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Bilingual Education Reduces Ethnic Outgroup Discrimination

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Abstract

Extant research on prejudice reduction often focuses on short-term interventions that yield inconclusive results. Instead, this article focuses on people's formative years and argues that bilingual education reduces ethnic outgroup discrimination through perspective-taking. I test my expectations in three distinct studies. In Study 1, cross-national analyses reveal that bilingual speakers are more sensitive to the unequal treatment of other ethnic communities in their country compared to monolinguals. Study 2 leverages a quasi-experimental variation in the language of instruction used in Malaysian schools and finds that individuals who received bilingual education display more inclusive attitudes than those exposed to monolingual instruction. In Study 3, results from a survey experiment indicate that participants who were instructed to switch between two languages, rather than using just one language, expressed lower levels of ethnic outgroup discrimination. The findings imply that education and language play important roles in reducing intergroup prejudice from an early age.

Short Title: Bilingual Education Reduces Ethnic Outgroup Discrimination

Keywords: education policy, language, ethnic politics, perspective-taking

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Ethnic outgroup discrimination and ingroup favoritism are pervasive issues that plague many diverse societies. Past research has shown that citizens generally prefer to vote for coethnic candidates (Adida, 2015; Ferree, 2006), while politicians often implement policies that benefit their own ethnic groups (Ejdemyr, Kramon and Robinson, 2018; Kramon and Posner, 2016). This interplay between ethnic identities and political behavior further exacerbates the under-representation of ethnic minorities, which raises the likelihood of political violence (Buhaug, Cederman and Gleditsch, 2014). Hence, considerable attention has been paid to the remedies that reduce intergroup discrimination. These include institutional reforms such as the use of quotas to improve minority representation (Chauchard, 2017; Dunning and Nilekani, 2013), and interpersonal factors including cross-ethnic contact (Adida et al., 2016; Weiss, 2021). However, the inclusionary impacts of many proposed interventions are mixed or short-lived (Paluck et al., 2021). This may be because political attitudes are deeply ingrained during childhood and are resistant to change in adulthood (Sears and Funk, 1999). It might therefore be more fruitful to focus on interventions during a person's formative years to better understand what shapes intergroup prejudice (Ostwald, Ong and Gueorguiev, 2019).

In this article, I consider whether bilingual instruction, as an early life intervention, affects individuals' attitudes toward ethnic outgroups. Bilingual instruction refers to the use of two languages to teach content subjects, such as History or Mathematics (Liu, 2011). Drawing on insights from the bilingualism and perspective-taking research in psychology and cognitive science (Galinsky, Ku and Wang, 2005; Grundy, Anderson and Bialystok, 2017), I propose a novel argument that this type of instructional method facilitates second language acquisition (Reljić, Ferring and Martin, 2015), thus creating bilingual speakers who are better at understanding other individuals' motives and actions (Schroeder, 2018). Unlike monolingual speakers, bilinguals can adapt to various linguistic demands by switching to a language that the listener can understand. This process of alternating between languages mirrors the cognitive process of switching from one person's perspective to another (Bialystok, 2005). Due to the higher rate of language switching at home/school, bilinguals are subconsciously

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trained to curtail their own predispositions and biases while shifting their attention towards the mental states of other individuals. Put simply, bilingualism fosters the cognitive development of perspective-taking, which should in turn decrease exclusionary political attitudes toward ethnic outgroups. Crucially, the proposed mechanisms highlight a previously unexplored pathway connecting education policies to intergroup attitudes – namely, through improved perspective-taking abilities. Furthermore, because these perspective-taking effects should emerge regardless of which languages are used – not just languages of specific ethnic outgroups – this approach builds on existing perspective-taking research by proposing a generalized mechanism rather than the target-specific interventions that dominate the field.

I conduct three studies that employ a variety of data sources and empirical approaches to test my claims. Study 1 investigates whether bilingualism – the ability to speak and understand two different languages – is linked to ethnic outgroup empathy through a cross-national analysis of the Asian Barometer Survey (ABS, 2017). The findings indicate that bilingual speakers display greater sensitivity toward the unequal treatment of other ethnic communities in their country when compared to monolingual individuals. Moreover, a series of placebo tests suggests that the effects of bilingualism are largely confined to outcomes that explicitly evoke ethnic perspective-taking.

While Study 1 demonstrates an association between bilingualism and ethnic attitudes, Study 2 seeks to uncover the causal relationship between bilingual education and ethnic discrimination. I analyze the impact of an education reform in Malaysia, where English replaced the ethnic majority language, *Bahasa Melayu*, as the language of instruction for Mathematics and Science in all public secondary schools since 2003. Consequently, ethnic Malays born after the cutoff experienced both English and *Bahasa Melayu* instruction during their secondary education, whereas those born before the cutoff were taught exclusively in *Bahasa Melayu*. Through an original survey of 1,800 ethnic Malay respondents, I find that those who received bilingual instruction display less political discrimination against ethnic outgroups than those who received monolingual instruction. The main results are also robust

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to different model specifications and alternative explanations, such as interethnic contact.

Finally, Study 3 validates the mechanisms underlying the relationship between bilingual instruction and outgroup attitudes – language switching and perspective-taking. I fielded an experiment in Malaysia where bilingual participants were assigned to a single-language condition (monolingual) or a condition that required them to switch between two languages during the survey (bilingual). The results showed that participants in the bilingual group outperformed their monolingual counterparts in perspective-taking while exhibiting lower ethnic outgroup discrimination. Across the three studies, the evidence suggests that a bilingual environment can shape how people perceive individuals of different ethnic backgrounds.

This article makes three contributions. First, it builds on the rich literature that the inculcation of political norms and values can be traced to a person's early upbringing in school (Campbell and Niemi, 2016; Cavaille and Marshall, 2019; Neundorf, Niemi and Smets, 2016). I argue that education's socializing impact not only includes the acquisition of civic skills and political knowledge (Finkel, Neundorf and Rascón Ramírez, 2024; Nelsen, 2021; Niemi and Junn, 1998), but it also shapes our cognitive ability to accept members of ethnic outgroups. Second, this article highlights the importance of studying political outcomes through a psycholinguistic lens. Past studies have shown that the language we speak can influence our outlook on several political issues, such as climate change, gender equality, and voting (Abrajano and Panagopoulos, 2011; Flores and Coppock, 2018; Liu et al., 2018; Pérez and Tavits, 2022). This research underscores the cognitive impact of bilingualism on intergroup tolerance by improving peoples' ability to put themselves in the shoes of others. Lastly, this article contributes to existing works on perspective-taking and prejudice reduction (Adida, Lo and Platas, 2018; Kalla and Broockman, 2020) by showing that perspective-taking is a cognitive ability that can be cultivated during a person's formative years. Unlike existing perspective-taking interventions that rely on direct, group-specific contact or targeted empathy exercises, this article demonstrates how cognitive abilities developed through bilingual education may provide a more durable solution to reducing intergroup prejudice.

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Bilingual Education, Perspective-Taking & Ethnic Attitudes

I argue that bilingual education has important consequences on intergroup relations. Specifically, individuals who were exposed to bilingual instruction in school should display more inclusive social and political attitudes than those who received monolingual instruction. This theoretical claim stems from three insights. First, bilingual instruction promotes bilingualism – i.e., the ability to speak two languages. Second, bilinguals possess better perspective-taking ability than monolinguals. Third, the ability to understand other individuals' motives and actions should be linked to lower levels of political discrimination against ethnic outgroups.

An immediate consequence of bilingual education is an increase in the number of hours that a student will have to read, write, and speak in a second language. I focus on the effects of language as a *medium of instruction* for content subjects such as History and Science, as opposed to language as an elective course such as Spanish classes. While single-language courses can be important for language acquisition, bilingual instruction offers an applied learning environment where two languages are used for specific purposes, such as reading history textbooks in French and writing scientific reports in English, thereby increasing exposure to both languages simultaneously (Dalton-Puffer, Nikula and Smit, 2010). This increases the likelihood that students will develop into bilingual speakers in the future (Reljić, Ferring and Martin, 2015). Additionally, bilingual education can be especially beneficial for students who only converse in their mother tongue at home, by making up for the lack of second language exposure in monolingual families (Rumlich, 2020).

By improving their proficiency in two languages, students develop into bilinguals whose perspective-taking ability is widely considered to be superior to monolinguals (Díaz, 2022). Conceptually, perspective-taking refers to the cognitive ability to understand and adopt another person's viewpoint and motivations (Davis, 1983; Galinsky, Ku and Wang, 2005). In the context of intergroup relations, perspective-taking enables individuals to better comprehend the experiences, challenges, and vantage points of those from different social groups.

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There are three primary accounts from cognitive science and psychology that explain why bilinguals excel in perspective-taking (Schroeder, 2018). First, bilingualism improves executive functioning such as attention control, working memory, and inhibition abilities – i.e., cognitive functions that are crucial for perspective-taking (Bialystok and Viswanathan, 2009). Due to the process of frequently switching between two languages and the suppression of one medium to use the other, bilingual speakers are subconsciously trained to control and down-weigh their prior beliefs and knowledge while "up-regulating" and shifting their attention towards understanding another person's mental state (Schroeder, 2018; Zhang et al., 2015). A second set of explanations focuses on bilinguals' heightened sense of metalinguistic awareness, defined as the ability to dissect and reflect on the properties of a language (Bialystok and Barac, 2012). The recognition that a single concept has multiple labels across different languages – e.g., "democracy" (English) and "*democracia*" (Spanish) – might be translated into a more general understanding that two people may interpret and react to the same event differently. Lastly, the socio-pragmatic account postulates that the ability to speak and understand multiple languages allows bilinguals to operate more effectively in multicultural settings. This leads to a greater appreciation that different language speakers may subscribe to different sets of beliefs and values, as well as an improved ability to consider another person's thoughts and actions (Fan et al., 2015; Goetz, 2003).

Taken together, the above explanations suggest that the ability to take the perspectives of others can be improved when individuals are forced to alternate between two (or more) languages.[1] Put simply, the process of language switching mirrors the cognitive process of switching and taking the perspectives of others (Bialystok and Viswanathan, 2009). For instance, when an English-French bilingual is conversing with someone who only understands French, the bilingual speaker suppresses their inclination to speak in English and focuses their attention on speaking in French. Similarly, when someone takes the perspectives of others, they have to downplay their own mental states while diverting their attention towards others.

[1]Indeed, the above mechanisms can also be generalized to multilingual contexts where people can speak and understand more than two languages.

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This is supported by brain imaging studies, which revealed that brain regions associated with perspective-taking become active when participants are engaged in translation activities (Grundy, Anderson and Bialystok, 2017; Kobayashi, Glover and Temple, 2006).

When bilingual individuals switch from one language to another, they are (subconsciously) training their cognitive flexibility to switch from their own personal thoughts to another person's mental state. The more frequent the language switching, the better the ability to take the perspectives of others. This might explain why multiple studies have shown that bilingual children and adults are better perspective-takers than monolinguals, given the higher rate of language switching among bilinguals (Fan et al., 2015; Greenberg, Bellana and Bialystok, 2013). Moreover, the fact that perspective-taking effects are observed among diverse language pairs, such as Arabic-Hebrew speakers in Israel (Bekerman and Horenczyk, 2004), English-Tamil bilinguals in India (Bialystok and Viswanathan, 2009), and Hungarian-Serbian bilinguals in Serbia (Javor, 2016), suggests that the link between bilingualism and perspective-taking may be applicable across a variety of linguistic and country contexts.

This enhanced ability to understand another person's mental state should in turn reduce bilinguals' susceptibility to discriminate against ethnic outgroups. Unlike past perspective-taking research which imposes clearly defined outgroup targets (Adida, Lo and Platas, 2018; Bilali and Vollhardt, 2013; Broockman and Kalla, 2016), I theorize that the cognitive exercise of language-switching itself develops a generalized perspective-taking ability that can reduce ethnic discrimination without invoking specific targets. This distinction is important as it implies that bilingualism cultivates a broader, more inclusive cognitive framework rather than improving attitudes toward specific outgroups. As such, these effects should be observable regardless of whether the languages involved are those of marginalized ethnic groups or colonial tongues. In other words, my argument does not require bilinguals to speak the language of the ethnic outgroup; the cognitive benefits of bilingualism should emerge from the process of language-switching itself, regardless of which specific languages are spoken.[2] While

[2]It is possible that the strength of the relationship may vary across different languages. For example, speaking a minority tongue may induce more perspective-taking than a non-ethnic language (Wright and

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this mechanism could potentially extend beyond ethnic boundaries to reduce discrimination against other outgroup types (e.g., immigrants or religious minorities), this paper focuses on testing bilingualism's impact on inter-ethnic discrimination as a crucial first step before extrapolating its effects to other forms of outgroup bias.

Before proceeding to the empirical studies, it is worth stressing that language education policies often serve broader political objectives (Albaugh, 2014; Liu, 2015). The choice of which language(s) to teach – and how many – typically reflects strategic national goals. Monolingual policies have historically functioned as instruments of nation-building and cultural homogenization (Laitin, 1992), while multilingual education may represent deliberate efforts to foster more inclusive national identities, accommodate regional autonomy, or advance economic competitiveness (Csergo, 2007). These political motivations thus suggest additional pathways through which bilingual education might influence ethnic attitudes.

To summarize the theoretical arguments, the primary expectation of this article is that individuals who received bilingual instruction should display less discrimination against ethnic outgroups than those who received monolingual instruction. Exposure to bilingual education increases the frequency of language switching and the ability to see things from other individuals' vantage points. The resulting improvement in perspective-taking ability should in turn reduce bilinguals' propensity to discriminate against ethnic outgroups.

Research Design

I investigate my claims through three distinct studies. The main outcome variable is ethnic outgroup discrimination, which I define as a person's propensity to deny members of ethnic outgroups the right to participate in a country's political process (Sorens, 2010). Ethnic outgroup discrimination can be manifested through an individual's opinions on (1) coethnic political leadership, (2) political rights of non-coethnic citizens, and (3) the role of ethnicity in

Tropp, 2005). Nonetheless, my baseline expectation is that perspective-taking effects should still be observed in settings where neither language spoken by the bilingual is native to any ethnic groups in a country.

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political competition. Studies 2 and 3 measure this concept directly, while Study 1 examines ethnic sensitivity as a proxy due to data limitations in the Asian Barometer Survey (ABS, 2017). Specifically, ethnic sensitivity captures the degree to which individuals empathize with and recognize the challenges faced by marginalized ethnic groups in their country.

Study 1 serves to establish the foundational relationship between bilingualism and ethnic sensitivity: compared to monolingual speakers, bilinguals are better at perspective-taking and should therefore possess a heightened level of sensitivity towards the challenges faced by marginalized ethnic communities. I conduct a cross-national analysis using Wave 4 of the ABS, which includes data from 15,000 participants representing 10 East and Southeast Asian countries. It is important to note that this study cannot directly test the language switching mechanism, as ABS interviews were conducted in only one language per respondent. Instead, it examines the broader association between bilingual status and ethnic attitudes.

Study 2 builds on the previous study by examining the causal relationship between bilingual education and ethnic outgroup discrimination. I exploit the exogenous implementation of a reform in Malaysia to tease out the causal effect of bilingual instruction on ethnic outgroup discrimination. Malaysia is an ideal case for two reasons. First, Malaysia is a multi-ethnic country where ethnicity is a salient political issue (Weiss, 1999). It comprises three main ethnic groups: Malays and other indigenous peoples (67.4%), Chinese (24.6%), and Indians (7.3%). Since its independence in 1957, the Prime Minister has always come from the ethnic majority group. Political parties are also organized primarily along ethnic lines. Moreover, the constitution contains provisions that grant a "special position" to Malays while the rights of other ethnic communities are marginalized. The introduction of the New Economic Policy in 1971 further exacerbated the unequal treatment of non-Malay groups through the use of pro-Malay quotas for admission into public universities, civil service employment, and business licenses. These policies continue to garner widespread support among Malays. According to one survey, 59% of Malay respondents agreed or strongly agreed that Malays should continue to enjoy special rights and privileges because they are the original

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inhabitants of the country (Merdeka Center for Opinion Research, 2010). Hence, Malaysia provides an interesting case to examine whether the reform had any impact in promoting more inclusive political attitudes among members of an ethnic majority group.

Second, the Malaysia case provides a unique natural experimental setting that helps avoid several empirical challenges for causal inference. For one, the language of instruction received may be confounded by other pretreatment factors, such as parents' ethnic attitudes (Huddy and Sears, 1995). Hence, ethnic discrimination among individuals who received monolingual instruction may simply be a reflection of their parents' outgroup biases. Moreover, analyzing the political effects of bilingual education through an experimental framework may pose ethical concerns for participants, as the type of language used in schools can have significant future repercussions on human capital outcomes (Laitin and Ramachandran, 2016).

Study 3 directly tests the mechanisms linking bilingualism to reduced ethnic outgroup discrimination – i.e., language-switching and perspective-taking. It also addresses possible alternative explanations that could not be tested in previous studies, such as whether speaking English alone reduces ethnic discrimination. I recruited 900 bilingual participants in Malaysia, and they were assigned to complete the survey in one language (monolingual) or a mixture of English and *Bahasa Melayu* (bilingual). Respondents in the monolingual group were further split into an English-only or a *Bahasa Melayu*-only condition. More generally, this experiment seeks to replicate two types of language environments: a monolingual one (i.e., English-only or *Bahasa Melayu*-only) and a bilingual setting.

Study 1: Cross-National Analysis

An advantage of analyzing the ABS is that the enumerators documented whether the interview took place in the respondent's mother tongue. Specifically, the ABS coded whether the interview was conducted in (1) the respondent's native language or dialect, (2) the main language of the country but *not* the native language or dialect of the respondent, or (3) the main language of the region but *not* the native language or dialect of the respondent.

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This implies that respondents in groups 2 and 3 can speak their native language *and* the main language of the country or region. Hence, the main explanatory variable, labeled as *Bilingual*, is assigned a value of 1 if a respondent is classified into groups 2 or 3 by the ABS.

The primary outcome of interest is *Ethnic Equality*, which is based on a question that asked if respondents strongly agreed (4), agreed (3), disagreed (2), or strongly disagreed (1) with the view that "all citizens from different ethnic communities in your country are treated equally by the government." This item measures the extent to which respondents empathize with other ethnic outgroups and reflect on the level of government discrimination against them. I expect that bilinguals should display stronger disagreement towards this statement.

Admittedly, the impact of bilingualism on *Ethnic Equality* may be confounded by respondents' ethnicity. Members of dominant ethnic groups are more likely to be monolingual and perceive government treatment as equitable, while non-dominant groups may show higher rates of bilingualism and perceive greater discrimination.[3] I create a control variable by cross-referencing ABS respondents' ethnicity with data from the Ethnic Power Relations (EPR, Vogt et al., 2015) study. *Dominant Ethnic Group*, equals one if a respondent belongs to an ethnic group that is classified as a "monopoly," "dominant" group, or "senior partner" in the EPR dataset.[4] Finally, I include other social and economic covariates in the regression models: *Female*, *Age*, *Education*, *Income*, *Employed*, *Religion*, *Internet*, and *Urban*.[5]

Results

To assess the robustness of the findings across different model specifications, I perform three regression analyses. In the OLS and ordered logit models, *Ethnic Equality* is regressed on *Bilingual* and control variables with country fixed effects. The third model employs the Coarsened Exact Matching (CEM) method to match bilingual and monolingual respondents on their covariate values and country origins (Iacus, King and Porro, 2012). Unlike propen-

[3]Section OA1a of the Online Appendix (OA) describes the ethnolinguistic patterns in the ABS dataset.
[4]Table OA1a.1 lists the dominant ethnic group(s) in each ABS country.
[5]Section OA1b describes the variables used in the cross-national analysis.

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Table 1: **Bilinguals Display More Sensitivity Towards Other Ethnic Communities**

DV =	Ethnic Equality		
Models =	OLS	Ordered Logit	CEM
Bilingual	−0.038*	−0.101*	−0.073*
	(0.018)	(0.044)	(0.031)
Covariates	Yes	Yes	No
Country FE	Yes	Yes	No
N	12219	12219	2744

Notes: Table entries are unstandardized coefficient estimates. Standard errors are shown in parentheses, with robust standard errors used in the OLS model, conventional standard errors in the ordered logit model, and standard errors clustered by strata in the CEM model. The values for *Ethnic Equality* range between 1 and 4, with larger values indicating stronger agreement that different ethnic groups are treated equally by the government. Covariates include gender, age, education, employment, income, internet access, whether the respondent identifies with a religion, urbanity of residence, and whether the respondent belongs to a dominant ethnic group in the country. Full results are reported in Table OA1d.6. $^{**}p < 0.01$; $^{*}p < 0.05$; $^{\dagger}p < 0.1$.

sity score matching, CEM resembles a fully blocked experimental design, and has lower levels of imbalance, model dependence, and bias (King and Nielsen, 2019). CEM weights are included in a bivariate OLS model to estimate the effect of *Bilingual* on *Ethnic Equality*.[6]

In line with my theory, Table 1 shows that bilinguals are less likely to perceive equal treatment of all ethnic groups by their government than monolinguals. Despite the effect sizes being modest, the point estimates are statistically significant at the conventional level across all three models. The OLS and CEM models estimate a 4.5%-8.6% standard deviation shift in disagreement with the statement (SD for *Ethnic Equality* equals 0.85), while the ordered logit model predicts a 1.9 percentage point increase in the probability that a bilingual respondent would strongly disagree or disagree with the statement (Figure OA1d.3).

I conduct multiple tests to assess the robustness of the findings. First, a large proportion of responses was dropped to achieve balance between treated and control units in the CEM model. I adjust the coarsening level by reducing the number of bins and present the results in Table OA1e.7. The main finding remains unchanged. Second, I re-estimate the OLS and ordered logit models with sampling weights and report similar results in Table OA1f.8. Next,

[6]Section OA1c details the CEM process prior to the regression analysis.

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I undertake three placebo tests by replacing *Ethnic Equality* with support for democracy (*Democracy Best*), respondents' trust in others (*Trustworthy*), and *National Pride*. *Bilingual* fails to predict the three placebo outcomes at the standard significance level (Table OA1g.9).

Fourth, I construct an alternative measure of bilingualism based on respondents' self-reported language use at home. I regress the outcome on *Bilingual (Alternate)*, which equals one if a respondent speaks a mixture of local and official languages at home, and zero otherwise. The primary findings remain robust to this alternative predictor (Table OA1h.10). Fifth, I control for respondents' social standing and find results consistent with the main results (Table OA1i.11).[7] Next, I conduct a sensitivity analysis to assess how robust the main findings are to the influence of unobserved confounders (Cinelli and Hazlett, 2020). Specifically, the point estimate for *Bilingual* would remain statistically significant at $p < 0.1$ even in the presence of a confounder that is as strong as the most influential covariate – *Dominant Ethnic Group* – in the current model (Tables OA1j.12 and OA1j.13). Finally, to investigate whether the aggregate effect was driven primarily by respondents' ethnic membership, I replicate the models separately for dominant and non-dominant ethnic groups. Among dominant group members, *Bilingual* is correlated with a decrease in support for the idea that government treatment of all ethnic groups is equitable ($p < 0.01$), while it has no significant effect among non-dominant group members (Table OA1k.14). This asymmetric pattern likely reflects a floor effect for the latter, as a large proportion of non-dominant ethnic group members already disagree with the statement about equitable treatment.

Collectively, the findings from Study 1 support the conjecture that bilingual speakers possess an elevated awareness of the challenges faced by other ethnic communities in the country, particularly those that are marginalized by the government. Above all, these findings are novel and lend greater confidence to the potential of bilingual education as a means to mitigate political discrimination against ethnic outgroups – a subject that will be investigated more extensively in the next section.

[7]Social standing is analyzed separately because it is highly correlated with other socioeconomic covariates.

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Study 2: Education Reform in Malaysia

Concerned about the general lack of English literacy among ethnic Malays, the Malaysian government announced on May 6, 2002, that Mathematics and Science would be taught in English in all public schools starting from 2003. Students who began their form one education (or grade seven) in 2003 and later cohorts received English instruction for STEM (Science, Technology, Engineering, Mathematics) courses. As such, Malay students affected by the reform were exposed to bilingual instruction during their secondary education – i.e., Mathematics and Science were taught in English while non-STEM classes were delivered in *Bahasa Melayu*. In contrast, students who had already advanced to form two or higher in 2003 were not affected by the reform; these students continued to receive *Bahasa Melayu* instruction for all subjects including Mathematics and Science – i.e., monolingual instruction.[8]

Given that children in Malaysia typically begin their formal education at the age of seven as well as the fact that the education system is structured on a $6 + 5 + 2$ model,[9] we can identify how the reform affected different birth year cohorts of Malay students. Figure 1 shows that the pioneer cohort of form one students who received bilingual instruction were born in 1990 – i.e., they would have turned thirteen years old in 2003. In contrast, Malay students who were born in 1989 and earlier studied both STEM and non-STEM subjects in *Bahasa Melayu* – i.e., they would have advanced to form two or higher in 2003, thereby missing the cutoff to study STEM subjects in English. While other educational reforms occurred during this period, none would have created effects comparable to the language of instruction change. Major reforms such as the introduction of Moral and Islamic Education had been implemented years earlier (in 1993), well before 2003, while other initiatives like computer-assisted learning were introduced gradually rather than as sudden policy shifts.[10]

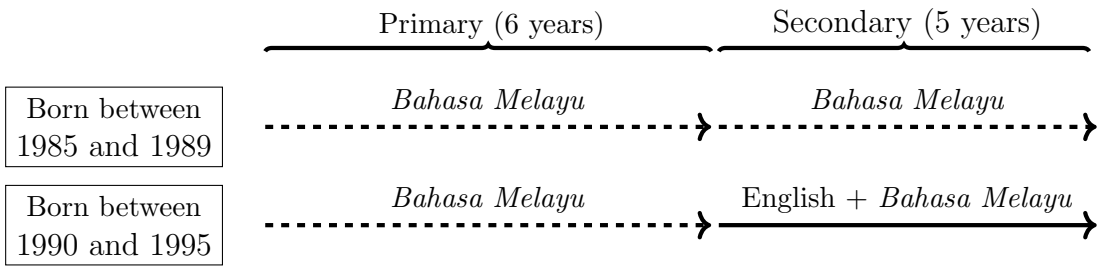
[8]This article focuses on ethnic Malay secondary school students who were affected by the reform. Section OA2a describes the education landscape and political context in Malaysia at the time of Studies 2 and 3, while Section OA2b provides a detailed description of the language reform in Malaysia.

[9]Students in Malaysia generally receive six years of primary school education, five years of secondary school education, and two years of pre-university training.

[10]Table OA2b.15 lists the pre-tertiary educational reforms in Malaysia between 1981 and 2005.

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Figure 1: **Language of Instruction in Malaysian Public Schools for Ethnic Malays**



There are also several reasons to suggest the quasi-randomized nature of the reform in assigning the language of instruction among Malay students. First, the narrow timeline between announcement (May 6, 2002) and implementation (January 2003) made it challenging for students to manipulate their probability of receiving English or *Bahasa Melayu* instruction. Second, grade skipping and repetition are uncommon in Malaysian schools, and it would be difficult or irrational for students to use these methods to avoid or self-select into the reform. Those born in 1989 who wished to self-select into the reform would have needed to repeat a grade unnecessarily, while those born in 1990 seeking to avoid the reform would have needed to skip directly from grade 6 to grade 8. Third, ethnic Malay students typically enrolled in public secondary schools that were not immune to the reform. Fourth, while Malay students could pursue the private education route, this option was dominated by Chinese-medium high schools, thus limiting the viability of this option for many Malay students. Finally, because Mathematics and Science were mandatory for all secondary students, it was impossible to opt out of these courses to avoid the language change.

Most importantly, the reform significantly increased the number and proportion of teaching hours allocated to English instruction. While their predecessors' exposure to English-medium classes was limited to just two hours per week, affected students spent at least 13 hours per week learning Mathematics and Science in English (Gill, 2013). Under the reform, about 40 percent of the teaching time was devoted to English, with the remaining 60 percent being taught in *Bahasa Melayu*. This was corroborated by evidence on the ground: according to a 2008 survey of 1,700 ethnic Malay students, more than 90 percent indicated that

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their teachers used either an English-only approach or a combination of English and *Bahasa Melayu* instruction to teach Mathematics and Science (Isahak et al., 2008). This suggests that affected Malay students, when compared to their predecessors, experienced a higher rate of language switching between their mother tongue and English in the classroom.

Moreover, the reform affected intermediate learners who had already acquired a basic level of English literacy, since English is a compulsory course in primary schools. This made the transition from monolingual to bilingual instruction less onerous.[11] The government also put in place measures to ensure that teachers were able to teach STEM classes in English. These include the introduction of a national re-training program for STEM teachers and a buddy system that matched STEM teachers with their English counterparts (Tan, 2011).

Survey Design

To investigate the impact of the education reform on ethnic outgroup attitudes, I fielded an original observational survey comprising 1,800 respondents in March 2022.[12] The survey was administered in *Bahasa Melayu* to ensure consistency in the interpretation of the questions and to eliminate any language effects that might contaminate the findings (Pérez, 2017).

The sampling frame of the survey comprised individuals who (1) are ethnic Malays, (2) were born between 1985 and 1995, and (3) had completed their secondary school graduation examination (*Sijil Pelajaran Malaysia*, SPM). On the first requirement, I excluded members of other ethnic groups (e.g., Chinese), as most ethnic Malays were enrolled in public secondary schools that were not immune from the reform in 2003.[13] Second, I did not sample ethnic Malays who were born before 1985 or after 1995 as they were exposed to a different set of language regimes.[14] Importantly, this sampling frame only includes individuals born

[11] However, it must be emphasized that students did not spend a significant amount of time learning English at the primary school level, since a majority of their classes were still delivered in their native tongue.

[12] Section OA2c provides details on the survey design, variable measurements, and descriptive statistics. The survey received approval from the author's institution's IRB on February 17, 2022 (IRB ID#202201122).

[13] Only one percent of the respondents indicated that they attended private secondary schools. Responses from these participants were dropped from the empirical analyses. I also excluded ethnic Chinese due to their preference to enroll into Chinese independent high schools that were exempted from the reform.

[14] Figure OA2b.5 displays the different types of language regimes based on Malay students' birth years.

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years after the introduction of the New Economic Policy (NEP) in 1971, which eliminates any possibility that any differences in ethnic attitudes between treated and control units could be attributed to NEP exposure.[15] The final prerequisite – secondary school graduation – ensures that the main reason why a participant received bilingual or monolingual instruction during their secondary school education can be explained by their birth year, rather than other factors such as dropping out of school or not enrolling in a secondary school.

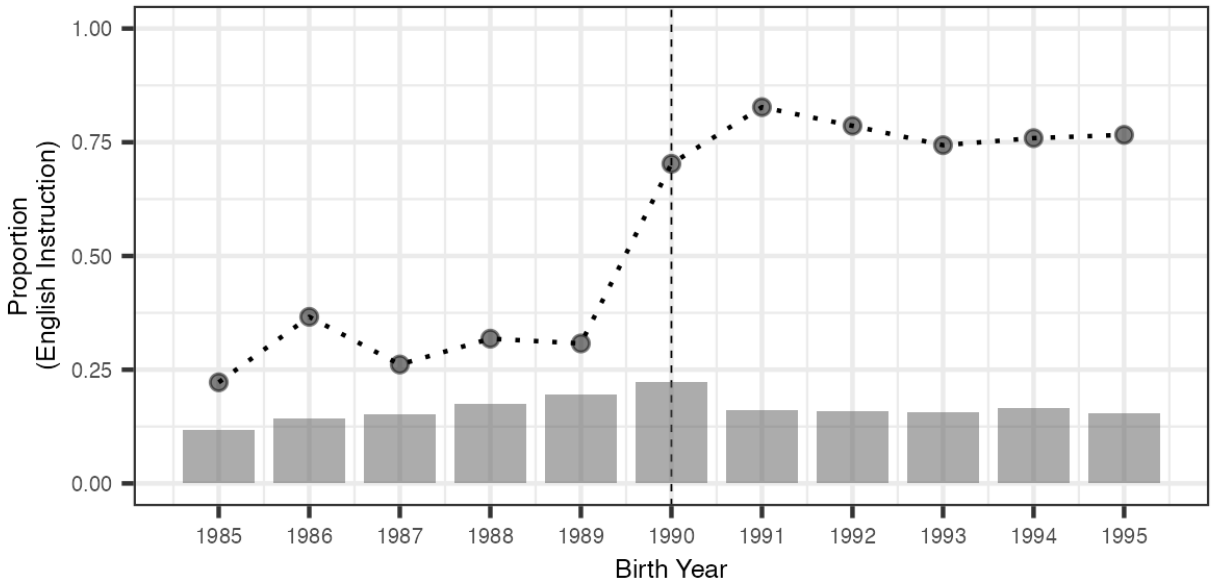
To verify if the implementation of the reform coincided with participants' birth years, the survey asked each respondent to provide their date of birth and to specify the language that was used to teach Mathematics and Science during their secondary school education. Figure 2 shows that the reform significantly increased the probability that a respondent who was born between 1990 and 1995 received English instruction for STEM classes in their schools. Empirically, this implies the use of a fuzzy regression discontinuity (RD) design to estimate the causal effect of bilingual instruction on ethnic attitudes. Specifically, *Reform* is an instrumental variable that equals one if a respondent's date of birth falls between 1990 and 1995, while the treatment variable, *Bilingual Instruction*, equals one if a respondent reported that English was used to teach Mathematics and Science during their secondary school education. Note that individuals who received English instruction for STEM subjects received *Bahasa Melayu* instruction for non-STEM courses – i.e., bilingual instruction. In contrast, those who reported *Bahasa Melayu* instruction for STEM classes were exposed to the same language of instruction for non-STEM subjects – i.e., monolingual instruction.

There are two reasons that may explain the imperfect compliance with the reform. First, the narrow timeframe between the policy announcement and implementation posed a daunting challenge for many STEM teachers, particularly those in rural schools. Despite efforts by the education ministry to re-train STEM teachers, most were accustomed to teaching in *Bahasa Melayu* and therefore found it difficult to adjust to the new language regime (Gill, 2013; Tan, 2011). Second, even if STEM teachers were proficient in teaching in English, many felt

[15]The NEP was accepted by many Malaysians across ethnic lines as necessary for national stability (Brown, 2007). This consensus could potentially shape ethnic attitudes independent of other factors.

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Figure 2: **Respondents' Birth Years & Language of Instruction for STEM Subjects**



Notes: The vertical bars reflect the frequency distribution of the respondents by their birth years. Each point refers to the proportion of respondents in a cohort who reported that English was used to teach STEM subjects at the secondary school level. The vertical dashed line refers to the cutoff year at 1990.

compelled to conduct their classes in *Bahasa Melayu* due to the concern that Malay students, especially those in rural areas, might struggle to grasp the content in a non-native language (Isahak et al., 2008). These factors suggest that reform compliance may vary depending on whether students attended urban or rural secondary schools. To address this concern, multiple covariates are included in the regression models, such as urban school attendance (*Urban School*), bilingualism at home (*Bilingual Home)*, and other socioeconomic indicators. Nevertheless, despite the presence of non-compliance, it is important to highlight that being born between 1990 and 1995 is by far the strongest predictor of receiving bilingual instruction in Malaysia. Table OA2d.18 shows that respondents born between 1990 and 1995 were 46.9 percentage points more likely to receive bilingual instruction than their predecessors, while urban school attendance marginally increases bilingual exposure by 7.7 percentage points. This finding reinforces the validity of the fuzzy RD design in the Malaysian context.

The primary outcome of interest is *Ethnic Outgroup Discrimination*, a composite variable based on three items measuring an ethnic Malay's propensity to deny ethnic outgroups from

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participating in Malaysia's political process. The first constituent item relates to an individual's preference toward the ethnicity of the country's chief executive. Participants indicated their level of agreement on a 4-point Likert scale with the statement, "The Prime Minister of Malaysia should always be a Malay," where responses are coded such that larger values correspond to stronger agreement with the statement. The next item asked respondents if they strongly disagreed (4), disagreed (3), agreed (2), or strongly agreed (1) with the view that "People should be treated and given the same rights in Malaysia regardless of race or religion." The last item pertains to opinions about the ethnicized nature of party competition in Malaysia. Respondents were presented with the statement, "There should be no race-based parties in Malaysia." Larger values are assigned to stronger disagreement, reflecting greater support for the continued presence of ethnic parties to safeguard Malay interests. *Ethnic Outgroup Discrimination* is then measured by averaging the responses to these three items, where larger values reflect greater political discrimination against non-coethnics.

Results

To estimate the local average treatment effect (LATE) of bilingual instruction on ethnic outgroup discrimination, I implement the method as recommended by Calonico, Cattaneo and Titiunik (2014). This approach involves estimating a local linear regression using a mean square error (MSE) optimal bandwidth selection procedure, with larger triangular kernel weights assigned to units closer to the cutoff at January 1, 1990. I also cluster the standard errors by state, as compliance rates and treatment exposure are likely to vary across states in Malaysia, particularly between those with a higher concentration of rural schools and those that are more urbanized.

Table 2 reports the LATEs of bilingual instruction on ethnic outgroup attitudes. The results provide strong support for the paper's main prediction: bilingual education reduces political discrimination against ethnic outgroups. The point estimates for *Bilingual Instruction* are consistently negative and statistically significant across various model specifications,

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Table 2: **Bilingual Instruction Decreases Ethnic Outgroup Discrimination**

DV =	Ethnic Outgroup Discrimination			
Models =	Without Covariates		With Covariates	
	Conventional	Robust	Conventional	Robust
Bilingual Instruction	−0.186*	−0.287*	−0.251*	−0.417*
	(0.094)	(0.133)	(0.117)	(0.177)
N	788	788	701	701
N (below cutoff)	378	378	337	337
N (above cutoff)	410	410	364	364
Bandwidth	764.218	764.218	686.775	686.775
Kernel	Triangular	Triangular	Triangular	Triangular

Notes: Table entries are unstandardized coefficient estimates. In the "Conventional" models, point estimates and standard errors (in parentheses) are conventional, while in the "Robust" models, bias-corrected estimates and robust standard errors (in parentheses) are provided (see Calonico, Cattaneo and Titiunik, 2014). All standard errors are clustered at the state level. Values for *Ethnic Outgroup Discrimination* range between 1 and 4, with higher values indicating greater political discrimination against ethnic outgroups. Covariates include gender, education, employment, household income, multilingualism at home, and attendance at an urban school. Bandwidths are MSE-optimal. Table OA2e.19 reports the first stage estimates. $^{**}p < 0.01$; $^{*}p < 0.05$; $^{\dagger}p < 0.1$.

such as the inclusion of covariates or the use of different bandwidths. Moreover, the effect sizes are substantively meaningful, with exposure to bilingual instruction leading to a 32.3%-72.4% standard deviation decrease in ethnic outgroup discrimination (SD for *Ethnic Outgroup Discrimination* equals 0.58). The first stage results in Table OA2e.19 also indicate that individuals born right after the cutoff experienced, on average, a 34.4-36.6 percentage points increase in the probability of receiving bilingual instruction, thus satisfying the relevance assumption. Overall, the main findings highlight the powerful and enduring effects of bilingual education in fostering more inclusive political attitudes. The fact that we can detect significant and substantial differences in ethnic outgroup attitudes among participants who completed their schooling over a decade ago underscores the notion that intergroup prejudice can be reliably and durably reduced during one's formative years.

I perform several analyses to test the robustness of the main findings. First, an ex-post power analysis reveals that the fuzzy RD models achieve statistical powers of 0.86 (without covariates) and 0.92 (with covariates), as shown in Figure OA2f.6. This suggests that the

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study was sufficiently powered to detect significant differences in ethnic outgroup discrimination between respondents exposed to bilingual and monolingual instruction in Malaysia. Next, I demonstrate that the main findings remain robust across various alternative specifications, such as different kernel weights (Table OA2g.20) and different bandwidths (Table OA2g.21). Additionally, I find that *Bilingual Instruction* fails to predict *Ethnic Outgroup Discrimination* when using placebo cutoffs occurring one year before and after January 1, 1990 (Tables OA2g.22 and OA2g.23). This implies that the impact of bilingual instruction occurs precisely at the cutoff on January 1, 1990.

Finally, I consider the possibility that intergroup contact (1) violates the exclusion restriction assumption or (2) provides an alternative explanation for the observed patterns. Regarding the former scenario, the shift from *Bahasa Melayu* to English instruction could have persuaded more Chinese parents to enroll their children in public secondary schools. This might have facilitated more interethnic contact and reduced discrimination.[16] If this is true, we would expect the frequency and quality of intergroup contact to be higher among ethnic Malays born just after the cutoff. However, Tables OA2h.24 and OA2h.25 show that there is no significant difference in contact frequency and quality between respondents born before and after the cutoff, thus mitigating the plausibility of this alternative channel. In the second scenario, bilingual instruction may facilitate interethnic contact by offering a shared language – English – for different ethnic groups to communicate with each other, leading to more favorable outgroup evaluations (Wright and Tropp, 2005). To rule out this alternative explanation, I regress the frequency and quality of interethnic contact on *Bilingual Instruction*, with *Reform* as the instrument. I find that bilingual instruction neither predicts the frequency nor the quality of interethnic interactions (Tables OA2h.26 and OA2h.27).

Notwithstanding, it is crucial to acknowledge two key limitations within this study. First, it examines the causal impact of bilingual instruction on ethnic attitudes by leveraging the educational context in Malaysia, where students born after a certain cutoff were taught in

[16]Ethnic Chinese parents in Malaysia typically prefer to send their children to Chinese independent high schools, which offer a Mandarin-based curriculum, rather than public secondary schools.

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English for STEM subjects and *Bahasa Melayu* for non-STEM subjects, while those born before received *Bahasa Melayu* instruction across all classes. As such, one could interpret the findings as a consequence of increased English instruction rather than the expectation that bilingual instruction promotes inclusive ethnic attitudes. Second, this study cannot make any direct conclusions about whether bilingual instruction improves ethnic attitudes through language switching and perspective-taking. I address these concerns in Study 3.

Study 3: Code-Switching and Perspective-Taking Experiment

The main objectives of Study 3 are twofold: (1) establish a more direct connection between bilingual exposure and ethnic outgroup attitudes, and (2) test the perspective-taking mechanism. A bilingual environment is operationalized in this study as a setting where individuals have to switch between two languages, a feature common in bilingual classrooms and families.

Building on the language experiments first introduced by Pérez and Tavits (2022), I conducted an IRB-approved, pre-registered survey experiment in Malaysia in August 2023.[17] The participant pool consisted of approximately 900 individuals who identified as ethnic Malays and possessed bilingual proficiency in English and *Bahasa Melayu*. Bilinguals were defined as those who indicated that they "can understand, speak, and write" or were "fluent" in both languages. Next, shortlisted participants were randomly assigned to complete the survey in one of three conditions: (1) *Bahasa Melayu* (30% of participants), (2) English (30%), or (3) a mixture of *Bahasa Melayu* and English (40%).[18]

Figure 3 presents an overview of the survey experimental design. Participants in this study, regardless of their assigned treatment, completed the same set of questions and tasks. The only distinction was the language used in each condition. For example, participants in conditions 1 and 2 completed the survey in *Bahasa Melayu* and English, respectively.

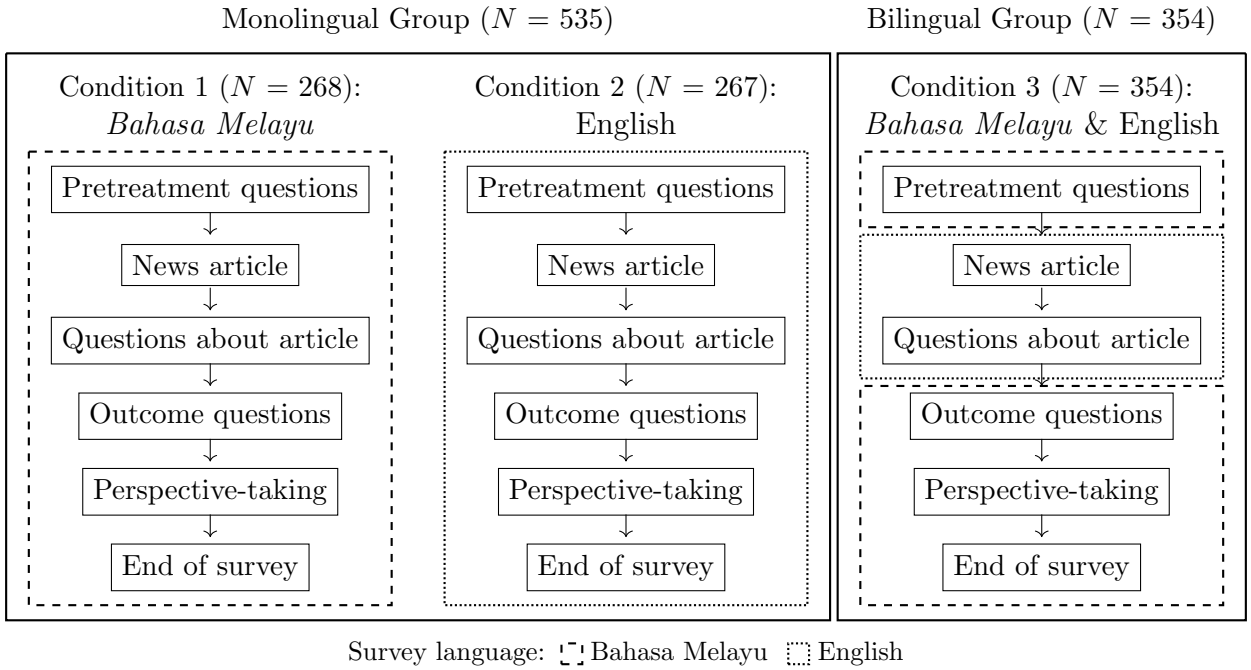
[17] I detail the recruitment process and survey design in section OA3b, while the variable measurements and descriptive statistics are reported in section OA3c. The survey experiment received approval from the author's institutional IRB on August 4, 2023 (IRB#202307062). The survey experiment was preregistered on the egap registry: `https://doi.org/10.17605/OSF.IO/4AXZQ`.

[18] Section OA3d shows that multiple pretreatment covariates are balanced across the three conditions.

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Collectively, these participants constitute the *Monolingual* group, as they only used one language throughout the survey. In contrast, condition 3 replicated a *Bilingual* environment, where participants had to switch between two languages. Specifically, participants in condition 3 first answered pretreatment questions in *Bahasa Melayu*, then read a news article and answered related questions in English, and finally answered the remaining questions in *Bahasa Melayu*. This setup sought to simulate a bilingual classroom environment akin to the education reform in Malaysia, where students had to switch between English and *Bahasa Melayu* for STEM and non-STEM classes.

Figure 3: **Overview of Survey Experimental Design**



All participants read a brief article (about 160 words) about a tourist destination in Malaysia. The article was deliberately chosen to be accessible and non-political to minimize the possibility of inducing respondents to display more or less ethnic discrimination and to ensure easy comprehension. After reading the article, respondents answered two questions related to it. These questions served as a manipulation check. Table OA3d.31 shows no significant differences in correct response rates across the three experimental conditions, which suggests that the degree of comprehension did not vary much among respondents.

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Importantly, over 93% of respondents answered the two questions correctly.

Regarding the outcome variable, I utilized the same set of component items as mentioned in the previous study: preference towards the ethnicity of Malaysia's prime minister, presence of ethnic parties, and equal rights for all ethnic groups in Malaysia. Additionally, I included a question that asked respondents whether they strongly support (1), somewhat support (2), somewhat do not support (3), or strongly do not support (4) the ratification of the International Convention on the Elimination of All Forms of Racial Discrimination (ICERD) in Malaysia.[19] Responses to the four items were recoded so that larger values correspond to stronger political discrimination against ethnic outgroups. The outcome of interest, *Ethnic Outgroup Discrimination*, is represented by the mean responses across the four items.

Finally, the survey experiment featured a series of questions aimed at assessing the level of perspective-taking among participants. This was gauged using the perspective-taking subscale from the Interpersonal Reactivity Index (IRI, see Davis, 1983). Participants read a total of seven statements measuring their perspective-taking ability (e.g., "If I'm sure I'm right about something, I don't waste much time listening to other people's arguments.") and rated each statement on a 5-point Likert scale ranging from "Does not describe me well" to "Describes me very well." The responses were averaged to generate a composite score reflecting a respondent's *Perspective-Taking* ability.

Results

As a reminder, a central argument of this paper is that the act of switching between multiple languages closely mirrors the cognitive process of shifting from one person's perspective to another. A higher frequency of language switching should improve an individual's propensity to adopt the viewpoints of others, which in turn should reduce their inclination to discrimi-

[19]ICERD is a United Nations convention which commits its members to eradicate racial discrimination. In late 2018, ICERD became a highly contentious and politically charged issue in Malaysia when the government expressed its intention to ratify the treaty. In response, an estimated 55,000 people, mostly ethnic Malays, staged a rally in the country's capital, urging the government to withdraw its support. Subsequently, the government announced they would not ratify the convention.

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nate against members of ethnic outgroups. Consequently, I expect that participants in the *Bilingual* group should exhibit lower levels of ethnic outgroup discrimination than those in the *Monolingual* group (i.e., conditions 1 and 2 combined).

As shown in Table 3, participants in the *Bilingual* group displayed, on average, lower levels of ethnic outgroup discrimination than those in the *Monolingual* group. Both point estimates are negative, with the reduction being statistically significant at the conventional level across the two models. Substantively, participants who switched between *Bahasa Melayu* and English experienced a 16.9%-20.5% standard deviation decrease in their tendency to discriminate against other ethnic outgroups (SD for *Ethnic Outgroup Discrimination* equals 0.52). Overall, the findings from Table 3 are consistent with the results of the previous two studies that bilingual exposure reduces ethnic outgroup discrimination.

Table 3: **Language Switching Reduces Ethnic Outgroup Discrimination**

DV =	Ethnic Outgroup Discrimination	
Models =	Without Covariates	With Covariates
Bilingual	-0.087^{*}	-0.106^{**}
	(0.035)	(0.034)
Region FE	No	Yes
N	870	853

Notes: Table entries are unstandardized coefficient estimates. Robust standard errors are shown in parentheses. The treatment variable, *Bilingual*, equals 1 for respondents assigned to the bilingual group and 0 for those in the monolingual group. Values for *Ethnic Outgroup Discrimination* range between 1 and 4, with higher values indicating stronger discrimination against ethnic outgroups. Covariates include gender, education, household income, age, and self-reported fluency in English and *Bahasa Melayu*. Full results are reported in Table OA3e.32. $^{**}p < 0.01$; $^{*}p < 0.05$; $^{\dagger}p < 0.1$.

A lingering concern from Study 2 was whether the observed results were primarily influenced by bilingual or specifically English instruction. This concern arises from the possibility that the impact of bilingual instruction in the Malaysian context might reflect something unique about the English language itself. For instance, previous research has shown that English proficiency is associated with more cosmopolitan and tolerant attitudes due to its status as a lingua franca in global settings (Hu and Liu, 2020).

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An advantage of the survey experiment is that we can analyze the treatment effects by employing a three-category treatment variable and making multiple pairwise comparisons across the three conditions. If this intuition holds true, then we should expect participants assigned to the English-only condition to exhibit lower levels of ethnic outgroup discrimination than those in the *Bilingual* and *Bahasa Melayu*-only conditions. Contrary to this expectation, Table OA3f.33 shows that participants in the *Bilingual* group displayed the lowest level of outgroup discrimination among the three experimental conditions. For example, compared to participants in the *Bilingual* condition, those in the English and *Bahasa Melayu* conditions showed a 20.5% and 20.6% standard deviation *increase* in *Ethnic Outgroup Discrimination*, respectively. Moreover, there is no meaningful and significant difference in ethnic outgroup attitudes between those in the English and *Bahasa Melayu* conditions, which challenges the notion that using the English language *alone* promotes tolerance. Importantly, these findings suggest that the reduction in discriminatory attitudes was mainly driven by the use of multiple languages rather than any single language.

Finally, Table OA3g.34 provides evidence that aligns with the theoretical expectation that language switching raises a person's willingness to consider the perspectives of others. The effect sizes are also meaningful, with a 13.9%-16.7% standard deviation increase in *Perspective-Taking* (SD for *Perspective-Taking* equals 0.58). Above all, it is remarkable to observe a significant connection between bilingual exposure and perspective-taking, despite the experiment not introducing any vignettes or information that would induce participants – especially those in the *Bilingual* group – to think in the shoes of others.

Conclusion

In this article, I show that differences in ethnic outgroup attitudes are linked to an individual's language exposure through three studies. First, I present cross-national evidence from the ABS in Study 1, which offer preliminary support for the link between bilingualism and inclusive political attitudes towards ethnic outgroups. Second, Study 2 demonstrates the

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causal effects of bilingual education on ethnic outgroup discrimination by leveraging the as-if random assignment of the language of instruction in Malaysian schools due to the sudden introduction of an education reform in 2003. I find that ethnic Malays who received bilingual instruction displayed less political discrimination against ethnic outgroups. Finally, I triangulate the evidence from Studies 1 and 2 with a direct examination of the effects of language switching on ethnic attitudes in Study 3. Bilingual exposure, specifically participants who alternated between two languages during the survey experiment, was linked to a decrease in ethnic outgroup discrimination and an improvement in perspective-taking ability.

While this research offers compelling evidence linking bilingual exposure to reduced ethnic discrimination, it is worth considering the scope conditions that may limit the generalizability of these findings. First, the findings primarily speak to the impact of bilingual exposure on ethnic discrimination among majority group members. In Study 1, the effects are most pronounced among dominant ethnic group members, while the samples in Studies 2 and 3 consist exclusively of ethnic Malay respondents. Second, Studies 2 and 3 investigate the impact of bilingual exposure through a non-ethnic language (English), thus raising the question of whether similar effects would emerge when the second language belongs to an ethnic outgroup. While the cross-national analysis in Study 1 partially addresses this concern, further investigation is needed to explore potential variations in perspective-taking effects across different language types (e.g., Wright and Tropp, 2005). Critically, in Study 2 we cannot differentiate between the effects from bilingual instruction versus English-specific cultural exposure. Individuals with English proficiency may be exposed to ideas and values from other countries that emphasize ethnic tolerance (Hu and Liu, 2020). This implies two possible mechanisms: perspective-taking through bilingual exposure and exposure to inclusive values through English-language sources. While Study 3 sought to isolate bilingualism's effects from the potential cultural influence of English exposure, future research could employ parallel studies to compare the perspective-taking effects of different forms of bilingualism (e.g., majority language + English, majority language + minority language).

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Third, this paper does not fully explore how socioeconomic outcomes might serve as an alternative pathway, especially in light of the fact that the language reform in Malaysia was introduced to improve the economic competitiveness of Malay graduates (Gill, 2013; Tan, 2011). Although Study 3 helps to rule this out as an alternative explanation, future research should examine whether improved socioeconomic conditions could complement the cognitive benefits of bilingualism. Finally, while the theoretical framework briefly touches on broader applications, the empirical focus on ethnic discrimination leaves open the question of whether similar effects would extend to other marginalized groups, such as immigrants or religious minorities. This represents an important direction for future research.

The findings from this paper make several important contributions. First, this article expands on the conventional wisdom that education influences political attitudes and behavior primarily through the acquisition of civic skills and political knowledge. I demonstrate that education also improves our cognitive ability to assume the vantage points of ethnic outgroup members in our midst. More broadly, the findings indicate that a person's education represents a bundle of experiences inside and outside the classroom, from the language of instruction used to the types of extracurricular activities offered. Hence, unpacking this bundle of experiences – through a rigorous analysis of other facets of the education system – represents an important step for future scholars to resolve some of the theoretical issues that remain resolved in the education literature (Cavaille and Marshall, 2019; Jensen, 2025; Lee, 2023; Persson, 2015).

Second, this article contributes to the more general understanding that the language(s) we speak can influence our social and political outlooks. The finding that bilingual instruction promotes the development of perspective-taking and lowers intergroup prejudice in Malaysia speaks to recent calls for a wider investigation of language's effects on affective, cognitive, and behavioral political outcomes (Pérez and Tavits, 2022). To my knowledge, this research is also one of the first that uncovers an empirical connection between bilingualism and outgroup tolerance at a cross-national level. Admittedly, the statistical tests and data are not perfect,

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primarily because we lack a good empirical measure of a person's linguistic diversity at home and outside. As such, future iterations of cross-national surveys should allow respondents to freely specify the language(s) they speak at home and outside, thereby enabling future researchers to test this phenomenon more robustly.

Finally, the results bear lessons for what types of policy interventions have long-lasting impacts on prejudice reduction. The fact that this research was able to detect significant differences in outgroup attitudes among Malays who had left school for more than a decade underscores the persistent influence of pre-adult factors in shaping a person's later-life political outlook. A more durable solution to the problem of intergroup prejudice may not lie in inducing one-off perspective-taking by reading about marginalized groups, but in cultivating perspective-taking through early life interventions such as bilingual education. Future works should devote attention towards investigating the efficacy of other agents of political socialization and how these inclusionary effects might extend to other marginalized groups.

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Online Appendix (OA): Bilingual Education Reduces Ethnic Outgroup Discrimination

Jeremy Siow*

OA1 Study 1: Cross-National Analysis

OA1a Ethnolinguistic Diversity in the Asian Barometer Survey

There is significant variation in ethnic compositions and power structures among the 10 ABS countries. Using the Ethnic Power Relations (EPR) data, an ethnic group is coded as a "monopoly" or "dominant" group if it rules alone, and a "senior partner" is defined as an ethnic group that participates as a leading member in a formal or informal power-sharing arrangement with other ethnic groups. According to Table OA1a.1, China's Han Chinese hold a "Monopoly" status, representing 91.60% of respondents, while Malaysia presents a more balanced ethnic landscape with Malays as "Senior Partner" at 49.96% of respondents. In Indonesia, Javanese are classified as "Senior Partner" despite comprising only 39.40% of respondents.

Table OA1a.1: **Dominant Ethnic Group(s) in Each ABS Country**

Country	Dominant Ethnic Group(s)	Status (from EPR)	Respondents (%)
China	Han Chinese	Monopoly	91.60
Philippines	Christian lowlanders: Tagalog, Waray, Aklanon, Hiligaynon, Cebuano, Ilocano, Pangasinense, Bicol	Dominant	72.02
Taiwan	Taiwanese (Min-nan)	Senior Partner	73.69
Thailand	Thai	Dominant	98.33
Indonesia	Javanese	Senior Partner	39.40
Singapore	Chinese	Senior Partner	75.84
Vietnam	Kinh	Dominant	93.58
Cambodia	Khmer	Dominant	97.17
Malaysia	Malay	Senior Partner	49.96
Myanmar	Bamar	Dominant	72.15

Notes: Respondents belonging to the above-mentioned ethnic groups are coded as members of the dominant ethnic group(s) in their respective countries.

These demographic and political classifications provide context for the linguistic patterns observed in Figure OA1a.1. The top panel shows the proportion of respondents who answered in a non-native language or dialect, while the bottom panel displays an alternative measure: the proportion speaking mostly local/official language or a mixture of both. Both panels distinguish between dominant ethnic groups (red) and non-dominant groups (teal).

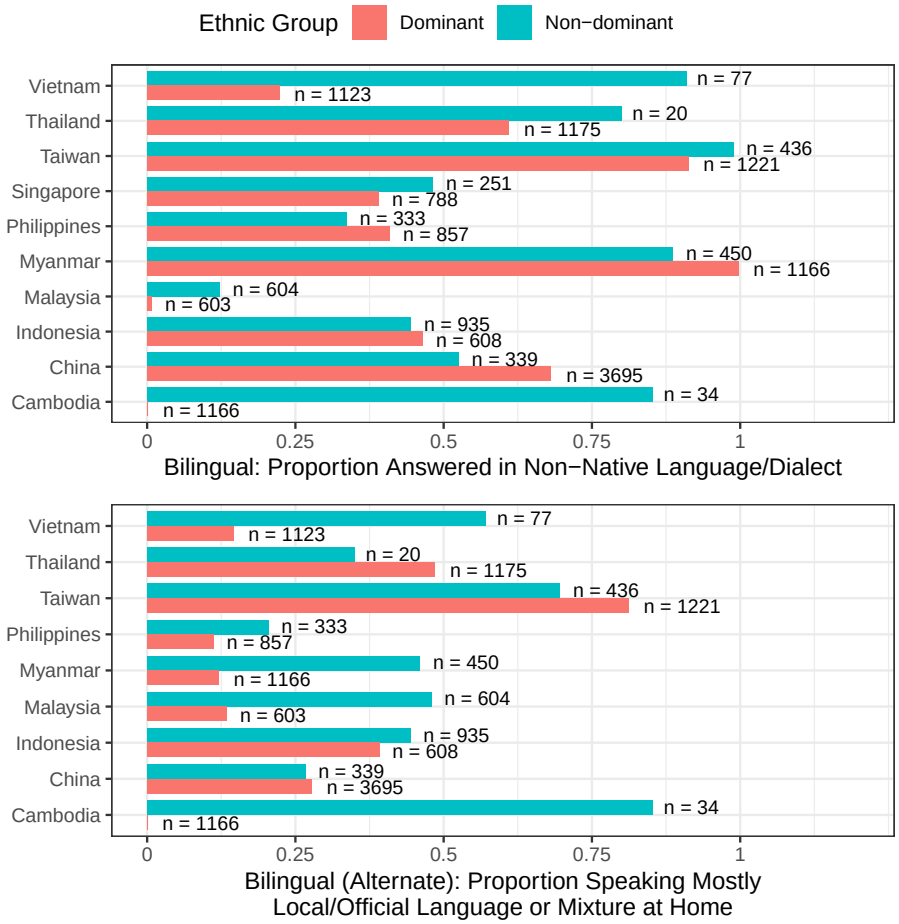
Across both measures, a consistent pattern emerges: respondents belonging to dominant ethnic groups generally demonstrate lower rates of bilingualism compared to non-dominant groups. This suggests that ethnic majorities are more likely to be monolingual, primarily using their native language or the official language of their country. Meanwhile, ethnic minorities are more likely to answer the survey questions in a non-native language or dialect.

However, there are significant discrepancies between the two panels that warrant further considerations regarding measurement. In Myanmar, for example, the proportion of bilingual respondents among the dominant Bamar group is substantially higher when using the primary measure of bilingualism (top panel)

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Figure OA1a.1: **Proportion of Bilingual Respondents in ABS Wave 4**



Notes: The figure consists of two panels. The top panel displays the proportion of respondents who answered in a non-native language or dialect among the 10 ABS countries. The bottom panel shows an alternate measure of bilingualism: the proportion speaking mostly local/official language or a mixture. Both panels present data divided between dominant ethnic groups (red) and non-dominant groups (teal), with sample sizes displayed for each bar.

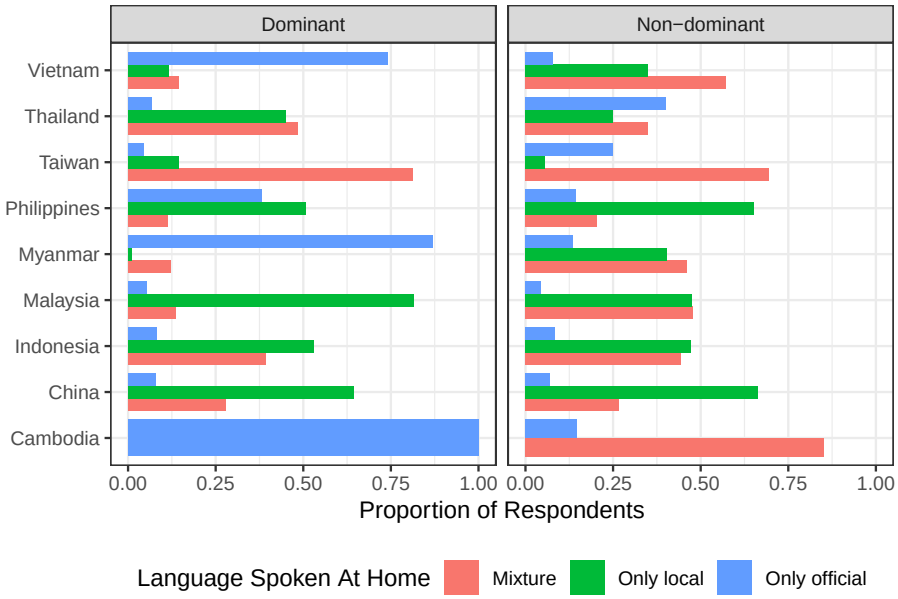
compared to the alternative measure (bottom panel). These differences likely stem from how regional dialects are classified – enumerators may distinguish between dialects of the same language family in the first measure, potentially inflating bilingualism rates. As a robustness check, I regress the outcome variable on this alternative measure of bilingualism to verify the consistency of the findings.

Further analysis of the languages spoken at home across the 10 ABS countries reveals additional nuances in linguistic patterns. The general trend confirms that dominant ethnic groups tend to exclusively use official languages (e.g., Vietnam, Myanmar, and Cambodia), while non-dominant groups demonstrate greater linguistic diversity through higher rates of local language use or a mixture of local and official languages.

Table OA1a.2 presents regression results examining the determinants of bilingualism in the ABS dataset using the primary and alternative measures of bilingualism as outcome variables. The findings strongly support the above intuition that members of dominant ethnic groups are less likely to be bilingual, with negative and statistically significant coefficients across both bilingualism measures. Among socioeconomic variables, education shows a consistent positive relationship with bilingualism, suggesting that educational attainment expands linguistic repertoires, while internet usage similarly demonstrates strong positive associations, indicating that digital connectivity may facilitate exposure to multiple languages and enhance bilingual capabilities.

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Figure OA1a.2: **Type of Language(s) Spoken At Home in ABS Wave 4**



Notes: The figure displays the proportion of respondents by language spoken at home, separated by dominant and non-dominant ethnic groups. Three language categories are shown: "Mixture" (using both local and official languages at home), "Only local" (exclusively using local language), and "Only official" (exclusively using the official language of the country).

Table OA1a.2: **Covariate Determinants of Bilingualism in ABS Wave 4**

DV =	Bilingual	Bilingual (Alternate)
Dominant Ethnic Group	−0.035**	−0.144**
	(0.009)	(0.010)
Female	−0.004	−0.002
	(0.007)	(0.008)
Age	−0.001**	−0.001**
	(0.0003)	(0.0003)
Education	0.015**	0.019**
	(0.002)	(0.003)
Income	0.011**	0.009**
	(0.003)	(0.003)
Internet	0.047**	0.041**
	(0.009)	(0.010)
Employed	−0.004	−0.005
	(0.008)	(0.009)
Religion	−0.008	0.059**
	(0.015)	(0.016)
Urban	−0.004	0.079**
	(0.009)	(0.009)
Country FE	Yes	Yes
N	12,821	12,326

Notes: Table entries are unstandardized coefficient estimates. Conventional standard errors are displayed in parentheses. Two different measures of bilingualism are used: in the primary measure, *Bilingual* equals 1 if the respondent answered the survey in a non-native language or dialect; in the alternative measure, *Bilingual (Alternate)* equals 1 if the respondent reported speaking mostly local, mostly official, or a mixture of both languages at home. $^{**}p < 0.01$; $^{*}p < 0.05$; $^{\dagger}p < 0.1$.

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OA1b Variables and Descriptive Statistics

Table OA1b.3: **Description of Variables and Measurements Used in Study 1**

Variables	Description and Measurements
Ethnic Equality	Q105: Please tell me whether you strongly agree, somewhat agree, somewhat disagree, or strongly disagree with the following statement: All citizens from different ethnic communities in [Country X] are treated equally by the government. 4 = Strongly agree 3 = Somewhat agree 2 = Somewhat disagree 1 = Strongly disagree
Bilingual	IR10: Language in which interview was conducted 0 = Native language or dialect (mother tongue) 1 = Main language of the country but not the native language or dialect of the respondent **OR** main language of the region but not the native language or dialect of the respondent
Bilingual (Alternate)	SE11: Language spoken at home 0 = Only local language **OR** only official language 1 = Mostly local language, mostly official language, **OR** a mixture of local and official languages
Female	SE2: Respondent's gender 0 = Male 1 = Female
Age	SE3_2: Respondent's age
Education	SE5: Respondent's highest educational attainment: 1 = No formal education 2 = Incomplete primary/elementary 3 = Complete primary/elementary 4 = Incomplete secondary/high school: technical/vocational type **OR** Incomplete secondary/high school 5 = Complete secondary/high school: technical/vocational type **OR** Complete secondary/high school 6 = Some university education 7 = University education completed 8 = Post-graduate degree
Religion	SE6: Respondent's religion 0 = None 1 = Otherwise
Dominant Ethnic Group	SE11A: Respondent's ethnic background 0 = Otherwise 1 = Belongs to dominant ethnic group in country (see Table OA1a.1)
Income	SE14: Respondent's annual or monthly household income 1 = Lowest quintile 2 = 2nd quintile 3 = 3rd quintile 4 = 4th quintile 5 = Highest quintile
Urban	IR13: Urbanity of respondent's location 0 = Village or countryside 1 = Small city or town (less than 100,000 people) **OR** Regional center or Other major cities (100,000 plus) **OR** Capital or Megacity (1 million population plus)
Employed	SE9: Are you currently employed? 0 = Not employed 1 = Employed

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Table OA1b.3 – continued from previous page

Variables	Description and Measurements
Internet	Q47: Do you have Internet access at home? 0 = No 1 = Yes
Democracy Best	Q129: Do you agree or disagree with the following statement: "Democracy may have its problems, but it is still the best form of government." 1 = Strongly agree 2 = Agree 3 = Disagree 4 = Strongly disagree
Trustworthy	Q24: General speaking, would you say you strongly agree, somewhat agree, somewhat disagree, or strongly disagree with the statement that "most people are trustworthy"? 1 = Strongly agree 2 = Agree 3 = Disagree 4 = Strongly disagree
National Pride	Q161: How proud are you to be a citizen of (COUNTRY)? 1 = Very proud 2 = Proud 3 = Not very proud 4 = Not proud at all
Social Status	SE12: Respondents' subjective evaluation of their families' social status from 1 (lowest status) to 10 (highest status)

Table OA1b.4: **Descriptive Statistics of Variables Used in Study 1**

	N	Mean	SD	Median	Min	Max	Skew
Bilingual	15835	0.54	0.50	1.00	0.00	1.00	-0.15
Bilingual (Alternate)	14856	0.32	0.47	0.00	0.00	1.00	0.77
Ethnic Equality	15044	2.85	0.85	3.00	1.00	4.00	-0.48
Female	15937	0.50	0.50	1.00	0.00	1.00	-0.01
Age	15899	44.38	15.21	44.00	17.00	108.00	0.31
Social Status	14850	5.46	1.89	5.00	1.00	10.00	0.06
Education	15889	4.20	1.81	4.00	1.00	8.00	-0.08
Religion	15540	0.70	0.46	1.00	0.00	1.00	-0.86
Employed	15894	0.71	0.45	1.00	0.00	1.00	-0.93
Income	13431	2.52	1.26	2.00	1.00	5.00	0.47
Internet	15773	0.37	0.48	0.00	0.00	1.00	0.56
Urban	15833	0.58	0.49	1.00	0.00	1.00	-0.31
Dominant Ethnic Group	15881	0.78	0.41	1.00	0.00	1.00	-1.36
Democracy Best	14050	1.91	0.60	2.00	1.00	4.00	0.43
Trustworthy	13909	2.34	0.74	2.00	1.00	4.00	0.36
National Pride	15595	1.46	0.63	1.00	1.00	4.00	1.26

OA1c Coarsened Exact Matching (CEM) Process

The Coarsened Exact Matching (CEM) process consists of two main steps. Initially, covariate values are "coarsened" to decrease granularity. This is achieved by binning numerical values in non-binary variables (i.e., *Age*, *Education*, and *Income*) into larger groups via the Sturges rule. Next, bilingual and monolingual respondents with identical coarsened covariate values are matched and grouped into the same subclass (or stratum). This process yielded a total of 758 subclasses, each containing at least one

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bilingual and one monolingual respondent, with an average of 3.62 respondents per subclass. Units in subclasses lacking either treated or control units are dropped. Table OA1c.5 displays the difference in means between bilingual and monolingual respondents on the original data and after CEM. Notably, CEM reduces imbalance for every single covariate. To estimate the average treatment effect (ATE) of *Bilingual* on *Ethnic Equality*, CEM weights are computed as follows:

$$w_{it} = \frac{n_{it} + n_{ic}}{n_{it}\left(1 + \frac{N_c}{N_t}\right)} \qquad w_{ic} = \frac{n_{it} + n_{ic}}{n_{ic}\left(1 + \frac{N_t}{N_c}\right)}$$

Table OA1c.5: **Difference in Means Between Bilingual and Monolingual Respondents on Raw data and after CEM**

	Raw data			After CEM		
	Bilingual	Monolingual	Diff. Means	Bilingual	Monolingual	Diff. Means
Dominant Ethnic Group	0.762	0.779	-0.017	0.849	0.849	-0.000
Female	0.491	0.500	-0.009	0.473	0.473	-0.000
Age	43.755	43.081	0.674	44.300	44.192	0.108
Education	4.443	4.080	0.363	4.118	4.118	-0.000
Income	2.561	2.479	0.082	2.297	2.297	-0.000
Internet	0.436	0.250	0.186	0.245	0.245	-0.000
Employed	0.721	0.725	-0.003	0.824	0.824	-0.000
Religion	0.723	0.774	-0.051	0.592	0.592	-0.000
Urban	0.596	0.595	0.001	0.657	0.657	-0.000
China	0.229	0.115	0.114	0.272	0.272	-0.000
Philippines	0.071	0.122	-0.051	0.163	0.163	-0.000
Taiwan	0.211	0.013	0.198	0.025	0.025	-0.000
Thailand	0.096	0.057	0.039	0.159	0.159	-0.000
Indonesia	0.094	0.115	-0.021	0.130	0.130	-0.000
Singapore	0.032	0.056	-0.024	0.069	0.069	-0.000
Vietnam	0.049	0.146	-0.096	0.152	0.152	-0.000
Cambodia	0.005	0.195	-0.190	0.000	0.000	0.000
Malaysia	0.010	0.173	-0.163	0.013	0.013	-0.000
Myanmar	0.203	0.008	0.195	0.017	0.017	-0.000

Here, w_{it} represents the weight assigned to the treated units in subclass i, w_{ic} denotes the weight assigned to the control units in subclass i, n_{it} and n_{ic} indicate the number of treated and control units in subclass i, respectively, and N_c and N_t refer to the number of treated and control units in the matched sample. CEM weights are incorporated into the bivariate OLS model, where *Ethnic Equality* is regressed on *Bilingual*. Additionally, standard errors clustered by subclass are used to compute the p-value of the point estimate.

It is worth noting that matching respondents on their country origins leads to a significant number of unmatched observations being dropped from the regression analysis. I discuss alternative approaches to manage the level of coarsening in Section OA1e.

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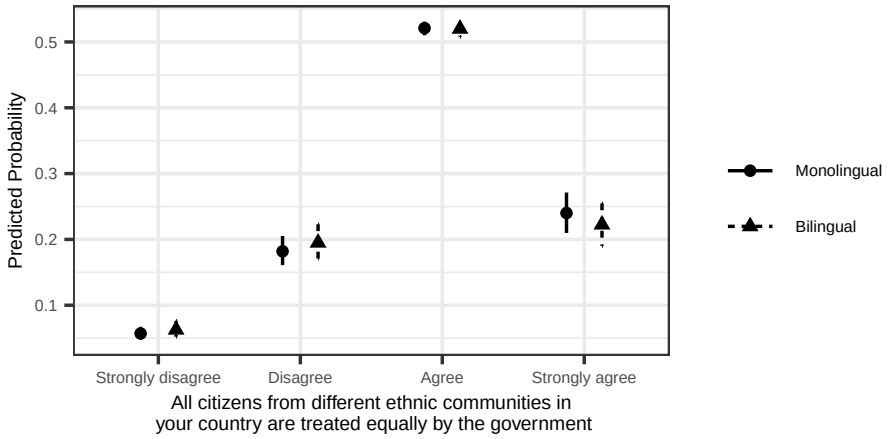
OA1d Results

Table OA1d.6: **Bilinguals Display More Sensitivity Towards Other Ethnic Communities (Full Results)**

DV =	Ethnic Equality		
Models =	OLS	Ordered Logit	CEM
Bilingual	-0.038^{*}	-0.101^{*}	-0.073^{*}
	(0.018)	(0.044)	(0.031)
Dominant Ethnic Group	0.114^{**}	0.240^{**}	
	(0.020)	(0.045)	
Female	-0.014	-0.044	
	(0.015)	(0.035)	
Age	$0.001^{\dagger}$	$0.003^{\dagger}$	
	(0.001)	(0.001)	
Education	-0.018^{**}	-0.036^{**}	
	(0.005)	(0.012)	
Income	-0.024^{**}	-0.060^{**}	
	(0.006)	(0.015)	
Internet	-0.043^{*}	-0.100^{*}	
	(0.021)	(0.048)	
Employed	-0.067^{**}	-0.145^{**}	
	(0.018)	(0.040)	
Religion	-0.019	-0.038	
	(0.030)	(0.075)	
Urban	-0.058^{**}	-0.138^{**}	
	(0.020)	(0.045)	
Country FE	Yes	Yes	No
N	12219	12219	2744

Notes: Table entries are unstandardized coefficient estimates. Standard errors are shown in parentheses, with robust standard errors in the OLS model, conventional standard errors in the ordered logit model, and standard errors clustered by strata in the CEM model. The values for *Ethnic Equality* range between 1 and 4, with larger values indicating stronger agreement that different ethnic groups are treated equally by the government. $^{**}p < 0.01$; $^{*}p < 0.05$; $^{\dagger}p < 0.1$.

Figure OA1d.3: **Predicted Probabilities from Ordered Logit Model**



Notes: The figure displays the predicted probabilities from the ordered logit model. Each vertical line represents the 95% bootstrapped confidence interval of the predicted probability (1000 iterations).

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OA1e Additional Test 1: Changing the Level of Coarsening

As Table OA1d.6 indicates, over 75% of the respondents are excluded from the CEM model because they could not be matched into any subclasses. This issue arises because the CEM technique attempts to match bilingual and monolingual respondents not only based on covariate values like *Age*, but also their country origins. To address this, I re-restimate the CEM weights by dropping country origins from the model. Specifically, I match bilingual and monolingual respondents based on nine covariates – i.e., *Dominant Ethnic Group*, *Female*, *Age*, *Education*, *Income*, *Employed*, *Religion*, *Internet*, and *Urban* – and generate a total of 1446 subclasses via the Sturges rule. Next, I perform an OLS regression of *Ethnic Equality* on *Bilingual*, while also incorporating country fixed effects and the recalculated CEM weights. The results are displayed in the column "Sturges Rule" in Table OA1e.7. Notably, despite the increase in the number of observations from 2741 (as shown in Table OA1d.6) to 6787, the substantive result remains unchanged. However, the number of matched observations still only represents half of the total sample size. As such, I reduce the number of bins for all variables to two and recalculate the CEM weights (without country origins). This adjustment significantly increases the number of observations to 11984, as shown in the "2 Bins" column of Table OA1e.7. Once more, we observe that the main predictor, *Bilingual*, is associated with a decrease in the likelihood that a respondent agrees that their government treats all ethnic groups equally in their country.

Table OA1e.7: **Alternative CEM Weights**

DV =	Ethnic Equality	
Coarsening Method =	Sturges Rule	2 Bins
Bilingual	-0.062^{*}	-0.066^{**}
	(0.027)	(0.023)
Country FE	Yes	Yes
N	6787	11984

Notes: Table entries are unstandardized coefficient estimates. Robust standard errors clustered by strata are displayed in parentheses. The values for *Ethnic Equality* range between 1 and 4, with larger values indicating stronger agreement that different ethnic groups are treated equally by the government. $^{**}p < 0.01$; $^{*}p < 0.05$; $^{\dagger}p < 0.1$.

OA1f Additional Test 2: Including Sampling Weights

Table OA1f.8: **Sampling Weights in OLS and Ordered Logit Models**

DV =	Ethnic Equality	
	OLS	Ordered Logit
Bilingual	-0.046^{*}	-0.125^{**}
	(0.022)	(0.045)
Country FE	Yes	Yes
Covariates	Yes	Yes
Sampling Weights	Yes	Yes
N	12219	12018

Notes: Table entries are unstandardized coefficient estimates. Standard errors are shown in parentheses, with robust standard errors used in the OLS model and conventional standard errors in the ordered logit model. Covariates include whether the respondent belongs to a dominant ethnic group in the country, gender, age, education, employment, income, internet access, whether the respondent identifies with a religion, and urbanity of residence. Country fixed effects are included in the OLS and ordered logit models. $^{**}p < 0.01$; $^{*}p < 0.05$; $^{\dagger}p < 0.1$.

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OA1g Additional Test 3: Placebo Tests

Table OA1g.9: **Placebo Tests**

DV =	Democracy Best		
Models =	OLS	Ordered Logit	CEM
Bilingual	0.007	0.021	−0.003
	(0.014)	(0.051)	(0.025)
Country FE	Yes	Yes	No
Covariates	Yes	Yes	No
N	11663	11663	2499

DV =	Trustworthy		
Models =	OLS	Ordered Logit	CEM
Bilingual	0.019	0.041	0.022
	(0.017)	(0.046)	(0.029)
Country FE	Yes	Yes	No
Covariates	Yes	Yes	No
N	11048	11048	2778

DV =	National Pride		
	OLS	Ordered Logit	CEM
Bilingual	−0.010	−0.012	0.037
	(0.015)	(0.049)	(0.025)
Country FE	Yes	Yes	No
Covariates	Yes	Yes	No
N	12637	12637	2768

Notes: The larger the *Democracy Best*, the stronger the respondent disagrees with the statement that "Democracy may have its problems, but it is still the best form of government." Larger values on *National Pride* correspond to less national pride, while larger values on *Trustworthy* indicate that the respondent do not think that most people are trustworthy. $^{**}p < 0.01$; $^{*}p < 0.05$; $^{\dagger}p < 0.1$.

OA1h Additional Test 4: Alternative Measure of Bilingualism

Table OA1h.10: **Bilinguals Display Greater Sensitivity Towards Ethnic Outgroups (Alternate Measure of Bilingualism)**

DV =	Ethnic Equality		
Models =	OLS	Ordered Logit	CEM
Bilingual (Alternate)	$-0.033^{\dagger}$	-0.093^{*}	-0.072^{*}
	(0.018)	(0.042)	(0.034)
Country FE	Yes	Yes	No
Covariates	Yes	Yes	No
N	11739	11739	2710

Notes: *Bilingual (Alternate)* equals 1 if the respondent reported speaking mostly local, mostly official, or a mixture of both languages at home. $^{**}p < 0.01$; $^{*}p < 0.05$; $^{\dagger}p < 0.1$.

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OA1i Additional Test 5: Controlling for Social Status

Table OA1i.11: **Bilinguals Display More Sensitivity Towards Other Ethnic Communities (Controlling for Social Status)**

DV =	Ethnic Equality		
Models =	OLS	Ordered Logit	CEM
Bilingual	-0.039^{*}	-0.104^{*}	-0.088^{**}
	(0.018)	(0.045)	(0.031)
Social Status	0.022^{**}	0.053^{**}	
	(0.004)	(0.010)	
Country FE	Yes	Yes	No
Covariates	Yes	Yes	No
N	11751	11751	2694

Notes: Table entries are unstandardized coefficient estimates. Standard errors are shown in parentheses, with robust standard errors in the OLS model, conventional standard errors in the ordered logit model, and standard errors clustered by strata in the CEM model. *Social Status* is measured on a 10-point scale (1=lowest, 10=highest) based on respondents' perception of their families' social standing. $^{**}p < 0.01$; $^{*}p < 0.05$; $^{\dagger}p < 0.1$.

OA1j Additional Test 6: Sensitivity Analysis

Table OA1j.12: **Sensitivity of the OLS Model to Unobserved Confounders**

Predictor:	Outcome: *Ethnic Equality*					
	Estimate	Std. Error	t-value	$R^2_{Y\sim D\|\mathbf{X}}$	RV	$RV_{\alpha=0.05}$
Bilingual	−0.0377	0.0192	−1.9638	0.03%	1.76%	0.29%

Notes: RV stands for robustness value, or the proportion of residual variance of both the treatment and the outcome needed to bring the point estimate to 0. $RV_{\alpha=0.05}$ is the proportion of residual variance of both the treatment and the outcome needed to bring the estimate to a range where it is no longer statistically significant (i.e., $p > 0.05$). $R^2_{Y\sim D|\mathbf{X}}$ is the proportion of residual variance of the treatment that an extreme confounder would need to explain in order to fully account for the observed estimated effect.

Table OA1j.13: **Benchmarking Sensitivity of Main Predictor Against Covariate**

Confounder Strength	Treatment	Estimate	SE	Lower CI	Upper CI
1x *Dominant Ethnic Group*	Bilingual	−0.034	0.019	−0.065	−0.002

Notes: The table shows how unobserved confounders affect the point estimate for *Bilingual*, relative to the most influential covariate in the OLS model – i.e., *Dominant Ethnic Group*.

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OA1k Additional Test 7: Disaggregating Effects By Ethnic Membership

Table OA1k.14: **Impact of Bilingualism on Ethnic Equality (By Dominant and Nondominant Ethnic Groups)**

DV =	Ethnic Equality			
Sample =	Dominant Ethnic Group = 1		Dominant Ethnic Group = 0	
Model =	OLS	Ordered Logit	OLS	Ordered Logit
Bilingual	−0.098**	−0.224**	0.036	0.038
	(0.021)	(0.052)	(0.036)	(0.089)
Covariates	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes
N	9414	9414	2805	2805

Notes: Table entries are unstandardized coefficient estimates. Standard errors are shown in parentheses, with robust standard errors used in the OLS model and conventional standard errors in the ordered logit model. **p < 0.01; *p < 0.05; †p < 0.1.

OA2 Study 2: Education Reform in Malaysia

OA2a Malaysia's Political Context and Education Landscape

The political context of Malay dominance in Malaysia has its roots in the country's colonial history and was institutionalized after independence in 1957 through the "ethnic bargain" (see Neo, 2006). This arrangement granted special privileges to ethnic Malays (*Bumiputera*) in education, civil service, and business ownership, while the Chinese and Indian minorities retained citizenship rights and economic freedoms. The introduction of the New Economic Policy (NEP) in 1971 further entrenched Malay political dominance through several affirmative action programs designed to uplift the economic standing of *Bumiputera*. Malay political primacy remains largely unchallenged, with all prime ministers being ethnic Malays. Government policies are frequently framed around preserving Malay interests, Islamic values, and the concept of "Ketuanan Melayu" (Malay supremacy). This has created an enduring system where political power remains concentrated within the Malay community despite Malaysia's multiethnic composition.

Since its independence in 1957, the Malaysian education landscape has remained deeply segregated. At the primary level, public schools are classified into two official types: (1) "national schools" (*Sekolah Kebangsaan*) that use *Bahasa Melayu* as their main medium of instruction, and (2) "national-type schools" (*Sekolah Jenis Kebangsaan*) that adopt either Mandarin or Tamil as the medium. While English and *Bahasa Melayu* are compulsory subjects for all primary school students, Math and Science were taught in accordance with the school's vernacular language before the 2003 reform – i.e., *Bahasa Melayu*, Mandarin, or Tamil. On the other hand, *Bahasa Melayu* was the sole language of instruction in all public secondary schools before 2003, though there also exists several Chinese independent high schools that are privately funded and that offer a Mandarin-based curriculum for their students. Similarly, English and *Bahasa Melayu* are compulsory subjects in both private and public secondary schools in Malaysia.

Unsurprisingly, parents in Malaysia typically enroll their children in schools that reflect their ethnic groupings. For instance, about 15 percent of the children enrolled in Chinese primary schools are Malays, while Indians comprise another 2.8 percent. Indian students make up 99 percent of all students in Tamil vernacular primary schools. Finally, less than one percent of the students in national primary schools – i.e., *Bahasa Melayu*-medium schools – are ethnic Chinese (The Straits Times, 2020). Although official figures for the racial composition of secondary school students are not available, our survey results indicate that less than one percent of the Malay respondents reported being enrolled in Chinese independent high

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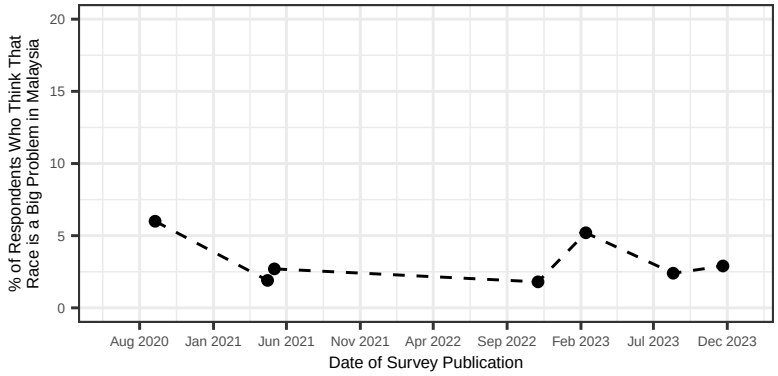
schools. These figures represent a stark contrast to the country's ethnic composition: Malays and other indigenous peoples (67.4%), Chinese (24.6%), and Indians (7.3%).

It is also worth stressing that English proficiency among secondary school students in Malaysia during the 2000s was fairly low. According to the Malaysia Education Blueprint 2013-2025, only 28% of students achieved a minimum credit (equivalent to a C grade) in the 2011 SPM English paper (*Sijil Pelajaran Malaysia*, Malaysia's national secondary school exit examination). English proficiency varied significantly by ethnicity, with Malay students typically lagging behind their Chinese and Indian counterparts. Based on the 2010 SPM examination results, only 23% of Malay students (and other indigenous groups) achieved a C grade or higher in English, compared to 42% of Chinese students and 35% of Indian students.

This low English proficiency among Malay students translates into significant downstream impacts on graduate employment. According to a survey conducted by Jobstreet.com (2015), an online employment website based in Southeast Asia, more than 60% of their surveyed employers cited 'poor command of the English language' as a key reason for not hiring fresh graduates in Malaysia. Supporting this finding, a 2005 study by the National Higher Education Research Institute (*Institut Penyelidikan Pendidikan Tinggi Negara*) found that 36.9% of employers rated graduates as either 'somewhat competent' or 'not competent at all' in their ability to speak languages other than Malay (Pandian and Ghani, 2005).

In 2022, Malaysia experienced significant political flux amid ongoing recovery from the COVID-19 pandemic. The year began with Ismail Sabri Yaakob from the United Malays National Organization (UMNO) serving as Prime Minister, who was appointed in August 2021 following Muhyiddin Yassin's (Perikatan Nasional) resignation. Ismail Sabri led a fragile coalition government dominated by UMNO and Perikatan Nasional. Political instability persisted throughout the year, culminating in the dissolution of Parliament in October and the subsequent 15th General Election held on November 19. This election resulted in a hung parliament with no single coalition securing a majority. After days of negotiations and at the King's urging, Anwar Ibrahim was appointed as Malaysia's 10th Prime Minister on November 24, forming a unity government comprising his Pakatan Harapan coalition, Barisan Nasional, and several East Malaysian parties. This marked the third government change in Malaysia since 2018, reflecting the country's increasingly fragmented political landscape and the centrality of ethnic politics in shaping coalition-building.

Figure OA2a.4: **Percentage of Respondents Who Mentioned Race as a Problem**



While we do not have definitive data on how the political turmoil in Malaysia directly affected interethnic relations among the country's three major ethnic groups – Malays, Chinese, and Indians – we can draw inferences from regular public opinion surveys conducted by the Merdeka Center for Opinion Research.[1] Figure OA2a.4 displays the percentage of respondents who consider race to be a major problem in Malaysia across multiple survey waves from September 2020 to November 2023. The data reveals

[1]Survey publication dates: September 2, 2020, April 23, 2021, May 7, 2021, November 4, 2022, February 11, 2023, August 11, 2023, and November 22, 2023. Full survey reports are available at `https://merdeka.org/poll-report/`.

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several notable patterns: racial concerns peaked at approximately 6% in September 2020, declined to around 2-3% through 2021 and early 2022, then showed some volatility with a spike to about 5% in late 2022 (coinciding with the general election period) before stabilizing at roughly 3% through 2023. Notably, even during periods of intense political competition and government transitions, the proportion of Malaysians identifying race as a major national problem remained relatively low, never exceeding 6% across the entire period. These relatively low percentages reflect the fact that racial issues were overshadowed by more pressing concerns during this timeframe. Economic issues, particularly inflation, dominated public attention with about 70% of respondents identifying it as a major problem over the same period. Importantly, these consistently low percentages suggest that the surrounding political situation in Malaysia during 2022 and 2023 is unlikely to have significantly confounded respondents' ethnic attitudes during the periods when Studies 2 and 3 were conducted.

OA2b Language Reforms in Malaysia

On May 6, 2002, then Prime Minister of Malaysia, Mahathir Mohamad, announced that English would replace the three vernacular languages as the sole medium of instruction for Math and Science in all public primary and secondary schools from 2003. This policy (known in *Bahasa Melayu* as *Pengajaran dan Pembelajaran Sains dan Matematik Dalam Bahasa Inggeris* or PPSMI) was implemented in a staggered fashion. Beginning 2003, Math and Science would be taught in English for all year one (i.e., grade one), form one (i.e., grade seven), and lower form six (i.e., grade twelve) students. For instance, year two students in 2003 would continue their Math and Science training in their respective vernacular languages, but would switch to English when they promote to form one in 2008. Similarly, public secondary schools in Malaysia were required to implement the policy change from 2003 (i.e., from *Bahasa Melayu* to English instruction), though it must be emphasized that Chinese independent high schools were exempted from PPSMI since their curriculum was distinct from that taught in public secondary schools. In the latter case, Math and Science were predominantly taught in Mandarin (and sometimes English).

More importantly, this reform significantly increased the number of English-based teaching hours in schools. While their predecessors' exposure to English-medium classes was limited to just two hours per week, affected students spent at least 13 hours per week learning Math and Science in English, in addition to their English and vernacular language classes (Gill, 2013). Under the reform, about 40 percent of the teaching time was dedicated to English instruction, with the remaining 60 percent being taught in *Bahasa Melayu*. This was corroborated by evidence on the ground: according to a 2008 survey of 1,700 ethnic Malay students, more than 90 percent indicated that their teachers used either an English-only approach or a combination of English and *Bahasa Melayu* instruction to teach Math and Science (Isahak et al., 2008).

However, amid mounting opposition from various sectors such as the coalition of Malay intellectuals under the banner of *Gerakan Mansuhkan PPSMI* (or Movement to Abolish PPSMI in *Bahasa Melayu*), the Malaysian cabinet decided in 2008 that PPSMI would be abolished. From 2012, the teaching of Math and Science would be reverted to the pre-2003 format: that is, both subjects would be taught in one of the three ethnic languages in primary schools – depending on the school's vernacular – whereas *Bahasa Melayu* would be used to teach both subjects at all public secondary schools. This policy reversal would also be implemented in stages. All year one, year four, form one, and form four students in 2012 would be affected by the policy reversal, while the rest would continue with English as the medium of instruction for Math and Science until their promotion to one of the four grades. For example, form two students in 2012 would switch from English to *Bahasa Melayu* when they advance to form four in 2014.

Given that Malaysian children typically begin their primary education at the age of seven as well as the fact that the education system is structured on a $6+5+2$ model, we can identify how the introduction and subsequent reversal of the language reform affected different cohorts of ethnic Malay students.[2] This

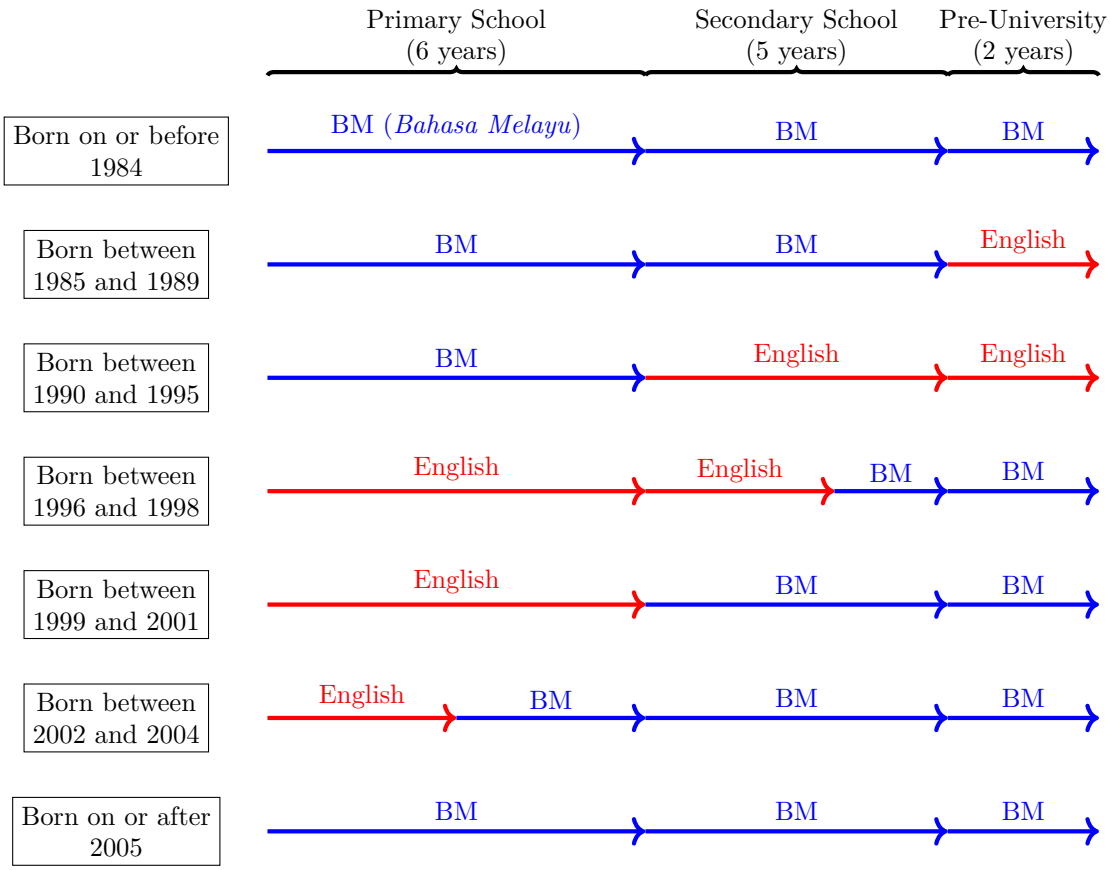
[2]For simplicity, I exclude ethnic Chinese from the description given their preference to enroll into Chinese independent high schools which, as mentioned earlier, were exempted from PPSMI.

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is illustrated in Figure OA2b.5. For instance, the pioneer batch of primary one students who were affected by the 2003 language reform would be born in 1996; however, this same group of students would have also experienced the policy reversal when they began their form four education in 2012, hence they received two years of *Bahasa Melayu* instruction for STEM (i.e., Science, Technology, Engineering, and Math) subjects during their secondary school education.

It should also be emphasized that ethnic Malay students should have experienced the greatest shock from the language reform, as they generally enroll into public secondary schools that were not immune from the policy changes. In addition, there do not exist any alternative schools that offer only *Bahasa Melayu* instruction during the time when the policy change was introduced, thereby mitigating the possibility that Malays manipulated the likelihood of receiving English instruction for STEM subjects.

Figure OA2b.5: **Language of Instruction for Math & Science Based on Birth Year Cohorts of Ethnic Malay Students**



The following provides brief descriptions on the variation in the length of exposure to English instruction across different birth year cohorts of ethnic Malay students in Malaysia:

- *Born on or before 1984*: This group of students would have completed their pre-university training at the time when the policy reform was introduced in 2003. As such, *Bahasa Melayu* was the only medium of instruction used to teach all subjects for this group of citizens.
- *Born between 1985 and 1989*: Recall that the policy reform in 2003 affected lower form six (or grade 12) students in Malaysia. As such, the first cohort of students to experience English instruction at the pre-university level were those who were born in 1985 (i.e., they would be eighteen years old in 2003). On the other hand, those who were born in 1989 missed the cutoff to experience English-based education for STEM subjects during their secondary school years i.e., they would be form two

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students in 2003 hence continuing their Math and Science training in *Bahasa Melayu*. As such, this group should have the shortest exposure duration to English-based instruction, either because (1) they left school after completing their secondary education i.e., zero exposure, or (2) they advanced to the pre-university level and experienced one and a half years of English education. Put simply, students in this group should have experienced no more than 2 years of English education.

- *Born between 1990 and 1995*: This group of citizens would have been exposed to English-based instruction for STEM classes during their five-year secondary education. For those who were born in 1990, they just made the cutoff to experience the language reform at the secondary level i.e., they would be form one students in 2003. Some citizens, who continued their education into the pre-university level, would have experienced an additional two years' worth of English education i.e., a total of seven years. The same could be said about the cohort of students who were born in 1995; however, this latter group just missed the cutoff to experience Math and Science education in English at the primary level i.e., they would be primary two students in 2003. Taken together, this group of students should have received a minimum of five years of English instruction for STEM subjects (but not more than seven years).

- *Born between 1996 and 1998*: Those who were born in 1996 would be the first cohort of students to experience English as the medium of instruction at the primary level (i.e., a total of six years). This policy remained the same for the first three years of their secondary education until the policy reversal in 2012, when the medium was switched from English to *Bahasa Melayu*. Overall, they would have spent a total of 9 years of English-based instruction for STEM subjects.

- *Born between 1999 and 2001*: Similar to the previous group, this group experienced six years' worth of English education for Math and Science at the primary level. However, because of the policy reversal in 2012, those who were born in 1999 would receive *Bahasa Melayu* instruction for STEM subjects when they advance to form one in 2012. This also applies to students who were born in the years of 2000 and 2001.

- *Born between 2002 and 2004*: For this group of students, the language of instruction was switched from English to *Bahasa Melayu* midway through their primary education. Specifically, those who were born in 2002 would be year four (or grade four) students in 2012 and hence received *Bahasa Melayu* instruction for Math and Science. In total, they would have spent three years' worth of English education for Math and Science during their primary education (i.e., from year one to year three).

- *Born on or after 2005*: Those who were born in 2005 entered primary school in 2012 (i.e., they would be seven years old); hence the medium of instruction for this group of students would be *Bahasa Melayu* throughout their entire education experience.

One primary justification for the policy reversal in 2012 was that the reform had a deleterious impact on Math and Science test scores, as many students did not possess the linguistic competency to learn STEM content in English (Rashid, Abdul Rahman and Yunus, 2017). One study found that 70 percent of their respondents could not understand the teaching of Math and Science in English (Isahak et al., 2008). The same study also observed that students from urban areas adapted better to the reform than students from rural regions, which worsened the rural-urban inequality in English proficiency (Isahak et al., 2008).

On the other hand, some observers such as Gill (2012) note that the reform had improved students' Math, Science, and English test scores. Indeed, the policy reversal received significant opposition from the Malaysian public: one opinion poll reported that almost 60 percent of the 1,060 respondents wanted to keep the reform, while only 32 percent agreed with the government's decision to roll back the policy. An online poll that was administered by former Prime Minister Mahathir Mohamad (N = 9,024) found

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that 74 percent of respondents voted against the abolition of PPSMI, while only 26 percent supported the government's initiative (Gill, 2013).

Table OA2b.15: **Pre-Tertiary Educational Reforms in Malaysia (1981 – 2005)**

Policy Reforms	Period	Changes
Revisions to Integrated Curriculum for Primary Schools (*Kurikulum Bersepadu Sekolah Rendah*, KBSR)	1990s	KBSR revisions introduced a significant shift from teacher-centered to student-centered learning that emphasized critical thinking and problem-solving skills rather than rote memorization. Key changes included replacing the traditional separate teaching of history and geography with a unified 'People and Environment' subject, integrating values education across the curriculum rather than teaching moral education in isolation, and making science a separate compulsory subject for all primary school students.
Revisions to Integrated Curriculum for Secondary Schools (*Kurikulum Bersepadu Sekolah Menenga*, KBSM)	1990s – early 2000s	KBSM revisions include the organization of subjects into core and elective categories and the introduction of more practical and vocational subjects to provide diverse educational pathways for students. Key changes included integrating critical thinking skills across all subjects, expanding information technology components, and incorporating life skills and character development as cross-curricular elements.
Smart School (*Sekolah Bestari*) Project	1990s – early 2000s	The Smart School Project was launched in 1991 as a national strategy aimed at modernizing the education system through technological integration. Key changes included the introduction of a more student-centered learning approach, and significant technology integration in classrooms with computer-assisted learning platforms.
Introduction of Moral Education and Islamic Studies	1980s – 1990s	Since the 1980s, the government have implemented significant educational reforms in Moral Education (*Pendidikan Moral*) and Islamic Studies (*Pendidikan Islam* aimed at strengthening national identity, religious understanding, and ethical development across the national school system. Key changes included making Moral Education compulsory for non-Muslim students and Islamic Studies mandatory for Muslim students, with both subjects designed to provide structured ethical and religious instruction that aligned with the nation's broader goals of cultural integration and values-based education.

Table OA2b.15 provides an overview of the key pre-tertiary educational reforms in Malaysia between 1981 and 2005, covering significant policy changes in curriculum, schooling approaches, and subject integration. These reforms include revisions to primary and secondary school curricula (KBSR and KBSM), the Smart School Project, and the introduction of Moral Education and Islamic Studies. Notably, the educational reforms outlined in Table OA2b.15 are unlikely to have substantively influenced the ethnic attitudes that could be attributable to the language reform (i.e., PPSMI) for two primary reasons. First, major reforms such as the introduction of Moral and Islamic Education for primary and secondary students and science as a compulsory subject at the primary level were already formalized in 1993 and 1994, respectively, well before the 2003 implementation of the language reform. Second, other reforms like the integration of technology and computer-assisted learning were implemented incrementally and gradually in classrooms, suggesting a piecemeal approach that would not have created a sudden, transformative impact comparable to the language of instruction shift introduced by PPSMI.

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OA2c Survey Design, Variables & Descriptive Statistics

Respondents were recruited by Rakuten Insight. They were redirected to an online survey that was hosted at Qualtrics. The sampling frame consisted of individuals who (1) are ethnic Malays, (2) had completed their secondary school exit examinations, and (3) were born between the years of 1985 and 1995. Tables OA2c.16 and OA2c.17 provide a description and summary statistics of the variables, respectively.

Table OA2c.16: **Description of Variables and Measurements Used in Study 2**

Variables	Description and Measurements
Reform	0 = Born before January 1, 1990 1 = Born on or after January 1, 1990
Bilingual Instruction	During your secondary school education, what was the language used to teach Science and Mathematics? 0 = *Bahasa Melayu* 1 = English
Running	Difference in the number of days between a respondent's date of birth and January 1, 1990
Ethnic Outgroup Discrimination	Average score based on 4-point Likert scale responses to following three items: • Can you tell us how strongly you agree or disagree with the following statement? "The Prime Minister of Malaysia should always be a Malay." (1 = Strongly disagree; 2 = Disagree; 3 = Agree; 4 = Strongly agree) • Can you tell us how strongly you agree or disagree with the following statement? "People should be treated and given the same rights in Malaysia regardless of race or religion." (1 = Strongly agree; 2 = Agree; 3 = Disagree; 4 = Strongly disagree) • Can you tell us how strongly you agree or disagree with the following statement? "There should be no race-based parties in Malaysia." (1 = Strongly agree; 2 = Agree; 3 = Disagree; 4 = Strongly disagree)
Female	0 = Male 1 = Female
Urban School	Where was your secondary school located at? 0 = Countryside 1 = City
Full-Time Employed	What is your current employment status? 0 = Part-time employee, student, homemaker, unemployed, or retired/pensioned 1 = Full-time employee or self-employed
Bilingual (Home)	What language(s) do you normally speak at home? 0 = Selected only one language 1 = Selected more than one language
Household Income	Please indicate your monthly household income below. Values range from 0 ("Less than RM1,000) to 10 ("RM10,000 and above"), in intervals of RM1,000.
Contact Quantity	How often do you engage in informal conversations with members of a different race? Values range from 1 ("Never") to 6 ("Daily")
Education	What is the highest educational qualification that you have attained? 1 = SPM or equivalent 2 = STPM or equivalent 3 = SKM, polytechnic/university certificate, or equivalent 4 = DKM, DLKM, polytechnic/university diploma, or equivalent 5 = Bachelor's degree 6 = Master's degree or Doctoral degree
Contact Quality	To what extent would you describe your experiences with members of a different race as positive? Values range from 1 ("Not at all positive") to 7 ("Very positive")

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Table OA2c.17: **Descriptive Statistics of Variables Used in Study 2**

	N	Mean	SD	Median	Min	Max	Skew
Reform	1802	0.57	0.50	1.00	0.00	1.00	-0.26
Bilingual Instruction	1802	0.56	0.50	1.00	0.00	1.00	-0.24
Running	1802	214.94	1095.48	160.00	-1820.00	2188.00	0.01
Ethnic Outgroup Discrimination	1799	2.39	0.58	2.33	1.00	4.00	-0.01
Female	1802	0.54	0.50	1.00	0.00	1.00	-0.17
Bilingual (Home)	1802	0.49	0.50	0.00	0.00	1.00	0.02
Urban School	1802	0.71	0.45	1.00	0.00	1.00	-0.91
Education	1802	4.63	1.22	5.00	1.00	6.00	-1.52
Employed	1802	0.91	0.29	1.00	0.00	1.00	-2.85
Household Income	1802	5.51	2.74	5.00	0.00	10.00	0.13
Contact Quantity	1801	5.29	1.07	6.00	1.00	6.00	-1.77
Contact Quality	1801	5.97	1.18	6.00	1.00	7.00	-1.25

OA2d Birth Year Predicts Language of Instruction in Malaysia

Table OA2d.18: **Birth Year Predicts Language of Instruction in Malaysia**

DV =	Bilingual Instruction	
Models =	OLS	Logit
Reform	0.469**	2.250**
	(0.020)	(0.120)
Female	−0.021	−0.118
	(0.021)	(0.114)
Bilingual (Home)	0.093**	0.518**
	(0.021)	(0.116)
Urban School	0.077**	0.432**
	(0.021)	(0.114)
Education	0.062**	0.343**
	(0.009)	(0.053)
Employed	0.035	0.189
	(0.042)	(0.231)
Household Income	0.009*	0.053*
	(0.004)	(0.024)
N	1,802	1,802

Notes: Table entries are unstandardized coefficient estimates. *Bilingual Instruction* equals 1 if a respondent reported that English was used to teach Mathematics and Science. $^{**}p < 0.01$; $^{*}p < 0.05$; $^{\dagger}p < 0.1$.

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OA2e Results

Table OA2e.19: **First Stage Estimates**

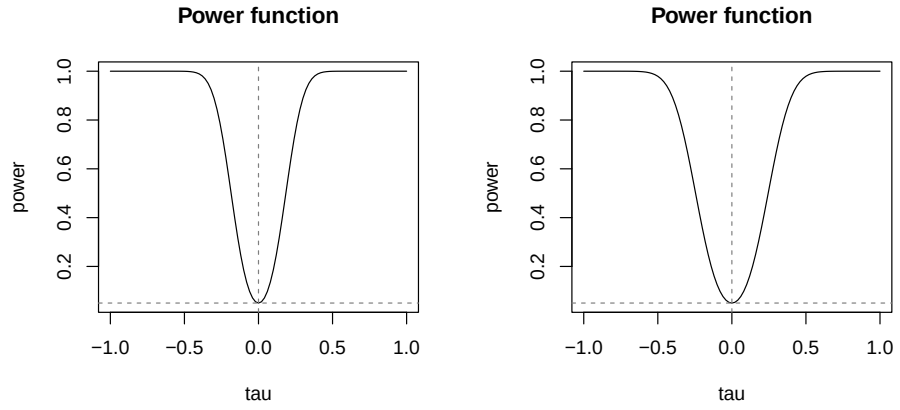
DV =	Bilingual Instruction			
Models =	Without Covariates		With Covariates	
	Conventional	Robust	Conventional	Robust
Reform	0.366**	0.344**	0.363*	0.347*
	(0.053)	(0.065)	(0.057)	(0.069)
N	788	788	701	701
N (below cutoff)	378	378	337	337
N (above cutoff)	410	410	364	364
Bandwidth	764.218	764.218	686.775	686.775
Kernel	Triangular	Triangular	Triangular	Triangular

Notes: Table entries are unstandardized coefficient estimates. In the "Conventional" models, point estimates and standard errors (in parentheses) are conventional, while in the "Robust" models, bias-corrected estimates and robust standard errors (in parentheses) are provided (see Calonico, Cattaneo and Titiunik, 2014). All standard errors are clustered at the state level. *Bilingual Instruction* is a binary variable that equals one if the respondent indicated that English was used to teach Mathematics and Science during their secondary school education. Covariates include gender, education, employment, household income, multilingualism at home, and attendance at an urban secondary school. Bandwidths are MSE-optimal. $^{**}p < 0.01$; $^{*}p < 0.05$; $^{\dagger}p < 0.1$.

OA2f Additional Test 1: Ex-Post Power Analysis

I utilize the *rdpower* package in *R* (Cattaneo, Titiunik and Vazquez-Bare, 2019) to generate power curves for fuzzy RD models, both with and without covariates, as depicted in Figure OA2f.6. With bias-corrected estimates of -0.287 and -0.417 for the two models, they attain statistical powers of 0.861 and 0.916, respectively.

Figure OA2f.6: **Ex-Post Power Analysis of Fuzzy RD Models**



Notes: The figure displays the power curves for the fuzzy RD models without (left plot) and with covariates (right plot).

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OA2g Additional Test 2: Different Model Specifications

Table OA2g.20: **Epanechnikov Kernel Weights**

DV =	Ethnic Outgroup Discrimination			
Models =	Without Covariates		With Covariates	
	Conventional	Robust	Conventional	Robust
Bilingual Instruction	−0.257†	−0.422*	−0.243*	−0.436*
	(0.146)	(0.212)	(0.123)	(0.181)
N	601	601	673	673
N (below cutoff)	285	285	324	324
N (above cutoff)	316	316	349	349
Bandwidth	605.677	605.677	657.718	657.718
Kernel	Epanechnikov	Epanechnikov	Epanechnikov	Epanechnikov

Notes: In the "Conventional" models, estimates and standard errors are conventional, while in the "Robust" models, bias-corrected estimates and robust standard errors are provided. **p < 0.01; *p < 0.05; †p < 0.1.

Table OA2g.21: **Different Bandwidths on Both Sides of Cutoff**

DV =	Ethnic Outgroup Discrimination			
Models =	Without Covariates		With Covariates	
	Conventional	Robust	Conventional	Robust
Bilingual Instruction	−0.253*	−0.298†	−0.298*	−0.383*
	(0.114)	(0.165)	(0.118)	(0.171)
N	675	675	657	657
N (below cutoff)	337	337	337	337
N (above cutoff)	338	338	320	320
Bandwidth (below cutoff)	687.123	687.123	690.353	690.353
Bandwidth (above cutoff)	634.652	634.652	614.008	614.008
Kernel	Triangular	Triangular	Triangular	Triangular

Notes: In the "Conventional" models, estimates and standard errors are conventional, while in the "Robust" models, bias-corrected estimates and robust standard errors are provided. **p < 0.01; *p < 0.05; †p < 0.1.

Table OA2g.22: **Placebo Cutoff = −365 Days**

DV =	Ethnic Outgroup Discrimination			
Models =	Without Covariates		With Covariates	
	Conventional	Robust	Conventional	Robust
Bilingual Instruction	−1.704	−1.583	−1.264	−1.308
	(1.132)	(1.222)	(0.819)	(0.906)
N	226	226	277	277
N (below cutoff)	89	89	120	120
N (above cutoff)	137	137	157	157
Bandwidth	236.396	236.396	278.707	278.707
Kernel	Triangular	Triangular	Triangular	Triangular

Notes: In the "Conventional" models, estimates and standard errors are conventional, while in the "Robust" models, bias-corrected estimates and robust standard errors are provided. **p < 0.01; *p < 0.05; †p < 0.1.

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Table OA2g.23: **Placebo Cutoff = 365 Days**

DV =	Ethnic Outgroup Discrimination			
Models =	Without Covariates		With Covariates	
	Conventional	Robust	Conventional	Robust
Bilingual Instruction	−2.404	−1.856	−4.619	−5.383
	(1.674)	(1.906)	(5.814)	(7.236)
N	509	509	698	698
N (below cutoff)	277	277	394	394
N (above cutoff)	232	232	304	304
Bandwidth	482.298	482.298	690.163	690.163
Kernel	Triangular	Triangular	Triangular	Triangular

Notes: In the "Conventional" models, estimates and standard errors are conventional, while in the "Robust" models, bias-corrected estimates and robust standard errors are provided. Bandwidths are MSE-optimal. $^{**}p < 0.01$; $^{*}p < 0.05$; $^{\dagger}p < 0.1$.

OA2h Additional Test 3: Intergroup Contact

As shown in Figure OA2h.7, there is the possibility that intergroup contact might (1) pose a challenge to the exclusion restriction assumption, and (2) offer an alternative explanation for the main findings. In substantive terms, the first concern is illustrated by the causal pathway diagram on the left, while the second scenario is depicted on the right.

Figure OA2h.7: **How Intergroup Contact Might Affect Outgroup Discrimination**

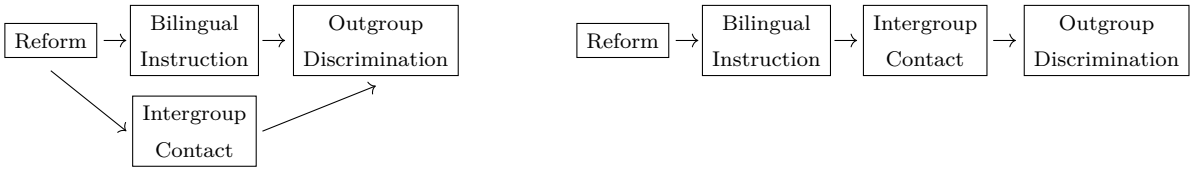


Table OA2h.24: **Reform Does Not Predict Contact Quantity**

DV =	Contact Quantity			
Models =	Without Covariates		With Covariates	
	Conventional	Robust	Conventional	Robust
Reform	−0.146	−0.189	−0.101	−0.132
	(0.184)	(0.222)	(0.188)	(0.228)
N	436	436	437	437
N (below cutoff)	208	208	209	209
N (above cutoff)	228	228	228	228
Bandwidth	385.086	385.086	386.056	386.056
Kernel	Triangular	Triangular	Triangular	Triangular

Notes: Table entries are unstandardized coefficient estimates. In the "Conventional" models, point estimates and standard errors are conventional, while in the "Robust" models, bias-corrected estimates and robust standard errors are provided. Values for *Contact Quantity* range between 1 and 6, with higher values indicating greater frequency of contact with ethnic outgroups. Bandwidths are MSE-optimal. $^{**}p < 0.01$; $^{*}p < 0.05$; $^{\dagger}p < 0.1$.

If the first concern is true, we would expect that the instrumental variable, *Reform*, would predict the frequency and quality of intergroup contact. In other words, respondents born just after the cutoff should

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report more frequent contact with outgroup members and a higher quality of interethnic interactions. During the survey, respondents were asked to specify the frequency of contact with members of a different race (*Contact Quantity*) and to evaluate their experiences with members of a different race on a 7-point Likert scale ranging from "not at all positive" to "very positive" (*Contact Quality*). Tables OA2h.24 and OA2h.25 show that there were no significant differences in intergroup contact frequency and quality between those born just after and before the cutoff at January 1, 1990.

Table OA2h.25: **Reform Does Not Predict Contact Quality**

DV =	Contact Quality			
Models =	Without Covariates		With Covariates	
	Conventional	Robust	Conventional	Robust
Reform	−0.104	−0.095	−0.046	−0.017
	(0.078)	(0.092)	(0.094)	(0.111)
N	435	435	434	434
N (below cutoff)	207	207	207	207
N (above cutoff)	228	228	227	227
Bandwidth	381.769	381.769	379.879	379.879
Kernel	Triangular	Triangular	Triangular	Triangular

Notes: Table entries are unstandardized coefficient estimates. In the "Conventional" models, point estimates and standard errors are conventional, while in the "Robust" models, bias-corrected estimates and robust standard errors are provided. Values for *Contact Quality* range between 1 and 7, with higher values indicating better quality of interethnic interactions. $^{**}p < 0.01$; $^{*}p < 0.05$; $^{\dagger}p < 0.1$.

The second concern pertains to whether intergroup contact might serve as a mechanism through which bilingual education influences ethnic outgroup discrimination. To explore this possibility, I substitute the outcome variable with *Contact Quantity* and *Contact Quality*, and replicate the fuzzy RD models. If this concern holds true, we would anticipate that *Bilingual Instruction* would exert a positive and statistically significant effect on both *Contact Quantity* and *Contact Quality*. Interestingly, as shown in Tables OA2h.26 and OA2h.27, *Bilingual Instruction* is linked to a *reduction* in both the quantity and quality of intergroup contact, albeit with largely insignificant point estimates at the conventional level. This implies that intergroup contact is unlikely to account for the decrease in discriminatory attitudes among Malays who underwent bilingual instruction.

Table OA2h.26: **Bilingual Instruction Does Not Predict Contact Quantity**

DV =	Contact Quantity			
Models =	Without Covariates		With Covariates	
	Conventional	Robust	Conventional	Robust
Bilingual Instruction	−0.178	−0.020	−0.070	0.154
	(0.551)	(0.654)	(0.495)	(0.643)
N	519	519	593	593
N (below cutoff)	237	237	279	279
N (above cutoff)	282	282	314	314
Bandwidth	507.249	507.249	591.075	591.075
Kernel	Triangular	Triangular	Triangular	Triangular

Notes: Table entries are unstandardized coefficient estimates. In the "Conventional" models, point estimates and standard errors are conventional, while in the "Robust" models, bias-corrected estimates and robust standard errors are provided. Values for *Contact Quantity* range between 1 and 6, with higher values indicating greater frequency of contact with ethnic outgroups. $^{**}p < 0.01$; $^{*}p < 0.05$; $^{\dagger}p < 0.1$.

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Table OA2h.27: **Bilingual Instruction Does Not Predict Contact Quality**

DV =	Contact Quality			
Models =	Without Covariates		With Covariates	
	Conventional	Robust	Conventional	Robust
Bilingual Instruction	$-0.489^{\dagger}$	-0.268	-0.394	-0.097
	(0.287)	(0.320)	(0.294)	(0.356)
N	619	619	619	619
N (below cutoff)	298	298	298	298
N (above cutoff)	321	321	321	321
Bandwidth	616.572	616.572	616.803	616.803
Kernel	Triangular	Triangular	Triangular	Triangular

Notes: Table entries are unstandardized coefficient estimates. In the "Conventional" models, point estimates and standard errors are conventional, while in the "Robust" models, bias-corrected estimates and robust standard errors are provided. Values for *Contact Quality* range between 1 and 7, with higher values indicating better quality of interethnic interactions. $^{**}p < 0.01$; $^{*}p < 0.05$; $^{\dagger}p < 0.1$.

OA3 Study 3: Code-Switching & Perspective-Taking Experiment

OA3a Political Context During Survey Experiment

In August 2023, Malaysia was governed by a "unity government" led by Prime Minister Anwar Ibrahim, who came into power in November 2022 after the 15th general election resulted in a hung parliament with no party or pre-existing coalition securing an absolute majority. This unity government represented a significant shift in Malaysian politics, as it included both Anwar's multi-ethnic Pakatan Harapan (PH) coalition and the previously dominant Barisan Nasional (BN) coalition, which has historically championed Malay interests through its key constituent party, the United Malays National Organization (UMNO). The Perikatan Nasional (PN) opposition, led by Muhyiddin Yassin and including the Malaysian Islamic Party (PAS), positioned itself as the defender of Malay-Muslim interests, claiming these were being undermined by Anwar's more inclusive government.

This political configuration created distinct ideological divisions in Malaysian politics. The unity government's more inclusive ethnic composition, with an increased proportion of non-Malay ministers, prompted strong rhetorical responses from opposition parties. These opposition groups portrayed Anwar's government as compromising constitutional provisions regarding Malay-Muslim special position (Kelesoglu, Hooi and Sidhu, 2024). This political messaging resonated with segments of the Malay electorate who were concerned about maintaining their community's traditional political influence and constitutional status as *Bumiputera* or "sons of the soil" (Chin, 2023).

These political dynamics were reflected in the May 2023 state elections in Selangor, Penang, and Negeri Sembilan, which showed significant gains for the Islamist PAS party, indicating growing electoral support for more conservative Malay-Muslim political representation. While the BN-PH alliance retained control in states like Selangor, Negeri Sembilan, and Penang, the significant inroads made by PN, particularly in Malay-majority constituencies, indicated the continued salience of issues like corruption and governance alongside identity-based concerns. Above all, the results underscored the importance of managing ethnic and religious political considerations to maintain political stability.

OA3b Recruitment and Survey Design

English proficiency is fairly high in Malaysia compared to other Asian countries, with Malaysia ranking in the "High Proficiency" category according to the Education First English Proficiency Index (28th globally in 2023). Urban populations generally demonstrate stronger English skills than rural communities, with

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ethnic Chinese and Indian Malaysians typically showing higher proficiency than ethnic Malays (Gill, 2013). English is taught as a compulsory second language throughout Malaysia's education system, with an estimated 50-60% of secondary school graduates achieving functional proficiency in recent years (Hanewald, 2016). Educational reforms have played a significant role in shaping English language abilities; notably, the 2003-2012 policy of using English as the medium of instruction for Mathematics and Science aimed to boost proficiency. This policy created a generation with enhanced English skills, particularly in STEM-related vocabulary and concepts. In professional settings, approximately 45% of the Malaysian workforce regularly uses English, with higher concentrations in sectors connected to international business, tourism, and multinational corporations (Rajadurai, 2010).

Study 3 was administered as an online survey experiment. Participants were recruited by Rakuten Insight through their consumer panel, and then redirected to our online survey that was hosted at Qualtrics. We targeted ethnic Malay individuals, age 18 and above, and can speak English and *Bahasa Melayu*. On the latter requirement, participants were asked about their ability to read, write and understand English and *Bahasa Melayu* at the beginning of the survey. The questions and answer choices were delivered in both languages:

- In your opinion, how well do you know English?

    1. Do not understand the language at all
    2. Can understand a little, but cannot speak
    3. Can understand and can speak a little
    4. Can understand, speak, and write
    5. Fluent

- In your opinion, how well do you know *Bahasa Melayu*?

    1. Do not understand the language at all
    2. Can understand a little, but cannot speak
    3. Can understand and can speak a little
    4. Can understand, speak, and write
    5. Fluent

I follow the approach outlined in Pérez and Tavits (2022), which involves identifying bilinguals by shortlisting respondents who rated themselves as either "4" or "5" on both items. However, it is possible that participants may have overrated their language proficiencies. In such a scenario, we would expect a substantial proportion of respondents to fail the two manipulation check questions later in the survey. However, more than 93% of respondents answered both manipulation check questions correctly. Furthermore, there are no significant differences in the accuracy of responses to the manipulation check questions across the three experimental conditions (Table OA3d.31).

Next, shortlisted participants were randomly assigned to one of three possible groups and read the following prompt, which were shown in English and *Bahasa Melayu*:

> Based on your previous answers, you had indicated that you can read, write, and speak in both Malay and English. Next, you will complete the rest of the survey in **Malay** / **English** / **Malay and English**. Please click next when you are ready.

During the survey, I also included an attention check question that was adapted from Berinsky, Margolis and Sances (2014). Participants who selected **Economic News** and **Sports News** advanced to the next segment of the survey, while the rest were screened out.

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- The purpose of this survey is to gauge people's preference for news sources because what news people watch affects their judgments on many issues. However, in this question, we only want to test whether you pay attention to the questions. Hence, regardless of what you are interested in, please choose Economic News and Sports News.

    1. Political News
    2. Local News
    3. International News
    4. Economic News
    5. News Interviews
    6. Investigative Journalism
    7. Entertainment News
    8. Technology News
    9. Stock Market News
    10. Sports News
    11. All of the above
    12. None of the above

All respondents read a news article about a little-known tourist destination in Malaysia, Pulau Lang Tengah, in the state of Terengganu. For those in the monolingual group (i.e., *Bahasa Melayu* and English conditions), they completed this portion of the survey in the language that they were originally assigned. In contrast, participants in the bilingual group (i.e., condition 3), who had been answering the previous questions in *Bahasa Melayu*, read the article and answered questions related to the article in English. An additional prompt was provided to participants in the bilingual group (in *Bahasa Melayu*), to alert them about the language change:

> Next, you will read a news article and answer questions about the article in English.

We intentionally chose an accessible and non-political article to mitigate the possibility that the article's content may induce respondents to display more (or less) ethnic discrimination, and to ensure that participants can comprehend the content easily. The article was originally published in *Bahasa Melayu* and appeared in a local newspaper, *Berita Harian* (Mohd A. Wahid, 2023). The lengths of the article in *Bahasa Melayu* and in English are 156 words and 179 words, respectively. The English version of the news article is shown below:

> Pulau Lang Tengah, Terengganu, is located between Pulau Redang, Kuala Nerus and Pulau Perhentian, Besut. It takes approximately 45 minutes to reach the island by boat from a jetty stop in Merang, Setiu.
>
> Some tourists consider Pulau Lang Tengah as an exclusive and isolated island compared to the other two neighbouring islands.
>
> The popularity of Pulau Redang and Pulau Perhentian, which are well-known and favoured by visitors, makes Pulau Lang Tengah a third option.
>
> Those who have visited here find its attractions more appealing than the other islands in Terengganu.
>
> In addition to having fewer crowds of visitors, this island is calmer due to the limited accommodations available for tourists and the absence of a large community settlement which can be found in Pulau Redang.

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> One of the fascinating locations in Pulau Lang Tengah is the coastline of Pantai Pasir Air, where beautiful panorama of white fine sand and crystal-clear emerald green water can be enjoyed during the daytime.
>
> Visitors will definitely be dazzled by the gorgeous view, and it would be an unfulfilled experience without an overnight stay.

After reading the article, respondents answered the following two questions relating to the article in *Bahasa Melayu* (i.e., those in the *Bahasa Melayu*-only condition) or English (i.e., those in the bilingual and English-only conditions):

- What do you think the title of the news article is?
  1. Worm infection affects emotions, slows down childrens growth.
  2. 6 ways to strengthen memory, prevent dementia.
  3. The stunning views at Pulau Lang Tengah
  4. Monitor blood pressure regularly.
- Where is Pulau Lang Tengah located at?
  1. Johor
  2. Terengganu
  3. Kedah
  4. Perlis

After answering the above questions, the bilingual group will resume the rest of the survey in *Bahasa Melayu*.

OA3c Variables and Descriptive Statistics

Table OA3c.28: **Description of Variables and Measurements Used in Study 3**

Variables	Description and Measurements
Ethnic Outgroup Discrimination	Average score based on 4-point Likert scale responses to following four items: • Can you tell us how strongly you agree or disagree with the following statement? "The Prime Minister of Malaysia should always be a Malay." (1 = Strongly disagree; 2 = Disagree; 3 = Agree; 4 = Strongly agree) • Can you tell us how strongly you agree or disagree with the following statement? "People should be treated and given the same rights in Malaysia regardless of race or religion." (1 = Strongly agree; 2 = Agree; 3 = Disagree; 4 = Strongly disagree) • Can you tell us how strongly you agree or disagree with the following statement? "There should be no race-based parties in Malaysia." (1 = Strongly agree; 2 = Agree; 3 = Disagree; 4 = Strongly disagree) • To what extent do you support or oppose ICERD to be ratified in Malaysia? (1 = Strongly support; 2 = Somewhat support; 3 = Somewhat do not support; 4 = Strongly do not support)
Bilingual	0 = Monolingual (English + *Bahasa Melayu* conditions) 1 = Bilingual

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Table OA3c.28 – continued from previous page

Variables	Description and Measurements
Language	Categorical variable where *Bilingual* = 1 is the reference category 0 = Bilingual 1 = English 2 = *Bahasa Melayu*
Female	0 = Male 1 = Female
Education	What is the highest level of school you have completed? 1 = Primary school (e.g., UPSR) 2 = Secondary school (e.g., SPM) 3 = High school, polytechnic, or community college (e.g., STPM, certificate, diploma) 4 = University (Bachelor, Master, PhD)
Check	0 = Otherwise 1 = Answered both manipulation check questions correctly
Age	2023 − Respondent's birth year
Income	Please indicate your monthly household income. 1 = Less than RM2,000 2 = RM2,000 - RM3,999 3 = RM4,000 - RM5,999 4 = RM6,000 - RM7,999 5 = RM8,000 - RM9,999 6 = RM10,000 and above
Fluent English	In your opinion, how well do you know English? 0 = Can understand, speak, and write 1 = Fluent
Fluent *Bahasa Melayu*	In your opinion, how well do you know *Bahasa Melayu* 0 = Can understand, speak, and write 1 = Fluent
Perspective-Taking	Average of responses to seven items from the Interpersonal Reactivity Index's perspective-taking subscale (Davis, 1983), with each item measured on a 5-point Likert scale ranging from 1 ("Does not describe me well") to 5 ("Describes me very well"): • I sometimes find it difficult to see things from the "other guy's" point of view. (*reverse coded*) • I try to look at everybody's side of a disagreement before I make a decision. • I sometimes try to understand my friends better by imagining how things look from their perspective. • If I'm sure I'm right about something, I don't waste much time listening to other people's arguments. (*reverse coded*) • I believe that there are two sides to every question and try to look at them both. • When I'm upset at someone, I usually try to "put myself in his shoes" for a while. • Before criticizing somebody, I try to imagine how I would feel if I were in their place.

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Table OA3c.29: **Descriptive Statistics of Variables Used in Study 3**

	N	Mean	SD	Median	Min	Max	Skew
Bilingual	889	0.40	0.49	0.00	0.00	1.00	0.42
Language (Bilingual)	889	0.40	0.49	0.00	0.00	1.00	0.42
Language (English)	889	0.30	0.46	0.00	0.00	1.00	0.87
Language (Bahasa Melayu)	889	0.30	0.46	0.00	0.00	1.00	0.86
Ethnic Outgroup Discrimination	870	2.47	0.52	2.50	1.00	4.00	0.09
Perspective-Taking	866	3.70	0.58	3.71	1.00	5.00	0.02
Female	877	0.64	0.48	1.00	0.00	1.00	-0.59
Education	887	3.53	0.67	4.00	1.00	4.00	-1.11
Age	882	33.84	10.23	32.00	18.00	69.00	0.78
Income	888	3.19	1.61	3.00	1.00	6.00	0.39
Check	889	0.94	0.25	1.00	0.00	1.00	-3.55
Fluent English	888	0.31	0.46	0.00	0.00	1.00	0.80
Fluent Bahasa Melayu	887	0.90	0.30	1.00	0.00	1.00	-2.64

OA3d Balance Checks

Table OA3d.30: **Balance Checks for Study 3 (Bilingual versus Monolingual)**

Covariates	Bilingual = 0	Bilingual = 1	F Statistic	Prob > F
Age	34.068	33.493	0.667	0.414
	(10.4)	(9.973)		
Check	0.94	0.929	0.414	0.52
	(0.237)	(0.257)		
Education	3.498	3.567	2.224	0.136
	(0.684)	(0.646)		
Fluent English	0.335	0.282	2.748	0.098
	(0.473)	(0.451)		
Female	0.66	0.614	1.941	0.164
	(0.474)	(0.487)		
Income	3.131	3.291	2.089	0.149
	(1.603)	(1.631)		
Fluent Bahasa Melayu	0.904	0.89	0.489	0.485
	(0.294)	(0.314)		

Notes: The "Bilingual = 0" and "Biligual = 1" columns report the covariate group means for (1) the English and *Bahasa Melayu* conditions combined, and (2) the bilingual condition, respectively.

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Table OA3d.31: **Balance Checks for Study 3 (Three Experimental Conditions)**

Covariates	Bilingual	English	Bahasa Melayu	F Statistic	Prob > F
Age	33.493	34.378	33.754	0.58	0.56
	(9.973)	(10.602)	(10.202)		
Check	0.929	0.929	0.951	0.778	0.46
	(0.257)	(0.258)	(0.215)		
Education	3.567	3.438	3.558	3.266	0.039
	(0.646)	(0.714)	(0.648)		
Fluent English	0.282	0.352	0.318	1.726	0.179
	(0.451)	(0.479)	(0.467)		
Female	0.614	0.675	0.645	1.235	0.291
	(0.487)	(0.469)	(0.479)		
Income	3.291	3.135	3.127	1.045	0.352
	(1.631)	(1.635)	(1.572)		
Fluent Bahasa Melayu	0.89	0.906	0.902	0.256	0.774
	(0.314)	(0.292)	(0.298)		

Notes: The "Bilingual," "English," and *Bahasa Melayu* columns correspond to the covariate group means for the three experimental conditions.

OA3e Results

Table OA3e.32: **Language Switching Reduces Ethnic Outgroup Discrimination**

DV =	Ethnic Outgroup Discrimination	
Models =	Without Covariates	With Covariates
Bilingual	-0.087^{*}	-0.106^{**}
	(0.035)	(0.034)
Female		-0.045
		(0.037)
Education		0.034
		(0.025)
Income		-0.014
		(0.011)
Age		0.011^{**}
		(0.002)
Fluent English		-0.179^{**}
		(0.040)
Fluent Malay		0.038
		(0.054)
N	870	853
Region FE	No	Yes

Notes: Table entries are unstandardized coefficient estimates. Robust standard errors are shown in parentheses. $^{**}p < 0.01$; $^{*}p < 0.05$; $^{\dagger}p < 0.1$.

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OA3f Additional Test 1: Disaggregating Treatment Variable

Table OA3f.33: **Treatment Effects Using Three-Category Treatment Variable**

DV =	Ethnic Outgroup Discrimination			
Models =	Reference = Bilingual		Reference = *Bahasa Melayu*	
English	0.093*	0.106**	0.011	−0.001
	(0.042)	(0.041)	(0.045)	(0.044)
Bahasa Melayu	0.082†	0.107**		
	(0.042)	(0.041)		
Bilingual			−0.082†	−0.107**
			(0.042)	(0.041)
N	870	853	870	853
Covariates	No	Yes	No	Yes
Region FE	No	Yes	No	Yes

Notes: Table entries are unstandardized coefficient estimates. Robust standard errors are shown in parentheses. **p < 0.01; *p < 0.05; †p < 0.1.

OA3g Additional Test 2: Perspective-Taking Mechanism

Table OA3g.34: **Language Switching Improves Perspective-Taking**

DV =	Perspective-Taking	
Models =	Without Covariates	With Covariates
Bilingual	0.080*	0.097*
	(0.040)	(0.040)
Female		−0.046
		(0.041)
Education		0.015
		(0.030)
Income		−0.002
		(0.013)
Age		−0.001
		(0.002)
Fluent English		0.142**
		(0.045)
Fluent Malay		0.102†
		(0.060)
N	866	849
Region FE	No	Yes

Notes: Table entries are unstandardized coefficient estimates. Robust standard errors are shown in parentheses. **p < 0.01; *p < 0.05; †p < 0.1.

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OA4 Study 3: Pre-Analysis Plan

In this study, we test whether code switching – defined as the process in which an individual shifts from using one linguistic code to another – generates greater perspective-taking and less prejudice towards ethnic outgroups and immigrants in an experimental setting.[3] Drawing on insights from the bilingualism and perspective-taking research in psychology (Galinsky, Ku and Wang, 2005; Schroeder, 2018), our primary argument is that bilingual training – at home and/or school – has important consequences on intergroup relations. For many cognitive scientists, the process of switching between multiple languages is analogous to the cognitive process of switching from one person's perspective to another (e.g., Fan et al., 2015; Goetz, 2003; Schroeder, 2018). When individuals are forced to switch between two (or more) languages, they are also subconsciously trained to curtail their own predispositions and biases while shifting their attention toward the mental state of the perspective-taking target (Bialystok and Viswanathan, 2009; Carlson and Meltzoff, 2008). This ability to display greater sensitivity toward another person's mental state should in turn reduce an individual's susceptibility to discriminate against immigrants. As such, we posit the following hypotheses:

> H1: Individuals who are exposed to a bilingual environment should display greater perspective-taking than those who are immersed in a monolingual environment.
>
> H2: Individuals who are exposed to a bilingual environment should display less prejudice against ethnic outgroups and immigrants than those who are immersed in a monolingual environment.

In a previous study that was conducted in Malaysia, we find that individuals who received bilingual instruction in schools display less political discrimination against ethnic outgroups than those who received monolingual instruction. Specifically, we analyzed the impact of an education reform in Malaysia, which resulted in those students who were born after the cutoff receiving bilingual instruction, while those born before the cutoff were only taught in their mother tongue. In addition, we uncovered a statistically significant link between bilingual instruction and greater perspective-taking ability. The current study therefore builds on these findings by investigating whether bilingual exposure affects ethnic and immigration attitudes in an experimental setting. More specifically, the primary objective of this study is to tease out the causal mechanism between bilingualism and outgroup attitudes – i.e., code-switching – and to test the validity of this mechanism through a survey experiment.

OA4a Research Design

We plan to recruit 1,000 survey participants from Rakuten Insight through their consumer panel. The participants would be redirected to an online survey that is hosted on Qualtrics. The sampling frame will consist of individuals who (1) are ethnic Malays, and (2) are proficient in English **and** *Bahasa Melayu*. Figure OA4a.8 illustrates the survey experimental flow. Shortlisted respondents will be randomized into three groups. One group will complete the entire survey in *Bahasa Melayu* (i.e., blue dashed box), a second group will complete the entire survey in English (i.e., red dashed box), and a third group that will take the survey in a mixture of English and *Bahasa Melayu* (i.e., middle column in Figure OA4a.8). Put simply, the experiment seeks to simulate two kinds of language environments – i.e., monolingual (i.e., English-only or *Bahasa Melayu*-only) versus bilingual exposure.

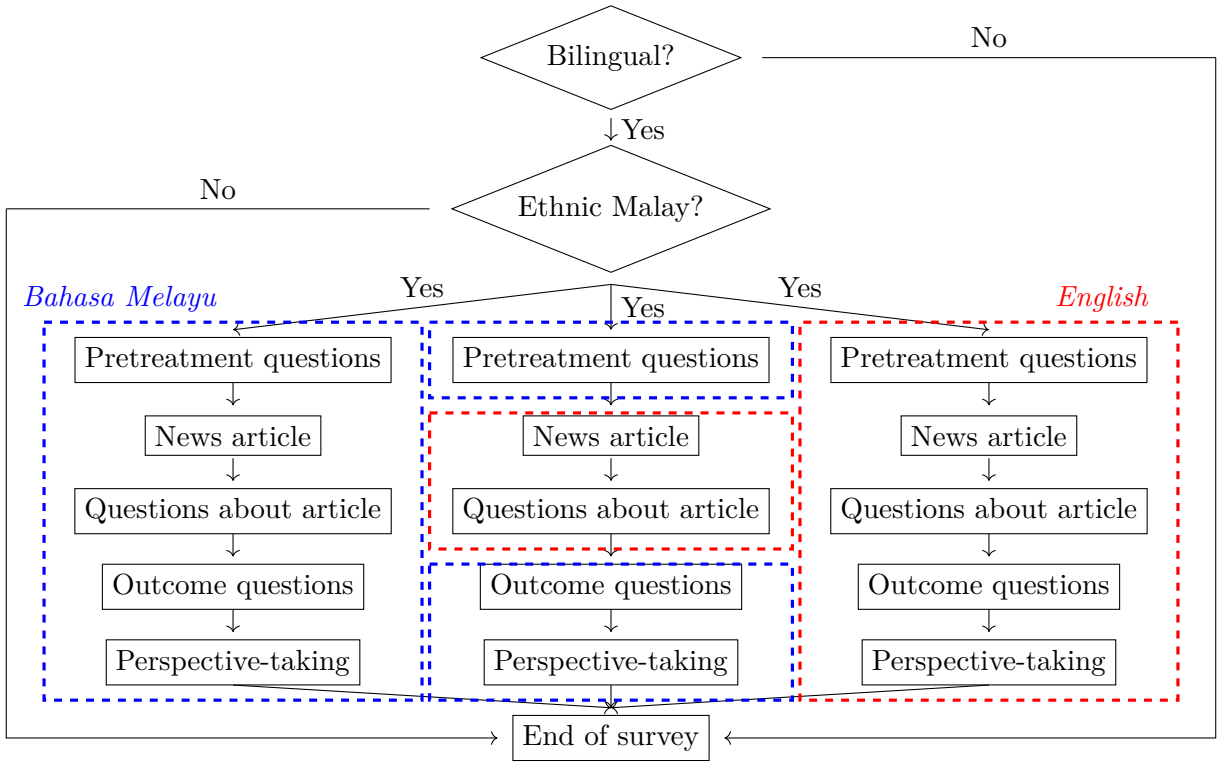
OA4b Screening Questions and Treatment Assignment

At the beginning of the survey, participants will be asked about their ethnicity and their ability to read, write and understand English and *Bahasa Melayu*. These questions will be displayed in both English and *Bahasa Melayu*. Specifically,

[3] This study was preregistered on egap Registry: `https://osf.io/4axzq`.

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Figure OA4a.8: **Survey Experiment Flow**



- *Race*: What is your race?
  1. Malay
  2. Chinese
  3. Indian
  4. Others
- *EngFluent*: In your opinion, how well do you know English?
  1. Do not know the language at all
  2. Can understand a little, but cannot speak
  3. Can understand and can speak a little
  4. Can understand, speak, and write
  5. Fluent
- *MalayFluent*: In your opinion, how well do you know *Bahasa Melayu*?
  1. Do not know the language at all
  2. Can understand a little, but cannot speak
  3. Can understand and can speak a little
  4. Can understand, speak, and write
  5. Fluent

After completing the questions, we will select participants who answered option (1) for the *Race* question, and at least option (4) for both the *EngFluent* and *MalayFluent* questions. Subsequently, shortlisted

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participants will be randomly assigned to one of three possible groups and read the following prompt, which will be shown in English and *Bahasa Melayu*:

> Based on your previous answers, you had indicated that you can read, write, and speak in both Malay and English. Next, you will complete the rest of the survey in **Malay** / **English** / **Malay and English**. Please click next when you are ready.

The proportions of respondents who will be assigned to the *Bahasa Melayu*-only, English-only, and bilingual groups are 30%, 30%, and 40% respectively.

OA4c Pretreatment Questions

Next, we will ask a series of demographic and socioeconomic questions. These questions will be displayed in *Bahasa Melayu* for those assigned to the *Bahasa Melayu*-only and bilingual groups, or English for the English-only group. These questions are:

- *Region*: Where are you currently living in?
    1. Northern region (Perlis, Kedah, Penang, and Perak)
    2. Central region (Selangor, Kuala Lumpur, and Putrajaya)
    3. Southern region (Negeri Sembilan, Melaka, and Johor)
    4. East coast (Kelantan, Pahang, and Terengganu)
    5. East Malaysia (Sabah, Sarawak, and Labuan)
- *Gender*: What is your gender?
    1. Male
    2. Female
    3. Others
- *BirthYear*: What is your year of birth?
    1. Dropdown menu from 1921 to 2010
- *Education*: What is the highest level of school you have completed?
    1. None
    2. Primary school (e.g., UPSR)
    3. Secondary school (e.g., SPM)
    4. High school, polytechnic, or community college (e.g., STPM, certificate, diploma)
    5. University (Bachelor, Master, PhD)
- *Income*: Please indicate your monthly household income.
    1. Less than RM2,000
    2. RM2,000 - RM3,999
    3. RM4,000 - RM5,999
    4. RM6,000 - RM7,999
    5. RM8,000 - RM9,999
    6. RM10,000 and above

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- *LangHome*: What language(s) do you normally speak at home? Select all that apply.
    1. Malay
    2. English
    3. Mandarin or other Chinese dialects e.g., Hokkien, Cantonese
    4. Tamil or other Indian dialects e.g., Hindi, Punjabi
    5. Others. Please specify:
- *LangHomeOut*: What language(s) do you normally speak outside your home?
    1. Malay
    2. English
    3. Mandarin or other Chinese dialects e.g., Hokkien, Cantonese
    4. Tamil or other Indian dialects e.g., Hindi, Punjabi
    5. Others. Please specify:

OA4d Attention Check

Next, respondents will complete an attention check question that is adapted from Berinsky, Margolis and Sances (2014). Participants who select **Economic News** and **Sports News** will proceed to the next stage of the survey, while the rest are screened out.

- *AttentionCheck*: The purpose of this survey is to gauge people's preference for news sources because what news people watch affects their judgments on many issues. However, in this question, we only want to test whether you pay attention to the questions. Hence, regardless of what you are interested in, please choose **Economic News** and **Sports News**.
    1. Political News
    2. Local News
    3. International News
    4. Economic News
    5. News Interviews
    6. Investigative Journalism
    7. Entertainment News
    8. Technology News
    9. Stock Market News
    10. Sports News
    11. All of the above
    12. None of the above

OA4e Reading and Code-Switching

Next, respondents will read a news article about a little known tourist destination in Malaysia, Pulau Lang Tengah, in the state of Terengganu. For those in the monolingual groups (i.e., *Bahasa Melayu*-only and English-only), they will complete this portion of the survey in the language that they were originally assigned to. In contrast, participants in the bilingual group, who had been answering the questions in *Bahasa Melayu* prior to this section, will now read the article and answer questions relating to the article in English. An additional prompt will be provided to participants in the bilingual group, to alert them about the language change:

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> Next, you will read a news article and answer questions about the article in English.

The above prompt will not be shown to participants in the "monolingual" conditions. We intentionally chose an accessible and non-political article to mitigate the possibility that the article's content may induce respondents to display more (or less) ethnic discrimination, as well as to ensure that participants can comprehend the content easily. This allows us to credibly identify the causal effect of bilingual exposure on ethnic and immigrant prejudice. The news article was originally published in *Bahasa Melayu* and appeared in a local newspaper, *Berita Harian* (click here to view the original article). The lengths of the article in *Bahasa Melayu* and in English are 156 words and 179 words, respectively. The English version of the news article is shown below:

> Pulau Lang Tengah, Terengganu is located between Pulau Redang, Kuala Nerus and Pulau Perhentian, Besut. It takes approximately 45 minutes to reach the island by boat from a jetty stop in Merang, Setiu.
>
> Some tourists consider Pulau Lang Tengah as an exclusive and isolated island compared to the other two neighbouring islands.
>
> The popularity of Pulau Redang and Pulau Perhentian, which are well-known and favoured by visitors, makes Pulau Lang Tengah a third option.
>
> Those who have visited here find its attractions more appealing than the other islands in Terengganu.
>
> In addition to having fewer crowds of visitors, this island is calmer due to the limited accommodations available for tourists and the absence of a large community settlement which can be found in Pulau Redang.
>
> One of the fascinating locations in Pulau Lang Tengah is the coastline of Pantai Pasir Air, where beautiful panorama of white fine sand and crystal-clear emerald green water can be enjoyed during the daytime.
>
> Visitors will definitely be dazzled by the gorgeous view, and it would be an unfulfilled experience without an overnight stay.

After reading the article, respondents will answer the following two questions relating to the article in *Bahasa Melayu* (i.e., those in the *Bahasa Melayu*-only condition) or English (i.e., those in the bilingual and English-only conditions).

- *Check1*: What do you think the title of the news article is?
    1. Worm infection affects emotions, slows down childrens growth.
    2. 6 ways to strengthen memory, prevent dementia.
    3. The stunning views at Pulau Lang Tengah
    4. Monitor blood pressure regularly.
- *Check2*: Where is Pulau Lang Tengah located at?
    1. Johor
    2. Terengganu
    3. Kedah
    4. Perlis

After answering the above three questions, the bilingual group will complete the rest of the survey in *Bahasa Melayu*. This concludes the code-switching component of the survey experiment.

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OA4f Outcome Variables: Ethnic Discrimination Variables

We implement the same set of questions from an early preregistered study that was conducted in Malaysia (click here):

> Now, can you tell us how strongly you agree or disagree with the following statements?

- *EthnicPM*: The Prime Minister of Malaysia should always be a Malay.
  1. Strongly agree
  2. Agree
  3. Disagree
  4. Strongly disagree
- *EthnicRights*: People should be treated and given the same rights in Malaysia, regardless of race or religion.
  1. Strongly agree
  2. Agree
  3. Disagree
  4. Strongly disagree
- *EthnicParty*: There should be no race-based parties in Malaysia.
  1. Strongly agree
  2. Agree
  3. Disagree
  4. Strongly disagree

We also include an additional set of ethnic discrimination variables that ask respondents about their attitudes towards the International Convention on the Elimination of All Forms of Racial Discrimination (ICERD).

> The International Convention on the Elimination of All Forms of Racial Discrimination (ICERD) is a United Nations convention which commits its members to the elimination of racial discrimination and the promotion of understanding among all races. Currently, Malaysia is one of 14 countries that have not signed or ratified ICERD.

- *ICERDrat*: To what extent do you support or oppose ICERD to be ratified in Malaysia?
  1. Strongly support
  2. Somewhat support
  3. Somewhat do not support
  4. Strongly do not support
- *ICERDview*: Which of the following statements is closest to your view? (Please choose one)
  1. Malaysia should not sign ICERD because Malay-Muslim privileges will erode.
  2. Malaysia should sign ICERD to treat everyone equally.

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- *ICERDharm*: Please tell me whether you agree or disagree with the following statement: "Ratification of ICERD will bring more benefit than harm."

    1. Strongly agree
    2. Agree
    3. Disagree
    4. Strongly disagree

OA4g Outcome Variables: Immigration Attitudes Variables

We implement the same set of questions from the European Social Survey, when measuring respondents' attitudes towards immigrants. Specifically, these include:

- *ImmEconomy*: Would you say it is generally bad or good for Malaysia's economy that people come to live here from other countries?

    1. 0 (Bad for the economy)
    2. 1
    3. 2
    4. 3
    5. 4
    6. 5
    7. 6
    8. 7
    9. 8
    10. 9
    11. 10 (Good for the economy)

- *ImmCulture*: Would you say that Malaysia's cultural life is generally undermined or enriched by people coming to live here from other countries?

    1. 0 (Cultural life undermined)
    2. 1
    3. 2
    4. 3
    5. 4
    6. 5
    7. 6
    8. 7
    9. 8
    10. 9
    11. 10 (Cultural life enriched)

- *ImmLive*: Is Malaysia made a worse or a better place to live by people coming to live here from other countries?

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1. 0 (Worse place to live)
2. 1
3. 2
4. 3
5. 4
6. 5
7. 6
8. 7
9. 8
10. 9
11. 10 (Better place to live)

The following questions will deal with foreigners and immigrants living in Malaysia. Here are some sentences or phrases, which you have probably heard before. Please tell me how much you agree or disagree with each statement.

- *ImmJobs*: Foreigners take away jobs from Malaysians.

  1. Strongly agree
  2. Agree
  3. Disagree
  4. Strongly disagree

- *ImmPolitical*: Foreigners in Malaysia should not be allowed to be politically active.

  1. Strongly agree
  2. Agree
  3. Disagree
  4. Strongly disagree

- *ImmPartner*: Foreigners in Malaysia should select their partners from their fellow countrymen or countrywomen.

  1. Strongly agree
  2. Agree
  3. Disagree
  4. Strongly disagree

- *ImmVote*: Foreigners in Malaysia should be allowed to vote for their Members of Parliament (MPs).

  1. Strongly agree
  2. Agree
  3. Disagree
  4. Strongly disagree

- *ImmCrime*: Foreigners increase crime problems in Malaysia.

  1. Strongly agree
  2. Agree
  3. Disagree
  4. Strongly disagree

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OA4h Mechanism: Perspective-Taking

Perspective-taking ability is measured using the perspective-taking sub-scale from the Interpersonal Reactivity Index (IRI, see Davis, 1983). The following prompt will be shown to participants:

> In this section, you will read several statements that inquire about your thoughts and feelings in a variety of situations. On a scale from 1 ("does not describe me well") to 5 ("describes me very well"), please indicate the extent to which each statement describes you well. Read each statement carefully before responding. Answer as honestly as you can.

Participants will then read a total of seven statements, and indicate the degree to which each statement describes them:

- I sometimes find it difficult to see things from the "other guy's" point of view.
    1. 1 ("Does not describe me well")
    2. 2
    3. 3
    4. 4
    5. 5 ("Describes me very well")
- I try to look at everybody's side of a disagreement before I make a decision.
    1. 1 ("Does not describe me well")
    2. 2
    3. 3
    4. 4
    5. 5 ("Describes me very well")
- I sometimes try to understand my friends better by imagining how things look from their perspective.
    1. 1 ("Does not describe me well")
    2. 2
    3. 3
    4. 4
    5. 5 ("Describes me very well")
- If I'm sure I'm right about something, I don't waste much time listening to other people's arguments.
    1. 1 ("Does not describe me well")
    2. 2
    3. 3
    4. 4
    5. 5 ("Describes me very well")
- I believe that there are two sides to every question and try to look at them both.
    1. 1 ("Does not describe me well")

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2. 2
3. 3
4. 4
5. 5 (“Describes me very well")

- When I’m upset at someone, I usually try to “put myself in his shoes" for a while.

1. 1 (“Does not describe me well")
2. 2
3. 3
4. 4
5. 5 (“Describes me very well")

- Before criticizing somebody, I try to imagine how I would feel if I were in their place.

1. 1 (“Does not describe me well")
2. 2
3. 3
4. 4
5. 5 (“Describes me very well")

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