 32% to 74% ethnic minorities, with most classrooms up to 90% ethnic minorities) replicating the procedure of Cohen et al. (2006; 2009). Across two longitudinal studies De Jong et al. found no effects of traditional self-affirmation for the most disadvantaged pupils in these contexts and suggest that there are broader, contextual, factors that could explain differences in intervention results. We argue that the minority-concentrated context plays a key role in the relevance of salient identities,
and thus relevance of identity affirmation. Given these mixed results across a variety of contexts, we investigate if in a minority-concentrated setting affirming the self without addressing the salient dual-identities will have the desired effects of reducing the achievement gap.

Second, we test a new procedure by introducing the affirmation exercises purportedly as a new school policy towards diversity, endorsed by a teacher as a representative of the school. Cohen and Sherman (2014) argue that affirmation interventions’ long-term effectiveness stems from the creation of a positive feedback loop, where minorities can re-affirm themselves in the face of identity threat. One technique in traditional affirmation interventions is the ‘stealthy’ approach, which relies on the fact that students do not see the affirmation as an intervention (Cohen & Sherman, 2014; Yeager & Walton, 2011). When researchers implement the intervention as part of an in-class assignment, given by the teachers, this type of affirmation intervention can last up to three years (Cohen & Sherman, 2014; Sherman et al., 2013). Therefore, in contrast to previous affirmation interventions, we introduce the affirmation exercises as a new school policy towards diversity, bringing affirmations to the school-level, rather than the (traditionally) individual level.

Third, we measure perceptions of identity threat as an underlying mechanism of affirmation interventions. Central to understanding self-affirmation effects is identity threat: self-affirmations aim to improve self-integrity enough to confront threat and thus improve performance or problem solving (Cohen & Sherman, 2014). In a similar process at the school-level, school policies which communicate the value of diverse identities, should affirm the value of minorities’ social identities. In turn, this should buffer the identity threat, allowing pupils to sustain engagement (Baysu et al., 2016) and reduce performance gaps between minority and majority youth (Celeste et al., 2019). Yet, while self-affirmation research claims to reduce threat, threat has seldom been directly measured in order to verify the explanatory
processes presumed to be involved in self-affirmation. Accordingly, we test perceptions of threat as a mediating process between affirmation and performance.

Fourth, we go beyond existing self-affirmation research by introducing a ‘dual-identity’ affirmation (affirming both an ethnic and common national identity) as a more effective strategy for minorities to deal with identity threat in a diverse context where dual identities are chronically salient. We will measure minorities’ dual identities (whether they combine multiple ways of living) before and after the affirmation exercise, to see if the (dual-identity) manipulation influences the strength of dual-identities.

**Dual-Identity Affirmation**

In today’s diverse societies, many more individuals are endorsing dual-identities (thus combining values, traditions, and/or ways of living from more than one culture) (Nguyen & Benet-Martínez, 2013; Sam & Berry, 2010). Dual-identity can be particularly beneficial in terms of social and psychological adjustment, if the context communicates support for both identities. For example, a study found Chinese American dual-identifiers were more creative in an environment that communicated bicultural cues (both Chinese and American) versus in a context communicating mono-cultural cues (for either American or Chinese cultures) (Saad et al., 2013).

Dual-identity affirmation (affirming a combined ethnic and common national identity) offers a way to include both identities whereby the school environment communicates the values of both identities, reaffirming the minorities’ worth in the given environment while also communicating shared values (Derks et al., 2007; Glasford & Dovidio, 2011). This group affirmation should give minorities the resources to see the identity threat as a surmountable challenge, rather than an unbeatable threat (Derks et al., 2011). A dual-identity affirmation may be a more adaptive strategy to deal with identity threat by addressing both cultural identities in a diverse context where dual-identities are chronically salient for disadvantaged
pupils. In other words, affirming the self without addressing salient dual identities as part of the self might not be as efficient to override the potentially chronic identity threat that a diverse multi-ethnic setting is likely to create. We argue that our approach to a dual-identity affirmation can be beneficial in improving minority pupils’ academic performance, through a similar contextual mechanism as self-affirmation: creating an inclusive school climate, reducing threat, and thus increasing performance.

Others have advocated that it can be beneficial for minorities to focus on only a single common (national) in-group identity as a way to increase inclusiveness and improve intergroup relations (Dovidio, Gaertner, & Saguy, 2007). Relatedly, it has been shown that immigrant minorities who value their national identity perform better than low national-identifiers in the face of an explicit stereotype threat manipulation (Weber, Appel, & Kronberger, 2015). However, re-categorization of minorities into one common group can also be understood as a ‘colorblind’ or ‘assimilationist’ strategy (Dovidio et al., 2007), in which minorities can be fully included only by adopting the mainstream cultural identity. Such an assimilationist strategy risks reinforcing the dominance of the majority group, leaving minorities feeling less included and less valued (Verkuyten, 2005). Particularly in contexts with high levels of minority concentration, a ‘one-group’ affirmation may be less effective than both the dual-identity affirmation and self-affirmation. We will use a one-group affirmation as a type of group affirmation control condition, to test against dual-identity and self-affirmations.

The Present Research Context

To examine the effects of self-affirmation in a more minority-concentrated setting, we conducted our intervention in an ethnically mixed borough of London, in which 63% of the secondary school population in this borough had a minority background (including non-Black backgrounds) and 29% had a Black minority background (Department of Education, 2013). In
the UK context, ‘Black’ signifies people (whose families originate) from Africa or the Caribbean and people of mixed Afro-Caribbean/African/White background. Similar to other schools in the region, the school involved in our study comprised minority pupils of several backgrounds, all disadvantaged to some degree. Nevertheless, Black pupils made up more than half of the school’s composition and were the most disadvantaged. Non-black pupils in this school were of a variety of immigrant origins.

With this research we tested a new dual-identity affirmation (affirming British identity as well as minority ethnic background), against a traditional self-affirmation intervention (affirming pupils as individuals), and two control conditions: one-group affirmation (affirming British identity only) and control (no affirmation). In our diverse context, we study Black pupils (of Afro-Caribbean, African and mixed Black backgrounds) and compare them to less-disadvantaged non-Black pupils. We use the term ‘ethnic background’ to inclusively mean ‘ethnic-racial identity’ (Umaña-Taylor et al., 2014). Black pupils arguably experience the most prejudice in the UK (Abrams & Houston, 2006) and are the lowest achieving ethnic group currently and historically (Department of Education, 2015). Black pupils may also face teachers’ stereotypes or low expectations (Crozier, 2005), or fears that they will reinforce such negative stereotypes (‘stereotype threat’), which can entail a downwards spiral of underachievement (Crozier, 2005), making them prime targets for our intervention.

In this context, we expect pupils will perform better in the affirmation conditions, compared to the control conditions (H1). We expect dual-identity and self-affirmation to have different effects on performance and this difference to depend on ethnic background (moderation of affirmation condition by ethnic background): (H2) Black pupils will perform better in the dual-identity condition (compared to self-affirmation); and (H3) stereotype threat will mediate these differences in H2 (mediated moderation) so that the dual-identity condition will decrease threat and increase performance for Black pupils. However, since non-Black
pupils in this study were also of a variety of immigrant origins, unlike the typical white
majority pupils in the original affirmation studies, we did not have any specific hypothesis as
to whether and how their performance would be affected by our experimental manipulation.

Method

Participants

Participants were all pupils (age 11-13) in the first two years of secondary school.
Specifically, this study was conducted in English class for all Year 7 students (4 classrooms)
and all Year 8 pupils (4 classrooms) involving 5 different teachers.¹ Pupils were from a super-
diverse UK school in an ethnically mixed borough in the metropolitan area of London (N =
179; Male = 54%; M_age = 12.29). Demographics were provided by the school administration.
Pupils were diverse in many ways: most were not born in the UK (N = 97 or 54%; for non-
native born, average time in the UK was 3.5 years), most had English as Additional Language
(EAL N = 102 or 57%), and many were eligible for additional governmental funding (Pupil
Premium) to raise attainment of economically disadvantaged pupils (as a proxy of low SES)
(PP, N = 74 or 41%). While these pupils were all somewhat disadvantaged in terms of social
status, with no one clear advantaged group, in terms of performance, non-Black pupils
typically out-performed Black pupils in the UK.²

We used school ethnicity data, in combination with corresponding self-reported
country of birth and self-identification, to identify Black pupils (Black African/Black
Caribbean/mixed parentage Black/Other Black background; N = 100) versus non-Black pupils
(N = 79). Non-Black pupils reported various ethnic-racial backgrounds³, with the largest
groups being European (Eastern, N = 24; Western N = 12), South-Asian (N = 20), and only 9
White-British pupils (only 2 of whom themselves, parents and grandparents were born in the
UK).

Design
The design was a 4 x 2 between-subjects design: Condition (self-affirmation, dual-identity, one-group control, non-affirmation control; between-participants manipulation) x Ethnic background (coded as Black = 1 vs. non-Black = 0). Self-affirmation N = 42 (25 Black), dual-identity N = 48 (29 Black), one-group N = 45 (25 Black), non-affirmation control N = 43 (21 Black); (1 non-Black participant received differing conditions at time 1 and 2, so was removed from all analyses).  

Procedure

Our procedure was modelled on Cohen et al. (2006; 2009) and Sherman et al. (2013, Study 2). However, instead of using a ‘stealthy’ approach, we tested a new overt procedure for self-affirmation interventions, asking teachers to instruct their pupils to write about their values or views as part of a ‘new school policy’. Teachers were aware that there were different conditions, and were carefully trained to implement the interventions, and closely followed the script from Sherman et al. (2013) to introduce the exercise and answer any questions that arose. Teachers implemented the intervention during normal class time by distributing envelopes which contained a single-page intervention writing task and the puzzle task packet. Each envelope was sealed and had the pupil’s name printed on it as a way to personalize it and keep teachers blind to the condition assignments (Sherman et al., 2013). After distributing the envelopes, teachers read aloud instructions from a script which introduced the task in class as “a short writing exercise, followed by a puzzle quiz.” Assignment to conditions was randomized within the 8 classrooms, thus the writing tasks were visually similar to minimize the chances of pupils noticing differences across conditions. After pupils completed the intervention and puzzle quiz they put the tasks back into the envelopes, the teachers collected them. The envelopes were returned to the researcher at a later date and after school hours to minimize the possibility of pupils linking the researcher to the intervention.
The researcher first administered a pre-questionnaire to obtain background information and initial thoughts of pupils at the beginning of the school year (2nd-3rd week of school). Each intervention session was conducted twice, four weeks apart, to “boost” the effects of the intervention (Cohen et al., 2009; Sherman et al., 2013). Intervention sessions were administered as early in the school year as possible, based on the findings that affirmation interventions may have the largest effects as pupils are in a transitionary period or at the start of a new school year (Cohen & Sherman, 2014). Both intervention sessions were followed by an 18-item cognitive test as a measure of performance. In the second and final session, after pupils completed the cognitive test and the envelopes were collected by the teacher, the teacher signaled to the researcher, who entered the classroom to present pupils with a post-questionnaire. After completing the post-questionnaire the researcher debriefed pupils, clarifying that the school policies mentioned in the manipulations were fabricated and answered any follow up questions. Researchers explained that the aim was to understand students' reactions to different types of school policies and that there would not be any changes made to their actual school policies; students raised no concerns. Pre- and post-questionnaires were administered by the researcher to keep the activities separate and seemingly unrelated. There were four different conditions as explained below, but each condition was delivered in a similar format (see supplemental material for descriptions of all manipulations and measures used).

All intervention conditions were in the form of a worksheet titled “School Policy Writing Task;” the non-affirmation control was titled “School Writing Task.” Next, all conditions stated “Please read what is written below and then follow the instructions. After you write your answers, be sure to answer the questions on the back. The teachers at [name of] High School want to hear your thoughts!” After this, all intervention conditions (except for the non-affirmation control) read: “To increase harmony in our school, the teachers and
staff want to get your opinions about a new policy towards diversity that will soon be used at our school” followed by the manipulation-specific text as described below.

**Self-Affirmation:**

In this condition, the alleged new school policy emphasized the importance of individuals and their personal values. “*Our New School Policy: As a school, we value each student as an individual. Your teachers value what matters to you, your ideas, your beliefs and your life. Because of our new school policy, your teachers want to know: What is the most important thing in your life? Circle ONE that is the most important to you*” (Examples: Being with Friends/Family, Being Religious, Being Independent, Being Smart or getting good grades, Listening to Music or Playing Music, Being Creative) (taken from Sherman et al., 2013, time 1 and 2 values list). Pupils then read: “*Now write in a few sentences why this is important to you. Try to include at least 3 reasons why this matters to you. Try to use examples from your own life (if you can) to explain your reasons. Be sure to focus on your thoughts and feelings, and don’t worry about spelling or how well written it is.*”

**Dual-Identity:**

In this condition, the new school policy emphasized the importance of pupils’ individual cultural backgrounds as well as everyone’s shared British identity. “*Our New School Policy: As a school, we believe that people from all different cultural backgrounds living in the UK have their own culture and traditions, as well as being British. We value students’ common identity as British as well as their minority cultural backgrounds. Minority cultural backgrounds are as important as the British identity.*” Pupils then read: “*We would like your help in explaining this new school policy to new students that will be coming to your school next year. Please write a list of at least 3 reasons explaining why you think this policy is good for our students. Try using examples from your own experiences at school (if you can)*
to explain your reasons. Be sure to focus on your thoughts and feelings, and don’t worry about spelling or how well written it is.”

**One-Group Control:**

In this condition, the new school policy emphasized the importance of a shared British identity, inclusive to all pupils. “Our New School Policy: As a school, we believe that people from all different cultural backgrounds living in the UK belong to one group: we are all British. We value students’ common identity as British. Our common British identity is more important than anything else.” Pupils were then given the same writing-task instructions as in the dual-identity condition.

**Non-Affirmation Control:**

Here we did not induce a school policy but used a neutral task of similar length. “Today’s writing task: We want to know what your daily morning routine is like. For this writing exercise, please describe your usual morning routine. You can write about what you usually do (even if this isn’t exactly the same every day). Examples could include: what you do to get ready; what you have for breakfast; how you get to school. As the writing task, pupils then read: “Please write about at least 3 things you do during your morning routine before you arrive at school. Use examples from your own experiences to explain your morning routine. Be sure to focus on your thoughts and feelings, and don’t worry about spelling or how well written it is.”

At the start of the school year, teachers completed opt-in consent forms consenting to themselves and their classes to participate. Parental information sheets and opt-out consent forms were sent home to parents in the first week of school. Additionally, pupils were
reminded during the pre- and post-questionnaire sessions that their responses were confidential, would not be shared with anyone, and that they could withdraw at any time.

**Measures**

**Cognitive Task**

The cognitive task was Raven’s Standard Progressive Matrices intelligence tests, sets A-D (Raven, Raven, & Court, 2000, updated 2004). Each item consists of a set of geometric symbols which form a logical pattern, with the last part of the pattern missing, and pupils must complete the pattern by choosing the correct multiple-choice option. These matrices consist of 12 items per section which get increasingly harder and are timed. These types of items are aimed at being more culture-fair, relying less on language mastery than verbal ability tests, and for this reason, have been used in previous stereotype threat research (Baysu et al., 2016). Moreover, a meta-analysis on stereotype threat studies with immigrant populations has shown that effects are stronger on cognitive ability tests than with other performance measures, such as verbal or math tests (Appel et al., 2015) which is what classroom grades most typically capture.

Items were presented in a paper and pencil booklet as puzzle tasks, and pupils were given only 5 minutes to complete them. In our first session we used the easier end of the spectrum, A-C (odd numbered items; 18 items in total). After the first session, we coded the answers *incorrect* (0), *correct* (1), and assessed that the test was slightly too easy (*M* = .79 correct *SD* = .21; Median = .89, 22 scoring 100% correct). Thus, in the second session we used slightly more difficult sets B-D, using even numbered 18-items (*M* = 61% correct *SD* = .72; Median = .68; 3 scoring 100% correct).

**Stereotype Threat**

We used the single-item measure from Cohen and Garcia (2005) “In my school, I worry that people will draw conclusions about my cultural group, based on my performance”
[as a specific measure of perceived stereotype threat]. This was measured in the pre- and post-intervention questionnaire using a 5-point scale, from (1) not at all to (5) very much.  

**Dual-Identification**

To measure the relevance of pupils’ dual-identities in the given context we asked pupils “Do you feel that you have more than one ‘way of living’? (For example: you combine a different language or traditions at home with those at school).” This was measured in the pre- and post-intervention questionnaire using a 5-point scale, from (1) not at all to (5) very much.

**Control Variables**

Pupil information (age, gender, country of birth, grades) was assessed in the pre-intervention questionnaire and confirmed by school administrative data. We controlled for half-term math grades, assessed earlier in the school term, before the first intervention. Age, gender (male = 0), country of birth (1 = born in the UK, 0 = not), EAL (1 = English as additional language, 0 = native speaker), Pupil Premium (1 = eligible, 0 = not) and pre-intervention English grades did not have any significant effects on performance, thus were omitted from the analyses.

**Results**

Results are presented in three sections. First, we report the principal effects of the intervention itself. Second, we report results of our mediation analyses. Third, we report supplemental analyses.

**Main Analyses**

Means, standard deviations, and correlations are reported in Table 1. Figure 1 shows the performance scores (% correct) by each condition and ethnic background, controlling for pre-intervention math grades based on means estimated in Mplus. To test our first hypotheses, that pupils would perform better in the manipulation conditions compared to the control (H1),
and that the interaction between our manipulation conditions and ethnic background would predict performance (H2), we conducted structural equation models in Mplus (Muthen & Muthen, 1998-2012) using Maximum Likelihood estimations with robust standard errors.\(^7\) We used three planned orthogonal contrasts coding for our intervention conditions in line with our hypotheses.\(^8\) Contrast 1 tested the effectiveness of the three affirmation conditions (each coded 1) versus the non-affirmation control condition (-3). Contrast 2 tested the effectiveness of dual-identity (1) and self-affirmation (1) versus one-group control (-2). Finally, Contrast 3 tested the effectiveness of dual-identity (1) versus self-affirmation (-1). We also included interactions of each contrast effect with ethnic background, to test if the effects of the conditions were differentially effective for Black and non-Black participants.

We first estimated a model including pre-math grades as a control variable, main effects of all three contrasts and ethnic background, as well as interactions of ethnic background with each contrast effect. Unstandardized effects are reported in Table 2, Model 1. First, results showed no significant differences in cognitive performance between the three affirmation vs. the non-affirmation control condition (Contrast 1), and dual-identity and self-affirmation vs. one-group control conditions (Contrast 2), not supporting Hypothesis 1. Results of this model revealed that Contrast 3 approached significance (dual-identity vs. self-affirmation intervention) \((B = -0.064, p = .092, 95\% \text{ CI } [-0.137, 0.010])\), that those in the self-affirmation condition had marginally higher performance than those in the dual-identity condition. As expected, when comparing the dual-identity affirmation vs. the traditional self-affirmation (Contrast 3), we found a significant interaction with ethnic background, \(B = 0.139, p = .007, 95\% \text{ CI } [0.038, 0.240]\), in line with Hypothesis 2.

To unpack interactions, the Wald chi-square tests can be used in Mplus (Muthen & Muthen, 1998-2012). In line with Hypothesis 2, Black participants performed better when their dual-identity was affirmed, compared to the traditional self-affirmation, Wald \(\chi^2(1) = \)
4.604, \( p = .032 \); and Black participants also performed marginally better than non-Black participants in the dual-identity condition, Wald \( \chi^2(1) = 3.733, p = .053 \). Non-Black participants performed marginally better in the self-affirmation condition than in the dual-identity condition, Wald \( \chi^2(1) = 2.847, p = .092 \) and, unexpectedly, non-Black participants performed significantly better than Black participants in the self-affirmation condition, Wald \( \chi^2(1) = 6.562, p = .010 \). The significant differences are also indicated in Figure 1.

**Mediation**

We tested Hypothesis 3, whether the interaction between the dual-identity intervention (vs. self-affirmation) and ethnic background was mediated by perceived stereotype threat at time 2 (mediated moderation) (Muller, Judd, & Yzerbyt, 2005). In line with Preacher and Hayes (2008), to test mediation, we included pre-intervention threat and all effects from our first model, (including ethnic background, the contrasts, and the interaction of ethnic background and each contrast) on post-intervention stereotype threat, and in the same model included all effects on performance at time 2 (Table 2, Model 2). The Contrast 3 x Ethnic Background interaction significantly predicted threat \( (B = -0.723, p = .022, 95\% \text{ CI } [-1.340, -0.106]) \), and threat significantly predicted performance \( (B = -0.29, p = .011, 95\% \text{ CI } [-0.510, -0.007]) \), showing the greater the threat participants felt after the intervention, the lower their performance score. Moreover, the interaction of Contrast 3 x Ethnic Background predicting performance, was reduced from the previously significant effect (Table 2, Model 1) to an effect that approached significance (Table 2, Model 2, \( p = .07 \)). The Goodman test — used for an unbiased estimate of the variance of the mediated (i.e., indirect) effect of the interaction on performance (Preacher & Leonardelli, 2015) — revealed that the indirect effect of the interaction effect on performance approached significance, \( z = 1.93, p = .054 \).

As expected, Wald tests revealed that Black participants perceived significantly less threat than non-Black participants in the dual-identity condition, Wald \( \chi^2(1) = 16.884, p < \)
Non-Black participants experienced significantly less threat in the self-affirmation than in the dual-identity condition, Wald $\chi^2(1) = 4.325, p = .038$. For Black participants, there was no significant difference in threat between the self-affirmation and dual identity conditions, Wald $\chi^2(1) = 1.103, p = .293$. There was no significant difference in threat between Black and non-Black participants in the self-affirmation condition, Wald $\chi^2(1) = 0.00 p = .990$. Figure 2 shows the stereotype threat scores.

Figure 3 shows the results of this final (partial) mediation model, with only significant pathways shown. Thus, the dual-identity affirmation was more beneficial for Black pupils, while the self-affirmation intervention was more beneficial for non-Black pupils in terms of reducing identity threat, and subsequently improving performance.

**Supplemental Analyses**

From our main analyses there were three points we sought to clarify further: (1) why did Black pupils perform better in the dual-identity condition than non-Black pupils, (2) why did Black pupils perform so poorly in the self-affirmation condition relative to non-Black pupils? (3) Did the school context in terms of concentration of minority pupils make a difference?

To address these three points we conducted further analyses.

In response to the first question, we had argued that the dual-identity affirmation might be most beneficial and relevant for disadvantaged minority participants, here, the Black pupils. Accordingly, we find that 94% of Black participants agree with the policy in the dual-identity condition, compared to only 70% of non-Black participants. Moreover, we found that Black pupils reported significantly stronger dual-identification ($M = 3.44, SD = 1.43$) than non-Black pupils ($M = 2.88, SD = 1.4$), $t(133) = 2.31, p = .023, 95\%$ CI [0.080, 1.050].

We tested whether self-reported dual-identification was really affirmed or enhanced in the dual-identity condition. To this end, we conducted an ANCOVA with ethnic background
and condition predicting post-intervention dual-identification, controlling for pre-intervention dual-identification. As we controlled for pre-intervention levels of dual-identification, a relative increase in dual-identification can be attributed to our conditions. The main effect of ethnic background (Black vs. non-Black) was significant, \( F(3,123) = 4.71, p = .032 \) (Black \( M = 3.39 \), Non-Black \( M = 2.85 \)). The main effect of condition was not significant \( F(3,123) = 1.34, p = .265 \) and neither was the interaction of Condition x Ethnic Background \( F(3,123) = 1.00, p = .395 \), but estimated marginal means showed the trend that participants in the dual-identity condition reported the strongest dual-identification (one-group \( M = 2.85 \); dual-identity \( M = 3.51 \); self-affirmation \( M = 3.00 \); non-affirmation control \( M = 3.13 \)). Pairwise comparisons revealed that only the difference between dual-identity and one-group conditions approached significance \( p = .057 \).

This pattern of results suggests that, in general, Black pupils were more strongly dual-identified than non-Black pupils, though a slight increase in their dual identification in the dual-identity affirmation condition was not significant.

Secondly, to better understand the unexpected effect of Black pupils performing poorly in the self-affirmation condition compared to non-Black pupils, we looked more closely at the self-affirmation condition (see also supplemental material). We counted the “most important values” that the pupils chose to write about. We found that the most common choice for Black pupils was “being smart/getting good grades” \( 38\%; N = 8/21 \) versus non-Black pupils \( 21\%; N = 3/14 \).\(^{10}\) This may have contributed to why Black participants performed worse than non-Black participants in the self-affirmation condition.

In response to the third question, we used the diversity argument as a heuristic tool since we only had one school with a high level of minority-concentration and no school to compare. Still, we were able to test whether or not the minority-concentration at the class level (% of Black pupils in class; \( M = 56\%, SD = 1\%, \) range from 35% to 79%) had an effect
on performance and dual-identification. We did find a consistent cross-level interaction between %Black pupils x Contrast 3 (dual-identity vs. self-affirmation), $B = 0.532, p < 0.001, 95\% \text{ CI } [0.351, 0.694]$ (in addition to the significant individual-level interaction between Contrast 3 x Ethnic Background, $B = 0.087 \ p = 0.040, 95\% \text{ CI } [0.004, 0.170]$). This interaction showed that pupils in the dual-identity condition performed significantly better in classes with higher concentration of Black minority pupils (compared to lower concentration), while the reverse was true for self-affirmation. Moreover, testing the same predictors’ effects on dual-identification, we found a significant classroom-level effect for %Black pupils in class predicting dual-identification $B = 2.412, p = 0.003, 95\% \text{ CI } [0.833, 3.990]$. This showed that greater classroom-level minority-concentration predicted stronger dual-identification. Taking the effects of minority-concentration together, this supported our reasoning that dual-identity affirmation was more beneficial for performance in classes with more Black pupils and dual-identity affirmation was more beneficial for Black pupils. In line with our heuristic argument from super-diversity, dual-identification was stronger and thus more relevant in minority-concentrated contexts. However, we caution the interpretation of these results also because this school with such a high concentration of Black pupils would ideally need to be tested against a less minority-concentrated school to see if the results replicate.

**Discussion**

With this research we bring together the literature on social identity and acculturation research on dual-identity (Brown & Zagefka, 2011; Sam & Berry, 2010) and stereotype threat and self-affirmation literatures (Cohen & Sherman, 2014) in order to offer adaptive affirmation exercises which take into account the social context surrounding the affirmation intervention. Conceptually, dual-identity affirmation extends a social identity approach of threat and valuation, focusing on the social context (e.g., school policies as social norms which can influence inclusion and performance, Celeste et al., 2019; school-level equal
treatment as a buffer to the negative impacts of stereotype threat on minority school achievement, Baysu et al., 2016) in which the phenomenon of ethnic performance gaps occurs, which is typically addressed in self-affirmation research. Empirically, by adding this targeted affirmation intervention we shed light on mixed results of traditional self-affirmation procedures – which do not typically focus on contextual or school-level influences (such as teachers or school policies) – with ethnically diverse student samples. From an applied angle, we contribute specific affirmation interventions which can be effective in increasingly common highly diverse educational settings, which are tailored to dilute the specific contextual threats that some devalued minorities face, and which can be applied in parallel with traditional self-affirmation as protective or compensatory tools in such settings.

We tested the effectiveness of a new dual-identity affirmation intervention for attenuating minority group scholastic underachievement. As expected, Black pupils performed significantly better in the dual-identity condition than in the traditional self-affirmation condition, in line with Hypothesis 2. But why Black pupils performed better than non-Black pupils in the dual-identity condition could be further understood by pupils’ dual-identification and agreement with the policy: Black pupils were significantly more dual-identified than non-Black pupils (regardless of condition), making the dual-identity manipulation more relevant for Black pupils than non-Black pupils; moreover, Black pupils also agreed with the dual-identity policy more than non-Black pupils, suggesting the dual-identity policy was more relevant, thus more effective for Black pupils compared to non-Black pupils. However, we should note that the dual-identity affirmation condition only had a marginal increase in the strength of dual identification. Lack of increase in dual identification could be because participants were already high on dual identification or identifications are more stable commitments.
Perceived stereotype threat partially explained these effects, in line with Hypothesis 3: For Black pupils, the dual-identity affirmation predicted reduced threat, explaining Black pupils’ improved performance in the dual-identity condition (versus self-affirmation). Our results also showed that the effectiveness of self-affirmation was not wholly consistent with previous research — here, self-affirmation was not helpful for Black pupils’ test performance but did benefit the non-Black pupils. However, a closer look at the self-affirmation values revealed that Black pupils were more likely to choose to write about academic success. Black pupils, who may feel less supported by their teachers (Baysu et al., 2020; McGrath & Van Bergen, 2015), may have seen this essay as an opportunity to show their teachers that they in fact do care about academic values, and choosing to write about the domain of the threat may have prevented the efficiency of a potential self-affirmation and thus contributed to why Black participants performed worse than non-Black participants in the self-affirmation condition. If the domain of the affirmation is indeed too closely related to the domain of the threat (i.e., academic performance), self-affirmation may not reduce threat because the threatened domain is made salient; rather it may increase people’s commitment to the threatened identity and resistance to change, and backfire, decreasing performance (Sherman & Cohen, 2006). Although we included this domain based on the list of values used in previous research, we note that Sherman et al. (2013), did not allow participants to select this option in their first intervention session but only their second session. Future research should ensure pupils do not select a (threatened) domain-relevant value; or if they do, contents of the essays should be further examined to better understand the (intrinsic/extrinsic) motivation for selecting a given domain (De Jong et al., 2016), or the potential cultural mismatch (independent/interdependent) of values chosen versus norms in the environment (Harackiewicz et al., 2014).
We add to the previous research on self-affirmation in several ways, including (1) testing affirmation in a new context, (2) testing a new (school policy) affirmation procedure, (3) testing a mediating mechanism of affirmation effects, and (4) introducing a new dual-identity affirmation.

First, the present study extends affirmation interventions to a more diverse and minority-concentrated school context. To the extent that multiple social identities are salient in diverse contexts, paying attention to those social identities through their valuation and affirmation might work as well as or better than traditional self-affirmation. As such, our study builds on previous research that finds no effects of traditional affirmation on performance for the most disadvantaged minorities in minority-concentrated schools (Bratter et al., 2016; De Jong et al., 2016). Although we cannot directly test whether dual-identity affirmation may work better in a diverse context, we found that in classrooms with a greater Black presence, pupils reported stronger dual-identification and performed better in the dual-identity condition (than self-affirmation) regardless of background. This finding is in line with research showing that self-affirmation worked better in less minority-concentrated schools (Hanselman et al., 2014).

In this diverse context, we also find that the traditional self-affirmation was effective for the diverse non-Black group of pupils. Traditionally self-affirmation research focuses on advantaged White majorities as the contrast group. Our contrast group (non-Black pupils) are less advantaged than the traditionally studied White groups (with relatively low SES and mostly with migration background in a generally low performing school) but still more advantaged than Black pupils (by typically achieving higher with less academic risk factors). We extend research by Bowen et al. (2013) who also find that self-affirmation was effective for a diverse (low performing, low SES) non-Black contrast group, and who similarly suggest this is because these pupils are likely still subjected to other stereotypes (such as social class)
and thus can benefit from self-affirmation. However, our findings suggest that traditional (individual) self-affirmation procedures can be effective for other pupils with migration backgrounds.

Second, we adapted a key procedural aspect of the affirmation intervention to capitalize on the role of the teacher to convey institutional support. While an unwelcoming social climate can induce identity threat resulting in maladaptive outcomes for minorities (Baysu et al., 2011; Derks et al., 2011), our findings suggest one way to avoid these maladaptive outcomes is creating a welcoming school climate. Teachers who ignore diversity in a ‘one-group’ or colorblind approach ignore the fact that most minorities even experience identity threat and inadvertently work against minority social inclusion (Meeussen, Otten, & Phalet, 2014). Whereas teachers who take a dual-identity approach, actively addressing diversity and promoting fairness can set a classroom norm of inclusiveness that values diversity (Verkuyten & Thijs, 2013) and, as we have shown, can reduce minorities’ perceived identity threat to improve academic performance. In terms of the wider implications of this finding, having the affirmation come from an apparently new school policy on diversity may be one way to signal institutional support. Thus, it is possible that the intervention facilitates lasting affirmation effects by creating a positive feedback loop, enabling minorities to reaffirm themselves in the face of identity threat.

Third, we have explicitly identified the mediating role of perceived stereotype threat (as a form of identity threat) as a mechanism through which affirmation operates. We were able to show that (controlling for pre-intervention threat) the dual-identity condition elicited significantly less threat for Black pupils than non-Black pupils, which helps explain how the dual-identity affirmation works for Black pupils. A laboratory study has shown that valuing dual-identities through a new (seemingly real) national policy reduced (cardiovascular) threat response for majority participants (compared to a ‘one group’ policy), but only when the dual-
identity approach was also preferred by their minority interaction partners (Scheepers et al., 2014). We add to this research by showing that in an applied school context, a policy valuing dual-identities can also reduce perceived stereotype threat for minorities, facilitating academic achievement. Another line of research has shown through experimental questionnaires that when a fictitious company communicated double-identity valuation (valuing both a strong work ethic and the ethnic minority identity) this predicted lower perceived workplace threat and thus greater perceived ability to perform at work, for minorities (Van Laar, Derks, & Ellemers, 2013). While this research did not measure stereotype threat or objective performance (but rather perceptions about imagined experiences), our research adds to these findings to show that when a real-world school context affirms dual-identities (in comparison to traditional self-affirmation) this predicted lower performance-related threat, explaining an increase of objective performance.

Unexpectedly, however, non-Black pupils experienced more threat in the dual-identity condition. This suggests that, while Black pupils appreciated the attention to dual-identities and felt more dual-identified overall, non-Black pupils – who were significantly less dual-identified – may have felt that this view of multiculturalism did not include them. This finding may demonstrate that a misfit between one’s own preference, and that of the manipulation may induce threat. For instance, Scheepers et al. (2014) find that majority participants experience greater intergroup threat when presented with a misfit (versus a match) between their own (primed) preference for a one-group approach, and minorities’ preference for a dual-identity approach. Our results thus imply that one size does not fit all when it comes to interventions. Rather, assigning a particular type of affirmation intervention based on ethnic background, individual self-identification, and/or identity salience in highly diverse contexts (rather than randomly) may be a better approach to foster higher achievement for all pupils involved.
Fourth, in order to explain our key finding, that affirming the dual-identity is the most beneficial for Black pupils in diverse contexts, we bridge the self-affirmation literature and previous research on minority group identity valuation, in which only the minority in-group is affirmed. Researchers have tested minority in-group affirmation (having participants write about in-group values, Sherman et al., 2007; providing bogus positive in-group feedback to make salient the value of the group, Derks et al., 2011) in comparison to a type of self-affirmation (writing about most important own value, Sherman et al., 2007; or getting bogus positive feedback about the self, Derks et al., 2011). With both approaches, researchers found that in-group affirmation was more effective (in reducing in-group bias and eliciting beneficial cardiovascular response, respectively) than self-affirmation, when participants’ group identity was highly important. Additional research by Derks et al. (2007) focusing on ‘double valuation’ (affirming the minority in-group, as well as valuing performance on status-defining domains of the higher-status outgroup), can have positive effects on women/minorities’ motivation to increase social status in threatening contexts dominated by men/Whites. Derks et al. (2007) found that ‘double valuation’ had benefits over and above self-affirmation, if the individual was highly identified with the minority in-group. These above-mentioned findings were found with sports teams and women/minority groups in less diverse settings but can also be translated to diverse school contexts, where minority (dual) identity(ies) becomes salient. However, to implement an in-group affirmation as a school policy may neglect those pupils without a distinct minority identity, whereas a dual-identity approach aims to include all pupils.

Thus, our key finding that a new dual-identity affirmation was beneficial for most disadvantaged pupils (the Black pupils) can be understood by building on the research mentioned above. In terms of wider implications of our study, we find that affirming the minority in-group as well as the common group can also be more adaptive than traditional
self-affirmation as an intervention to improve the performance of disadvantaged minorities in a diverse school context. This is likely because multiple social identities are salient in such a diverse setting (Crisp & Turner, 2011). A school policy which communicates the value of the individual without acknowledging the value of diverse identities (i.e. self-affirmation) comes close to a colorblind approach in that it does not address the reality of the diverse context, and may thus lead minorities to not feel valued (and possibly threatened). In contrast, a dual-identity affirmation is similar to a multiculturalism approach in that it communicates the value of minorities’ identities. Again, this suggests that a targeted intervention may be more adaptive (than a one size fits all approach) and that the social context may affect which intervention is most relevant for pupils. Future interventions should ensure that the dual-identity affirmation communicates a sense of ‘all-inclusive multiculturalism’ (Jansen, Otten, & Van der Zee, 2015; Stevens, Plaut, & Sanchez-Burks, 2008) such that majority White groups feel explicitly valued in this condition as well. Moreover, future research should pay attention to the majority-minority context to better understand which educational interventions are most appropriate in such highly diverse settings.

There are also limitations, however. Our findings revealed clear differences between dual-identity affirmation and traditional self-affirmation, but performance in all affirmation conditions taken together was not significantly different from the non-affirmation control, for either ethnic background, not supporting Hypothesis 1. This may have been due to the nature of the non-affirmation control task. To be able to randomize within classrooms, the procedure was the same for all conditions meaning that the non-affirmation control task was completed as an in-class writing assignment, given by the teachers. It is possible that because the task was self-relevant (writing about their own morning routine) and endorsed by the teachers, pupils may have seen this as some kind of affirmation from the teacher. Pupils may have inferred that their individual daily routines were valued by the teacher. Future research should
use less self-relevant non-affirmation control tasks (or a control group given no writing task).

Given the nature of our intervention (introducing a fabricated a new school policy), we were not able to test longitudinal effects on grades, because pupils would likely notice that we did not actually change the policies, thus long term effects would be uninterpretable. Although previous studies have shown the effects of affirmation on test performance (Lokande & Müller, 2019), it is a limitation that the present study did not test longitudinal effects. In addition, given practical limitations of sample size in a small school, it is a limitation that this study is underpowered to detect small effects. Future research should test dual-identity affirmation in highly-diverse but larger schools in order to be able to test differential effects for different ethnic groups.

In sum, our study tests the mechanisms of self-affirmation, in a new context, with non-traditional groups, to see under what conditions affirmation interventions prove most effective. Our findings offer a new dual-identity affirmation intervention as a promising strategy for attenuating minority underachievement in ethnically diverse schools. Our findings extend affirmation research to diverse minority-concentrated contexts, which is becoming an ever-present reality in many metropolitan schools in Europe and elsewhere, and also show for the first time that reduced stereotype threat may be partly responsible for the successful operation of affirmation interventions.
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https://doi.org/10.1016/S0065-2601(02)80009-0


https://doi.org/10.3102/0034654311405999
Endnotes

1. The school itself was on the smaller size (a total of 735 students across 6 years) compared to the average state-funded secondary school in the UK (946 in 2017; Department of Education, 2019). We wanted to conduct the study with students as they transitioned to secondary school (at this school, year 7), however the school only had about 85 pupils in Year 7. Thus, we opted to include year 8 students as well, which increased the sample size while still focusing on students in the first two years of secondary school.

2. In the national percentages of pupils achieving the UK government’s minimum standards for five or more GCSEs at grade A* to C or equivalent, Black pupils are one of the lowest performing ethnic groups (53%), whereas others achieve around the national average (White-British at 56%), or above (>61%; Bangladeshi, Indian, Irish, Chinese, White/Asian mixed parentage) (Department of Education, 2015).

3. Our categorization of Black pupils versus the rest of pupils was justified statistically and theoretically. Theoretically, we expected our Dual-identity affirmation to only work for the most disadvantaged, and discriminated group (Black pupils), in accordance with earlier arguments. Statistically, Black pupils were the only ethnic group with a large enough N, with enough statistical power in our sample to look at separately; we did not have enough power or participants per condition to investigate the differing effects on each ethnic group. However, we did test a ‘3-group’ comparison for Ethnic Background (Black vs. White vs. Other backgrounds). Results for the ‘other backgrounds’ group most closely resembled results of the White group, making the findings robust for a less heterogeneous comparison group (because these results were similar, this statistically justified the combined white and other backgrounds into one category for more statistical power). A similar categorization is made in a self-affirmation study by Bowen, Wegmann, & Webber (2013) who note that a diverse
sample, small sample size, and relative higher achievement led the authors to create
comparison group called “Other” which consisted of White, Asian, and Mixed-race students.

4. In terms of statistical power, we conducted an a priori power analysis to assess the sample size needed to reach a comparable effect to similar previous studies (Dienes, 2008). However, there was confusion in the relevant effect size for the calculation of power, and we based the power analysis on a larger effect size from Sherman et al. (2013) \( d = 1.20 \) and high power of .95, which would require a minimum of 16 participants per condition. A more appropriate effect size from that study would be \( d = 0.29 \) (affirmation compared to control for Latino students), and a more appropriate power would be .80 given the context of discovery of the present study. We re-ran the power analysis, this time with the effect size of 0.29, using G*power (Faul et al., 2009) \( (p =.05 \text{ and } .80 \text{ power}) \), and this showed a required sample size of 148 per condition, for detecting small effects with high power. However, given the differences between that study and ours, a more relevant study to compare effect sizes is Covarrubias, Herrmann, and Fryberg (2016, study 1) in which they tested a new culturally specific interdependent affirmation against traditional self-affirmation and a control condition on performance on a numerical task. While they find a wide range of small to large effect sizes for the different comparisons (ranging from \( d =.19 \) to .88), in the present study we were most interested in the difference between the new culturally relevant dual-identity affirmation compared to the traditional self-affirmation for Black students, closest to Covarrubias et al.’s interdependent versus traditional affirmation \( (d = .88) \). Accordingly, we ran a power analysis, with the effect size of 0.88 using G*power (Faul et al., 2009) \( (p =.05 \text{ and } .80 \text{ power}) \), and this showed a required sample size of 17 per condition. If seeking a comparable range of effect sizes (.19 to .88) from Covarrubias et al. (2016, study 1) for Black students across conditions in the present study, this would require a range of 17 to 344 participants per condition. To sum up, the present study may have enough power to detect large effect sizes but is
underpowered to detect small effect sizes and we note this as a limitation. However, the power analysis was not used as a stopping rule for (as many students as possible were recruited from the school to participate) and low power does not undermine the relevance of this novel study to the field.

The primary aim of this study was of the study to explore the efficacy of a novel dual-identity affirmation in highly diverse educational settings while using established self-affirmation as our standard of reference. The validity of our study should be evaluated within the “context of discovery” which is a different scientific undertaking from the “context of justification” in replication science (Fiedler, Kutzner, & Krueger, 2012). Moreover, to increase statistical power in spite of small numbers we investigate theoretical contrasts instead of omnibus analyses of variance, which increase the risk of false negatives as non-specific tests of the existence of any difference between 4 conditions suffer from low statistical power (Fiedler et al., 2012). Accordingly, we focused our analysis mostly on a theoretical contrast between (established) self-affirmation and (novel) dual-identity affirmation.

5. We measured performance immediately following the first intervention session to test initial effects, but analyses revealed no significant (main or interaction) effects of our manipulations. We believe this was due to the easy nature of the performance task. Ultimately though, we were interested in the durability of the intervention, which was achieved by assessing performance after the second intervention session. All reported performance results refer to performance at time 2, after both intervention sessions.

6. Cohen & Garcia’s (2005) separate measure of ‘general threat of being stereotyped’ (“In my school, I worry that people will draw conclusions about me, based on what they think about my cultural group”), did not have any effect on our performance measure so was not included in analyses.
7. To account for the potential influence that the different teachers had on the impact of our intervention, we first conducted a two-level multilevel analysis (pupils at level 1, pupil’s teacher at level 2) predicting performance with a random intercept and without predictors (Hox, 2010). This model showed no significant variance in performance at teacher level for performance ($\sigma_{v0}^2 = .0045, p = .280, 95\%$ CI [0.001, 0.027]); we also conducted the two-level model with classroom as level 2, and still found no significant variance at class level for performance ($\sigma_{u0}^2 = .005, p = .170, 95\%$ CI [0.001, 0.021]), not necessitating multilevel analysis. Also, with 5 teachers across 8 classes, and only 179 pupils, we did not reach the recommended cases per level to conduct multi-level analyses. We therefore opted for an individual level analysis.

8. Experimental interventions are often analyzed with analysis of variance (ANOVA or ANCOVA). However, ANOVA does not allow for precise testing of mediation, thus making SEM the best option for the present analyses. Nevertheless, some readers may be reassured to learn that a 4x2 ANCOVA (with pre-intervention math grades as a covariate) conducted on performance (missing values replaced with mean values) yielded the predicted Condition x Ethnic Background interaction $F(3,152) = 3.78, p = 0.012$. We provide full ANCOVA results in the supplemental materials.

9. The $Ns$ were too small per cell ($N < 5$) to test statistically without violating chi-square assumptions (Field, 2009), but we report it for those interested, $\chi^2(1) 2.90, p = .088$.

10. Again small cell sizes ($N < 3$) violate the chi-square assumptions, but we report if for those interested $\chi^2(1) 1.08, p = .298$. 
Table 1
Means, Standard Deviations, and Correlations ($N = 179$)

<table>
<thead>
<tr>
<th></th>
<th>M (SD)</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Pre-intervention Math Grade</td>
<td>4.53 (1.12)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td>2. Ethnic Background</td>
<td>56%</td>
<td>.015</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. % Black pupils in class</td>
<td>56%</td>
<td>.091</td>
<td>.291***</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Pre-intervention Threat</td>
<td>2.17 (1.30)</td>
<td>.011</td>
<td>.084</td>
<td>-.139</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Post-intervention Threat</td>
<td>2.69 (1.35)</td>
<td>-.099</td>
<td>-.094</td>
<td>-.112</td>
<td>.433***</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Pre-intervention Dual-identification</td>
<td>3.37 (1.50)</td>
<td>.072</td>
<td>.103</td>
<td>-.055</td>
<td>.008</td>
<td>-.043</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Post-intervention Dual-identification</td>
<td>3.18 (1.44)</td>
<td>.089</td>
<td>.196*</td>
<td>.230**</td>
<td>.235**</td>
<td>.095</td>
<td>.276**</td>
<td></td>
</tr>
<tr>
<td>8. Performance (Time 2)</td>
<td>0.61 (0.22)</td>
<td>.392***</td>
<td>-.048</td>
<td>.019</td>
<td>-.176*</td>
<td>-.233**</td>
<td>-.009</td>
<td>.061</td>
</tr>
</tbody>
</table>

***p<.001, **p<.01, *p<.05

NOTE: For Ethnic Background (Black = 1) and %Black pupils in class, percentages are presented rather than means and standard deviations.
Table 2

*Structural Equation Models of intervention effects on performance (Model 1) with threat as a mediator (Model 2)*

<table>
<thead>
<tr>
<th></th>
<th>Model 1</th>
<th>Model 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Effects on DV Performance</td>
<td>Effects on Mediator Post-intervention Threat</td>
</tr>
<tr>
<td>Intercept</td>
<td>0.630 (.023)***</td>
<td>0.434 (.171)**</td>
</tr>
<tr>
<td>Pre-intervention Math Grade</td>
<td>0.076 (0.01)***</td>
<td>NS</td>
</tr>
<tr>
<td>Ethnic Background</td>
<td>-0.029 (.033)</td>
<td>-0.728 (.227 )***</td>
</tr>
<tr>
<td>Contrast 1</td>
<td>0.011 (.011)</td>
<td>0.088 (.094)</td>
</tr>
<tr>
<td>Contrast 2</td>
<td>0.020 (.020)</td>
<td>0.065 (.141)</td>
</tr>
<tr>
<td>Contrast 3</td>
<td>-0.064 (.038)</td>
<td>0.524 (.252)*</td>
</tr>
<tr>
<td>Contrast 1 x Ethnic Background</td>
<td>-0.016 (.017)</td>
<td>-0.082 (.141)</td>
</tr>
<tr>
<td>Contrast 2 x Ethnic Background</td>
<td>-0.018 (.027)</td>
<td>-0.095 (.178)</td>
</tr>
<tr>
<td>Contrast 3 x Ethnic Background</td>
<td>0.139 (.052)**</td>
<td>-0.723 (.315)*</td>
</tr>
<tr>
<td>Pre-intervention Threat</td>
<td>0.139 (.052)**</td>
<td>0.492 (.082)**</td>
</tr>
<tr>
<td>Post-intervention Threat</td>
<td></td>
<td></td>
</tr>
<tr>
<td>R-squared</td>
<td>0.198 (.052)**</td>
<td>0.282 (.075)***</td>
</tr>
</tbody>
</table>

*Note.* Structural Equation Model results present unstandardized coefficients with standard errors in parentheses. Contrast 1: affirmation conditions (1+1+1) vs. non-affirmation control (-3). Contrast 2: dual-identity (1) and self-affirmation (1) vs. one-group control (-2) with non-affirmation control (0). Contrast 3: dual-identity (1) vs. self-affirmation (-1) with others (0).

Model 1 shows effects of the predictors on performance without accounting for threat (the mediator). In Model 2, the effects of the predictors on performance indicate the remaining direct effects in the presence of the mediator. NS indicates the ‘non-significant’ effects of the control variables that were set to be zero.

***p<.001, **p<.01, *p<.05
Figure 1

**Condition x Ethnic Background**

![Bar chart showing performance at time 2 by intervention condition and ethnic background.](image)

**Figure 1.** Intervention condition predicting performance at time 2, as a function of pupils’ ethnic background, controlling for pre-intervention math scores. Error bars are standard errors. Significant differences are based on Wald tests in Mplus, indicated by **p < .01, *p < .05, ^ p = .053**
Figure 2

Contrast 3 x Ethnic Background: Dual-Identity vs. Self-Affirmation

Figure 2. Intervention condition (Contrast 3: Dual-Identity versus Self-Affirmation) predicting identity threat, as a function of pupils’ ethnic background. Error bars are standard errors. Significant differences are based on Wald tests in Mplus, indicated by ***p < .001, *p < .05
**Figure 3.** SEM Mediation Model: Post-intervention stereotype threat as the Mediator and performance as the dependent variable.

*Note:* Structural Equation Model presents unstandardized coefficients. Non-significant pathways are not shown for simplicity. Contrast 1: affirmation conditions (1) vs. non-affirmation control (-3). Contrast 2: dual-identity (1) and self-affirmation (1) vs. one-group control (-2). Contrast 3: dual-identity (1) vs. self-affirmation (-1). Ethnic Background was coded as Black = 1, Non-Black = 0.

***p<.001, **p<.01, *p<.05
Supplemental Material

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D. Content of Self-Affirmation condition essays
A. Manipulations:

1. Self-affirmation Condition:

Time 1: School Policy Writing Task

Please read what is written below and then follow the instructions. After you write your answers, be sure to answer the questions on the back. The teachers at XXXXXXX High School want to hear your thoughts! To increase harmony in our school, the teachers and staff want to get your opinions about a new policy towards diversity that will soon be used at our school.

Our New School Policy:

As a school, we value each student as an individual. Your teachers value what matters to you, your ideas, your beliefs and your life.

Because of our new school policy, your teachers want to know: What things really matter in your life? Read the list below and circle **TWO** that are most important to you. Even if more of them might be important, please only circle the two most important. (Write the letter “M” next to the most important one to you.)

- Being Good at Art
- Being Religious
- Having a Sense of Humour
- Being Smart or getting good grades
- Being with Friends and Family
- Being good at Sports
- Being good at Music (like playing an instrument/singing)
- Being Creative
- Being Independent
- Being in a group (like your community, cultural group or school club)
- Living in the moment

Look at the two you circled. Now write in a few sentences why these things are important to you. Try to include at least 3 reasons why these things matter to you. Try to use examples from your own life (if you can) to explain your reasons. Be sure to focus on your thoughts and feelings, and don’t worry about spelling or how well written it is.

Time 2: School Policy Writing Task #2

A few weeks ago you did writing task about a new school policy. Thank you for your thoughts about our new school policy. Based on your responses, we have decided to use this new school policy next term. Now we would like to find more out about what really matters to you. Read the school policy again, and then follow the instructions.

Our New School Policy:

As a school, we value each student as an individual. Your teachers value what matters to you, your ideas, your beliefs and your life.
Because of our new school policy, your teachers want to know: What is the most important thing in your life? Read the list below and circle ONE that is the most important to you. Even if more of them might be important, please only circle the one that is most important.

- Enjoying Sports
- Being Good at Art
- Being with Friends and Family
- Being Religious
- Being Independent
- Being Smart or getting good grades
- Listening to Music or Playing Music
- Being in a group (like your community, cultural group or school club)
- Having a Sense of Humour
- Being Creative
- Living in the moment

Look at the one you circled. Now write in a few sentences why this is important to you. Try to include at least 3 reasons why this matters to you. Try to use examples from your own life (if you can) to explain your reasons. Be sure to focus on your thoughts and feelings, and don’t worry about spelling or how well written it is.
2. Dual-identity affirmation condition:

**Time 1: School Policy Writing Task**

Please read what is written below and then follow the instructions. After you write your answers, be sure to answer the questions on the back. The teachers at XXXXX High School want to hear your thoughts! To increase harmony in our school, the teachers and staff want to get your opinions about a new policy towards diversity that will soon be used at our school.

Our New School Policy:

**As a school, we believe that people from all different cultural backgrounds living in the UK have their own culture and traditions, as well as being British. We value students’ common identity as British as well as their minority cultural backgrounds. Minority cultural backgrounds are as important as the British identity.**

Be as creative as possible! Try to think of activities, projects, or school events that we can organise to help all students learn about our new diversity policy. Please write a detailed list of at least 3 things (ideas, activities, or events) that we can plan to help all students learn about our new school policy.

And again, be sure to focus on your thoughts and feelings, and don’t worry about spelling or how well written it is.

**Time 2: School Policy Writing Task #2**

A few weeks ago you did writing task about a new school policy. Thank you for your thoughts about our new school policy. Based on your responses, we have decided to use this new school policy next term. Now we would like to hear your ideas for how we can show this policy to the whole school. Try to think of activities, projects or school events that we can organise to help all students learn about our new school policy.

Read the school policy and then follow the instructions at the end of the page.

Our New School Policy:

**As a school, we believe that people from all different cultural backgrounds living in the UK have their own culture and traditions, as well as being British. We value students’ common identity as British as well as their minority cultural backgrounds. Minority cultural backgrounds are as important as the British identity.**

Be as creative as possible! Try to think of activities, projects or school events that we can organise to help all students learn about our new diversity policy. Please write a detailed list of at least 3 things (ideas, activities or events) that we can plan to help all students learn about our new school policy.

And again, be sure to focus on your thoughts and feelings, and don’t worry about spelling or how well written it is.
**3. One-group Control Condition:**

**Time 1: School Policy Writing Task**

Please read what is written below and then follow the instructions.
After you write your answers, be sure to answer the questions on the back.
The teachers at XXXXX High School want to hear your thoughts! To increase harmony in our school, the teachers and staff want to get your opinions about a new policy towards diversity that will soon be used at our school.

Our New School Policy:

As a school, we believe that people from all different cultural backgrounds living in the UK belong to one group: we are all British. We value students’ common identity as British. Our common British identity is more important than anything else.

Be as creative as possible! Try to think of activities, projects, or school events that we can organise to help all students learn about our new diversity policy. Please write a detailed list of at least 3 things (ideas, activities, or events) that we can plan to help all students learn about our new school policy.
And again, be sure to focus on your thoughts and feelings, and don’t worry about spelling or how well written it is.

**Time 2: School Policy Writing Task #2**

A few weeks ago you did writing task about a new school policy.
Thank you for your thoughts about our new school policy. Based on your responses, we have decided to use this new school policy next term.

Now we would like to hear your ideas for how we can show this policy to the whole school. Try to think of activities, projects or school events that we can organise to help all students learn about our new school policy.
Read the school policy and then follow the instructions at the end of the page.

Our New School Policy:

As a school, we believe that people from all different cultural backgrounds living in the UK belong to one group: we are all British. We value students’ common identity as British. Our common British identity is more important than anything else.

Be as creative as possible! Try to think of activities, projects or school events that we can organise to help all students learn about our new diversity policy. Please write a detailed list of at least 3 things (ideas, activities or events) that we can plan to help all students learn about our new school policy.
And again, be sure to focus on your thoughts and feelings, and don’t worry about spelling or how well written it is.
4. No-affirmation Control Condition:

School Writing Task

Please read what is written below and then follow the instructions. After you write your answers, be sure to answer the questions on the back. The teachers at XXXXXX High School want to hear your thoughts!

Today’s writing task:
We want to know what your daily morning routine is like.

For this writing exercise, please describe your usual morning routine. You can write about what you usually do (even if this isn’t exactly the same every day). Examples could include:

- What you do to get ready
- What you have for breakfast
- How you get to school

Please write about at least 3 things you do during your morning routine before you arrive at school.
Use examples from your own experiences to explain your morning routine.
Be sure to focus on explaining your routine, and don’t worry about spelling or how well written it is.

Time 2: School Writing Task #2

A few weeks ago you did writing task about your usual morning routine, and what you usually do before coming to school. For today’s writing task, we would like to hear about a different routine.

Today’s writing task:
We want to know what your daily afternoon routine is like.
What is a typical afternoon like for you?

For this writing exercise, please describe your usual afternoon routine. You can write about what you usually do (even if this isn’t exactly the same every day). Examples could include:

- What you do right when school finishes
- Do you go to an after school activity or home?
- How you get there?

Please write about at least 3 things you do during your afternoon routine once school finishes.
Use examples from your own experiences at school to explain your reasons.
Be sure to focus on explaining your routine, and don’t worry about spelling or how well written it is.
SELF-AFFIRMATIONS

B. Measures:

1. **Manipulation Checks**

Answered after Dual-identity & One-group Conditions:

Circle YES or NO:
Do you agree with our new school policy?

**Dual-identification**
(Measured pre and post-intervention)
(Scale from 1-5, Not at All, A little bit, Somewhat, Quite a bit, Very Much)

Instructions: Some people combine different traditions or ‘ways of living’
   a. Do you feel that you have more than one ‘way of living’? (For example: you combine
      a different language or traditions at home with those at school)

2. **Mediator**

**Perceived Threat** (Cohen & Garcia pilot 2005)
(Measured pre- and post-intervention)
(Scale from 1-5, Not at All, A little bit, Somewhat, Quite a bit, Very Much)

“In my school, I worry that people will draw conclusions…
   a. …about my cultural group, based on my performance.” *(Stereotype threat)*
   b. “…about me, based on what they think about my cultural group.” *(General threat)*

3. **Dependent Measures**

**Cognitive Task Performance:** Raven’s Standard Progressive Matrices
(Raven, Raven, & Court, 2000 updated 2004)

- Performance Time 1: A-C, odd numbered items; 18 items in total (not used in analyses)
- Performance Time 2: sets B-D, even numbered 18-items

Because the Raven’s Matrices are not available publicly (but must be paid for), we only
include the three examples that we created and gave to students, as well as the first (easiest)
and last (hardest) items as examples. However these should not be published without their
permission.

Figure Puzzles Quiz

Instructions: Circle the option that best completes the pattern
Example 1

Example 2

Example 3

—DO NOT START UNTIL TOLD—
(Be sure to complete the front and back of each page)

A1.

D18.
C.

1. Analysis of Covariance (ANCOVA) effects of Condition x Ethnic Background on Time 2 Performance, controlling for pre-math grades.

<table>
<thead>
<tr>
<th>Term</th>
<th>ANCOVA</th>
<th>$p$</th>
<th>$\eta^2_p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>$F(1,152) = 14.08$</td>
<td>&lt;.001</td>
<td>.085</td>
</tr>
<tr>
<td>Pre-intervention Math Grade</td>
<td>$F(1,152) = 28.32$</td>
<td>&lt; .001</td>
<td>.157</td>
</tr>
<tr>
<td>Condition</td>
<td>$F(3,152) = 0.16$</td>
<td>.921</td>
<td>.003</td>
</tr>
<tr>
<td>Ethnic Background</td>
<td>$F(1,152) = 1.27$</td>
<td>.261</td>
<td>.008</td>
</tr>
<tr>
<td>Condition x Ethnic Background</td>
<td>$F(3,152) = 3.78$</td>
<td>.012</td>
<td>.069</td>
</tr>
</tbody>
</table>

Means and Standard deviations of Time 2 Performance

<table>
<thead>
<tr>
<th>Condition</th>
<th>Ethnic Background</th>
<th>$M$ (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>One Group</td>
<td>Non-Black</td>
<td>62% (.22)</td>
</tr>
<tr>
<td></td>
<td>Black</td>
<td>62% (.22)</td>
</tr>
<tr>
<td>Dual identity</td>
<td>Non-Black</td>
<td>57% (.23)</td>
</tr>
<tr>
<td></td>
<td>Black</td>
<td>67% (.19)</td>
</tr>
<tr>
<td>Self-Affirmation</td>
<td>Non-Black</td>
<td>69% (.24)</td>
</tr>
<tr>
<td></td>
<td>Black</td>
<td>49% (.28)</td>
</tr>
<tr>
<td>Control</td>
<td>Non-Black</td>
<td>64% (.14)</td>
</tr>
<tr>
<td></td>
<td>Black</td>
<td>60% (.20)</td>
</tr>
</tbody>
</table>

For those interested, we conducted a 4x2 ANCOVA testing the effects of the 4 condition x 2 ethnic background interaction, on performance at time 2 controlling for pre-math grades and using mean replacement for missing values of the performance measure. The ANCOVA yielded the predicted Condition x Ethnic Background interaction $F(3,152) = 3.78$, $p = .012$. We calculated Bonferroni adjusted pairwise comparisons to unpack the interaction, and the results showed the same pattern as demonstrated with the Wald tests reported in text. The interaction effect was driven by the effect of ethnic background in the self-affirmation condition $F(1,152) = 11.231$, $p = .001$. Additional pairwise comparisons showed that for Black participants, the difference in performance in the self-affirmation condition versus dual identity condition was significant, $F(3,152) = 2.86$, $p = .039$. The only difference was that two effects reported in text that approached significance were not significant in the ANCOVA: the difference between Black and non-Black participants in the dual-identity condition ($F(1,152)$
= 1.231, \( p = .269 \) and the difference for non-Black participants in the self-affirmation versus dual identity condition (\( F(3,152) = 1.41, \ p = .243 \)).
2. Analysis replicated using bootstrap (2000) and ML estimation

*Structural Equation Models using bootstrap (2000) and ML estimation of intervention effects on performance (Model 1) with threat as a mediator (Model 2)*

<table>
<thead>
<tr>
<th></th>
<th>Model 1</th>
<th>Model 2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Effects on DV</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Performance</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>0.630 (.024)***</td>
<td>0.434 (.179)*</td>
</tr>
<tr>
<td>Pre-intervention Math Grade</td>
<td>0.076 (0.01)***</td>
<td>NS</td>
</tr>
<tr>
<td>Ethnic Background</td>
<td>-0.029 (.035)</td>
<td>-0.728 (.237)***</td>
</tr>
<tr>
<td>Contrast 1</td>
<td>0.011 (.011)</td>
<td>0.088 (.096)</td>
</tr>
<tr>
<td>Contrast 2</td>
<td>0.020 (.020)</td>
<td>0.065 (.145)</td>
</tr>
<tr>
<td>Contrast 3</td>
<td>-0.064 (.039)</td>
<td>0.524 (.267)***</td>
</tr>
<tr>
<td>Contrast 1 x Ethnic Background</td>
<td>-0.016 (.017)</td>
<td>-0.082 (.147)</td>
</tr>
<tr>
<td>Contrast 2 x Ethnic Background</td>
<td>-0.018 (.028)</td>
<td>-0.095 (.182)</td>
</tr>
<tr>
<td>Contrast 3 x Ethnic Background</td>
<td>0.139 (.054)***</td>
<td>-0.723 (.332)***</td>
</tr>
<tr>
<td>Pre-intervention Threat</td>
<td>0.198</td>
<td>0.282</td>
</tr>
<tr>
<td>Post-intervention Threat</td>
<td></td>
<td></td>
</tr>
<tr>
<td>R-squared</td>
<td>0.198</td>
<td>0.282</td>
</tr>
</tbody>
</table>

Note: Structural Equation Model with bootstrap (2000) ML estimation results present unstandardized coefficients with standard errors in parentheses. Bootstrap (2000) ML estimation results replicate all results reported in Table 2.

***p<.001, **p<.01, *p<.05
3. Analyses with and without covariates

<table>
<thead>
<tr>
<th></th>
<th>Covariates Only</th>
<th>Model 1 with covariates</th>
<th>Model 1 without covariates</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Effects on DV</td>
<td>Effects on DV</td>
<td>Effects on DV</td>
</tr>
<tr>
<td></td>
<td>Performance</td>
<td>Performance</td>
<td>Performance</td>
</tr>
<tr>
<td>Intercept</td>
<td>0.805 (.017)*</td>
<td>0.827 (.365)*</td>
<td>0.630 (.023)***</td>
</tr>
<tr>
<td>Pre-intervention Math Grade</td>
<td>0.062 (0.01)**</td>
<td>0.063 (.022)**</td>
<td>0.076 (0.01)***</td>
</tr>
<tr>
<td>Ethnic Background</td>
<td>-0.041 (.037)</td>
<td>-0.043 (.036)</td>
<td>-0.029 (.033)</td>
</tr>
<tr>
<td>Age</td>
<td>-0.014 (.028)</td>
<td>-0.017 (.029)</td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td>-0.021 (.034)</td>
<td>-0.022 (.033)</td>
<td></td>
</tr>
<tr>
<td>Born in the UK</td>
<td>-0.002 (.045)</td>
<td>-0.003 (.044)</td>
<td></td>
</tr>
<tr>
<td>English as Additional Language</td>
<td>-0.060 (.042)</td>
<td>-0.051 (.040)</td>
<td></td>
</tr>
<tr>
<td>Pupil Premium</td>
<td>-0.057 (.036)</td>
<td>-0.046 (.038)</td>
<td></td>
</tr>
<tr>
<td>Pre-intervention English Grade</td>
<td>0.020 (.021)</td>
<td>0.020 (.021)</td>
<td></td>
</tr>
<tr>
<td>Contrast 1</td>
<td>0.012 (.011)</td>
<td>0.011 (.011)</td>
<td></td>
</tr>
<tr>
<td>Contrast 2</td>
<td>0.023 (.020)</td>
<td>0.020 (.020)</td>
<td></td>
</tr>
<tr>
<td>Contrast 3</td>
<td>-0.063 (.038)</td>
<td>-0.064 (.038)</td>
<td></td>
</tr>
<tr>
<td>Contrast 1 x Ethnic Background</td>
<td>-0.013 (.017)</td>
<td>-0.016 (.017)</td>
<td></td>
</tr>
<tr>
<td>Contrast 2 x Ethnic Background</td>
<td>-0.024 (.027)</td>
<td>-0.018 (.027)</td>
<td></td>
</tr>
<tr>
<td>Contrast 3 x Ethnic Background</td>
<td>0.127 (.052)**</td>
<td>0.139 (.052)**</td>
<td></td>
</tr>
<tr>
<td>R-squared</td>
<td>0.187 (.056)***</td>
<td>0.219 (.055)***</td>
<td>0.198 (.052)***</td>
</tr>
</tbody>
</table>

Note: Structural Equation Model results present unstandardized coefficients with standard errors in parentheses. Age, gender (male = 0), country of birth (1 = born in the UK, 0 = not), English as additional language (1 = EAL, 0 = native speaker), Pupil Premium (1 = eligible, 0 = not) and pre-intervention English grades did not have any significant effects on performance, thus were omitted from the analyses.

***p<.001, **p<.01, *p<.05
4. Analysis with Time 1 Performance as DV

<table>
<thead>
<tr>
<th></th>
<th>Effects on DV Time 1 Performance</th>
<th>Effects on DV Time 2 Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>0.828 (.019)***</td>
<td>0.630 (.023)***</td>
</tr>
<tr>
<td>Pre-intervention Math Grade</td>
<td>0.085 (.013)***</td>
<td>0.076 (0.01)***</td>
</tr>
<tr>
<td>Ethnic Background</td>
<td>-0.062 (.030)*</td>
<td>-0.029 (.033)</td>
</tr>
<tr>
<td>Contrast 1</td>
<td>-0.005 (.008)</td>
<td>0.011 (.011)</td>
</tr>
<tr>
<td>Contrast 2</td>
<td>0.009 (.016)</td>
<td>0.020 (.020)</td>
</tr>
<tr>
<td>Contrast 3</td>
<td>-0.014 (.031)</td>
<td>-0.064 (.038)</td>
</tr>
<tr>
<td>Contrast 1 x Ethnic Background</td>
<td>0.003 (.017)</td>
<td>-0.016 (.017)</td>
</tr>
<tr>
<td>Contrast 2 x Ethnic Background</td>
<td>-0.032 (.023)</td>
<td>-0.018 (.027)</td>
</tr>
<tr>
<td>Contrast 3 x Ethnic Background</td>
<td>(0.068 (.048)</td>
<td>0.139 (.052)**</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.255 (.058)***</td>
<td>0.198 (.052)***</td>
</tr>
</tbody>
</table>

Note: Structural Equation Model results present unstandardized coefficients with standard errors in parentheses. Answers were coded incorrect (0), correct (1). Time 1 performance used the easier items, and upon scoring it was assessed that the time 1 performance test was slightly too easy for this age group ($M = .79$ correct SD = .21; Median = .89, 22 scoring 100% correct). Therefore for Time 2 performance we gave pupils slightly more difficult items and use this as the outcome variable of interest ($M = 61\%$ correct SD = .72; Median = .68; 3 scoring 100% correct). Time 1 performance showed a similar pattern of results as Time 2, but is only reported here for complete reporting.

***$p<.001$, **$p<.01$, *$p<.05$
D. Content of Self-Affirmation Condition Essays

As for sample essays, we coded the content of the essays for whether or not the text was about belonging/togetherness. Shnabel et al. (2013) find that when Black students write about belonging this improves performance (but not for White students). In our sample, half of the Black pupils and half of the non-Black pupils wrote about connectedness, regardless of which value they chose. Thus the content (at least in terms of belonging) did not differ between groups, and did not explain the differences we find. However, with our small sample size we caution any interpretation, but future research should investigate the content of essays to test the effects on performance. The break-down of the types of values chosen are listed below:

<table>
<thead>
<tr>
<th>Value</th>
<th>Black</th>
<th>Non-Black</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Being Good at Art</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Being Religious</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Being Smart or getting good grades</td>
<td>8</td>
<td>3</td>
<td>11</td>
</tr>
<tr>
<td>Being with Friends and Family</td>
<td>5</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>Being good at Sports</td>
<td>3</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Being good at Music</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Being Creative</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Being Independent</td>
<td>2</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Living in the moment</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>21</strong></td>
<td><strong>14</strong></td>
<td><strong>35</strong></td>
</tr>
</tbody>
</table>