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Exploring the ideational explanation for pro-immigrant sentiment: evidence from a South Korean survey

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Abstract

A consistent finding in the public opinion literature shows that individuals who attain higher levels of education are more likely to express pro-immigrant attitudes. The ideational hypothesis suggests that ideas learned during formal education drive this empirical relationship. In this article, we develop this hypothesis further by asking, "What types of ideas socialize pro-immigrant attitudes?" We argue that exposure to social theories during higher education promotes social inclusivity and tolerance, leading to positive views toward immigrants. This article draws theoretical insights from attitudinal-based theories of immigrant sentiment to construct a mediation model linking ideas from the classroom to attitudes toward immigrants. Using original data from a population-based survey in South Korea, we examine the relationship between respondents' prior enrollment in different academic courses and their attitudes toward immigrants. We measure exposure to social theories as enrollment in social science and arts & humanities and find that only social science courses are positively associated with pro-immigrant attitudes. We also examine whether enrollment exhibits indirect effects via previously identified attitudinal determinants of immigrant sentiment. Results from our mediation analysis show that enrollment in social science courses is associated with stronger cosmopolitan views and negatively correlates with isolationist attitudes. In contrast, we find that enrollments in courses unrelated to social theories, like math & science and engineering, are not statistically significant predictors of immigrant attitudes. We interpret our results as observational evidence consistent with ideational-based explanations for pro-immigrant attitudes.

Keywords: Immigrant attitudes, Education, Ideational hypothesis, South Korea

Introduction

Individuals who obtain higher levels of education are more likely to express pro-immigrant attitudes and support pro-immigrant policies.[1] Arguably, educational attainment is one of the most robust and consistent cross-national determinants of pro-immigrant sentiment in the literature. This empirical relationship holds within countries over time,

[1] See Betts (1988), Chandler and Tsai (2001), Guimond and Palmer (1990), Guimond and Palmer (1996), Hainmueller, Hiscox, and Margalit (2015), Janus (2010), Mayda (2006), Scheve and Slaughter (2001), and O'rourke and Sinnott (2006).

as well as across countries with diverse cultural settings. Yet, despite the strong association, scholars continue to debate how to interpret the finding because it is empirically consistent with economic (material-based) *and* ideational (idea-based) explanations for immigrant attitudes. Putting aside the debate, there appears to be a general agreement that at least part of the effect of education can be attributed to learned ideas socializing pro-immigrant attitudes. Thus, in this article, we ask, what types of learned ideas socialize pro-immigrant attitudes?

The ideational hypothesis has become a dominant explanation of immigrant sentiment. This hypothesis stresses that exposure to new ideas through formal education socializes attitudes toward immigrants in an inclusive direction.[2] Espenshade and Calhoun (1993) were amongst the first wave of scholars to advance the ideational hypothesis, noting: "An advanced formal education bestows a more enlightened perspective that is less vulnerable to the narrow appeals of intergroup negativism (p.195)." Subsequent scholars have expanded on the ideational linkages connecting formal education and pro-immigrant sentiment. For example, Hainmueller and Hiscox (2007) suggest that "higher levels of education lead to greater ethnic and racial tolerance among individuals and more cosmopolitan outlooks (p.400)." From the outset, the aim of this article is not to debate ideational versus economic explanations; the extant research covers that topic extensively. Instead, we refine and build on the ideational hypothesis literature by identifying the types of learned ideas that could promote pro-immigrant sentiment. Moreover, our inquiry is modest—seeking to probe the plausibility of the ideational hypothesis and not to provide a hard test of it.

We make three contributions to the literature explaining immigrant sentiment. First, despite the centrality of learned ideas, most studies that test the ideational hypothesis rely on measures of educational attainment as a proxy for ideas (i.e., primary, secondary, and tertiary education or years of schooling). We argue that educational attainment is, at best, a crude proxy for ideas. Noting the variation in coursework, we argue that those exposed to theories of social phenomena (herein social theories) are more likely to express positive attitudes toward immigrants than those in other fields of study where society and human behavior are not the main focus. Examples of social theories include theories on social interaction and construction, structures of human association, and the human condition. Second, while there are various pathways that link education to pro-immigrant attitudes, the empirical examination of these pathways has been limited. Therefore, in this article, we present a theoretical model that brings ideational-based theories of pro-immigrant sentiment and attitudinal-based explanations into a single, coherent framework. Third, most studies have not directly addressed problems of endogeneity in the form of selection bias. In this article, we leverage the rigid higher education system in South Korea to measure the effects of exposure to ideas while also reducing the bias associated with students choosing to be exposed to particular ideas (self-selection). Unlike many Western countries (Europe and the United States), where much of the research on pro-immigrant sentiment has been conducted thus far, South

[2] Other scholars have referred to this transmission of ideas through formal education as the socialization hypothesis (Coenders & Scheepers, 2003; Elchardus & Spruyt, 2009) or the liberalization hypothesis (Ceobanu & Escandell, 2010; Hanson et al., 2012; Lipset, 1982).

Korea maintains a traditional national exam system for entry into degree programs in university. In general, the exam-based system strongly incentivizes students to select their university and areas of study based on their exam scores, rather than personal interest (Kwon et al., 2017). Accordingly, we conduct a targeted analysis of Korean respondents who reported selecting their university and major based on their scores, not their academic interest.

Using data from a population-based survey of South Koreans conducted in 2019, we estimate the direct and indirect effects of taking social science and arts & humanities courses (our measures of exposure to social theories) on pro-immigrant sentiment via two attitudinal mediators (cosmopolitanism and isolationism). Our results show that enrolling in social science courses is positively related to support for immigrants, a statistically significant direct effect. For indirect effects, the results from our mediation analysis show that enrollment in social science courses is negatively associated with isolationist foreign policy and positively associated with cosmopolitanism, and thus positively correlated with pro-immigrant attitudes. We find only indirect effects of enrollment in arts & humanities courses via cosmopolitanism. For comparison, we also examined whether taking engineering and math & science courses has the same effect as social science courses. We find that these courses have no direct or indirect effect on respondents' opinions on immigrants, suggesting that not all post-secondary education produces pro-immigrant sentiment. Together, the results provide observational evidence consistent with the ideational hypothesis. Finally, we discuss the caveats and scope conditions of our study and outline possible avenues for future research in the conclusion.

Ideational hypothesis for pro-immigrant attitudes

The ideational hypothesis is a prominent explanation for the positive impact of education on pro-immigrant attitudes. The most commonly cited version suggests that higher education breeds tolerance of differences, so racial and cultural differences become less important to those with high levels of education than those with low levels of education (Card et al., 2012; Dustmann & Preston, 2007; Hainmueller et al., 2015; Janus, 2010). College education also exposes students to a variety of perspectives, enabling them to appreciate foreign cultures and develop positive attitudes toward immigrants (Bean, 1995; Betts, 1988; Chandler & Tsai, 2001; Hainmueller et al., 2015; Haubert & Fussell, 2006). For example, Haubert and Fussell (2006: 503) point out that those with college or advanced degrees are pro-immigrant because they acquire "ideas and values that increase their appreciation of other cultures or at least provoke them to question negative stereotypes of foreigners and immigrants." A related version of the hypothesis instead focuses on the development of analytical and critical thinking skills (Meeusen et al., 2013). This strand of the literature has hypothesized that education develops critical thinking skills that then countervail prejudiced beliefs inherent in anti-immigrant sentiment. Importantly, both versions of the hypothesis share the notion that exposure to new ideas through formal, structured education breeds pro-immigrant views.[3]

[3] Relatedly, the literature on intergroup contact theory emphasizes that structured environments, such as a classroom setting, are optimal for reducing prejudice (Allport et al., 1954).

Indeed, the robust finding that individuals with higher levels of education are more likely to hold more pro-immigrant attitudes than those with less formal education is consistent with the ideational hypothesis. We do not dispute this finding. However, in our view, this correlation alone does not provide sufficient, nor deeply compelling, evidence supporting the ideational hypothesis. Upon reviewing the literature, we identify at least three empirical shortcomings with the existing evidence: (1) (mis)measuring socially inclusive ideas; (2) lack of an empirical test of ideational pathways; (3) ignoring selection bias. We elaborate on each of these issues in turn.

(Mis)measuring Ideas

Following Hainmueller and Hiscox (2007), scholars have increasingly accepted and have used levels of education attainment (measured by the number of years spent at school or the highest completed education) as a proxy for ideas. However, the measure of educational attainment presents operational ambiguity, serving as a proxy for ideas *and* skills (Bearce & Roosevelt, 2019). As such, scholars need to consider alternative measures that more narrowly identify ideas while also not proxying skill levels.

A related criticism of using education attainment as a proxy for ideas is that even if it measures a basket of learned ideas, the level of education likely masks nuances across different academic disciplines. Yet, most existing studies use the level of education as a proxy measure of learned ideas because more time in formal schooling is thought to increase tolerance, broaden perspectives, and internalize values congruent with pro-immigrant sentiment. In our view, the emphasis on educational attainment has incorrectly overshadowed the importance of the types of ideas that also influence individuals' opinions about immigration. Years of education and the highest level of education completed capture a "vertical" aspect of the impact of education on individual attitudes but mask a "horizontal" aspect (De Witte 1999: 66-67). Put differently, these proxy measures for ideas overlook potentially rich variation in the distribution of ideas across academic disciplines. These aspects should not be overlooked because individuals pursue more specialized training following their post-secondary education, and their attitudes are likely to evolve as a result.

Lack of testing ideational pathways

Second, the literature has given insufficient attention to studying relevant ideational pathways—that is, examining the causal processes by which we might expect ideas to influence immigrant sentiment. Put simply, the ideational hypothesis suggests a chain of causal steps: (1) students are exposed to certain ideas transmitted by the educational system; (2) students integrate those ideas with their pre-existing ideas (or ideas socialize them) to varying degrees; (3) students use those learned ideas to form their attitudes towards immigrants. While previous research has predominantly focused on the initial and final steps, limited attention has been given to the intermediary step.

Indeed, it is extremely difficult, if not impossible, for researchers to observe the integration process of ideas at the population level. Yet, to the extent that the educational system exposes students to new ideas (and that those ideas socialize students to express pro-immigrant sentiment), we ought to observe mediators linking individuals' exposure to ideas to their attitudes toward immigrants. With this goal in mind, we identify and

use observable attitudinal mediators that are expected to be correlated with ideas and immigrant sentiment.

Selection bias

Third, and perhaps the most difficult issue, is addressing endogeneity in the form of selection bias. Until recently, prior works studying the effects of education have ignored selection bias. d'Hombres and Nunziata (2016:p.206) observe, "Education is likely to be endogenous in a model of attitude toward immigrants. Omitted variables related to family background and unobservable individual characteristics are likely to prevent the interpretation of simple OLS estimates as causal." Similarly, Lancee and Sarrasin (2015:p.492) note, "When comparing attitudes across educational groups, the effect of having a high education is likely to be confounded with factors related to but not caused by education." Despite the obvious concern of selection bias, few papers besides the authors noted above and Finseraas et al. (2018) have attempted to correct for the bias in their estimates.

These studies share similar research designs, using survey data on European respondents to estimate the causal effects of educational attainment on immigrant sentiment (d'Hombres & Nunziata, 2016; Lancee & Sarrasin, 2015; Finseraas et al., 2018). Both d'Hombres and Nunziata (2016) and Finseraas et al. (2018) exploit educational reforms extending (and shortening) compulsory schooling in Europe as exogenous treatments, but their findings are mixed. While Finseraas et al. (2018) find no significant difference in immigration attitudes between those who were educated in the old (7 years of schooling) and the new (9 years of schooling) education systems, d'Hombres and Nunziata (2016) find that more years of compulsory education are positively correlated with pro-immigrant sentiment. In contrast, Lancee and Sarrasin (2015) use panel data on Swiss households to study the with-in respondent effects of educational attainment and find that education level has no major effect on immigrant sentiment. d'Hombres and Nunziata (2016) attempt to test the mechanisms behind the effect of education, specifically examining economic channels (the labor market competition hypothesis) and non-economic channels (ideational hypothesis). However, considering the earlier discussion noting that additional years of education can be proxying for both skill and ideas, it is perhaps unsurprising that the authors provide a mixed conclusion, noting "Education affects attitudes not only by providing natives with more secure positions in society but also by changing their values and understanding of the role of migrants in host countries" (d'Hombres & Nunziata 2016:p.217).

In summary, the ideational hypothesis has become a dominant interpretation of why higher educational attainment is positively correlated with pro-immigrant sentiment. However, we find that the existing empirical work can be improved in at least three ways: using a better measurement of ideas, testing ideational pathways, and addressing selection bias. In the following section, we discuss types of ideas that matter for pro-immigrant attitudes to further elaborate on our proxy for ideas. We also present a mediation model connecting exposure to ideas to immigrant sentiment and identify specific ideational pathways linking the two. Then, in the research design section, we discuss how we attempt to mitigate selection bias in our analysis.

A refined ideational model of pro-immigrant sentiment

While individuals with college degrees or advanced degrees tend to express more positive perceptions of immigrants than those without higher education, not all post-secondary education contributes to pro-immigrant sentiment to the same degree. The ideas introduced to students during formal education affect their attitudes toward immigrants, so we should expect exposure to *certain* ideas to have a greater (or lesser) influence on immigrant sentiment than others. Put differently, the ideational hypothesis needs to specify specific ideas that increase pro-immigrant sentiment and the sources of those ideas.

The link between fields of study at higher education institutions and individuals' values and attitudes has been extensively studied. Guidmond's several works have concluded that areas of study have a transformative impact on individual attitudes. In a more recent longitudinal study, Fischer et al. (2017) discovered that economics students tend to become more pro-free market by the time of graduation. Field-based attitudinal differences are also observed in environmental and moral issues. Political science students are more supportive of state intervention in environmental issues than students trained in economics and law because of their understanding of the government and policy (Harring et al., 2017). Brońić and Miles (2021) conclude that while higher education liberalizes moral attitudes, it also promotes moral absolutism rather than relativism, which is particularly strong for students educated in the fields of humanities, arts, or social science.

Field-based differences are also observed in behavior. For instance, humanities and social science promote political participation (Mu¨hleck and Hadjar, 2023). Individuals educated in fields that emphasize communicative qualities (such as sociopolitical fields, personal care, and teacher education) tend to be more tolerant of gender roles, join socially responsible organizations, and lean towards left-wing political parties when voting (van de Werfhorst et al., 2001).

Indeed, fields of study affect individuals' attitudes, values, and behavior. However, most studies studying the impact of academic fields have not addressed whether the observed changes in individuals are due to pre-existing differences or the fields of study themselves. The findings on this topic are mixed. Using a sample of Czech university students, Vesely and Soukup (2022) show that academic fields do not determine individual political and policy attitudes, refuting both socialization and self-selection effects. On the other hand, using cross-sectional and panel data on incoming college students in Brussels, Elchardus and Spruyt (2009) find evidence of both selection effects and socialization effects after taking social science courses. Fischer et al. (2017), in a study of German university students, find evidence of socialization impact. According to them, the observed change in economics students' attitudes toward free market policy is mainly influenced by course contents. Similarly, Guimond et al. (1989b) found little evidence of selection but found support for socialization.

Scholars suggesting socialization effects have identified various factors that contribute to field-based differences. Factors such as course contents (Stubager, 2008; van de Werfhorst et al., 2001; Mu¨hleck & Hadjar, 2023; Harring et al., 2017; Guimond & Palmer, 1996), professors' ideological orientations (Gross & Fosse, 2012; Klein et al., 2005), their pedagogical styles, classmates' orientations (Klofstad, 2007), and interactions among

students, and students and teachers can all affect individuals' values, attitudes, and behavior. Studies particularly emphasize the impact of course contents transmitted to students as a determining factor in field-based differences. Numerous scholars have promoted the hypothesis that social science, humanities, and economics courses particularly contribute to liberalizing one's social, economic, and political beliefs by teaching students theories of domestic and foreign societies.[4] For instance, Guimond and Palmer's (1996) longitudinal study, spanning three years, revealed that students majoring in social science exhibited a greater inclination towards liberalism compared to commerce students when it came to issues related to poverty, unemployment, and specific social groups. The major source of this field-based attitudinal difference was the academic programs to which the students were exposed within their field. Guimond and Palmer found courses and faculty members in social science to be more accepting of individuals from marginalized groups (including ex-convicts and homosexuals).[5] In contrast, previous studies have noted that physical sciences and engineering courses are less likely to transmit ideas related to social theories than social science and humanities courses (Elchardus & Spruyt, 2009; Hanson et al., 2012; Lipset, 1982). According to Stubager (2008), individuals who received education in fields stressing others' welfare and arguments (such as humanities, arts, and education) tend to be more liberal than those educated in fields like production, business, and administration.

In summary, the literature suggests that not all ideas from higher education are likely to increase support for immigrants to the same degree across fields of study. The extant literature suggests that individuals exposed to ideas of social inclusivity and tolerance are more likely to express greater pro-immigrant sentiment and that exposure to these ideas is most likely to occur in social science and humanities courses, where theories of societies in home country and foreign countries are the main focus of the curriculum. Thus, we formally state our first hypothesis as:

H1 Respondents who take more courses on social theories are more likely to express pro-immigrant sentiment.

To explore causal pathways linking social theories and pro-immigrant attitudes, it is essential to examine whether individuals, who have been exposed to social ideas, have integrated new ideas from the courses with their pre-existing ideas. Prior research has shown that attitudinal measures (cosmopolitanism and isolationism) are highly correlated with opinions on immigrants (Haubert & Fussell, 2006; Quillian, 1995). We present a theoretical mediation model in Fig. 1 that brings ideational-based theories of pro-immigrant sentiment and attitudinal-based explanations together into a coherent framework, treating exposure to social theories as the independent variable and attitudinal measures as causal mediators. The bottom arrow in the diagram represents the expected sign of the direct effect of exposure to social theories on immigrant attitudes.

[4] See Lipset (1982), Betts (1988), Chandler and Tsai (2001), Guimond et al. (1989a, 1989b), Guimond and Palmer (1990, 1996), Selznick and Steinberg (1969), and Hanson et al. (2012).

[5] Similarly, in explaining trade preferences, Hainmueller and Hiscox (2006) suggest the transmission of pro-trade ideas through economics courses.

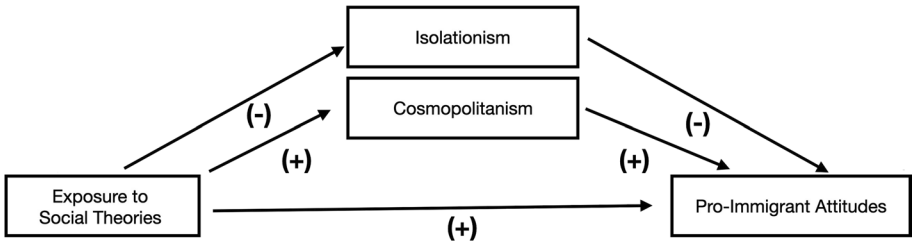


Fig. 1 Mediation Model

The arrows at the top of the diagram represent two potential pathways (via isolationism and cosmopolitanism) linking exposure to social theories to pro-immigrant sentiment.

Our mediation model addresses two obvious shortcomings with the attitudinal-based explanations as stand-alone theories of immigrant attitudes: failure to explain and test the source of "causal" attitudes shaping pro-immigrant attitudes and the endogeneity problem of using attitudes to explain attitudes. Fordham and Kleinberg (2012) note a similar problem of causal inference related to regressing attitudes on attitudes in the issue-area of international trade. Below we describe each pathway and its expected relationship with social theories and immigrant sentiment.

Cosmopolitanism Individuals with a narrow perspective are inclined to express prejudice against minorities. Roof (1974) shows that people with a localistic worldview or an orientation toward the local community tend to reject religious minorities. While one's perspective is an important determinant of individual attitudes, education influences the attitudes by changing the person's perspective (Gabennesch, 1972; Roof, 1974). Education "broadens, multiplies, and diversifies" one's sociocultural perspective (Gabennesch, 1972:858). Education does so by exposing the person to "new dimensions of reality" and "new and modified outlooks on the world" through which the person recognizes a wide range of perspectives (Gabennesch, 1972:858).

Enrollment in courses that expose students to social theories is likely to influence their outlook. Specifically, the fields of social science and humanities teach students various facets of reality in and outside their home country. Students learn about foreign countries' politics, culture, religion, and history. They are also introduced to several perspectives and educated to approach issues at hand from different angles. As students advance in these disciplines, they become more familiar with people from different backgrounds and more receptive to ideas outside their community and country. Furthermore, they are socialized to appreciate foreign cultures and their own in relative terms. Therefore, students who enrolled in substantive courses on social theories are more likely to develop inclusive views towards immigrants.

Prior studies have surmised that more educated individuals tend to be more pro-immigrant than those with lower educational attainment because they learn diversity-accepting perspectives (Bean, 1995; Betts, 1988; Chandler & Tsai, 2001; Haubert & Fussell, 2006). Although these studies report cosmopolitanism as a main component of immigrant attitudes, the education-cosmopolitanism-immigrant attitude link has not been adequately examined. For example, Bean (1995) and Chandler and Tsai (2001) use the level of education as a proxy measure of cosmopolitanism. In contrast, we examine how education promotes cosmopolitanism and then affects views on immigrants by

treating education and cosmopolitanism as distinct variables and shedding light on how various ideas are transmitted across different fields of study.

Isolationism In explaining trade preferences, Mansfield and Mutz (2009) found that isolationists tend to oppose free trade. While this pattern is also likely to be found in immigrant attitudes, isolationist views can be mitigated with increased exposure to cooperative ideas and other ideas covered in social science. As mentioned in the discussion on cosmopolitanism—and in contrast to natural, formal, and applied science, social science explores various aspects of foreign countries and international relations. Students in this discipline learn about reality outside their home countries that some might not have been aware of. They are also exposed to ideas incongruent with isolationism, such as interdependence, cooperation, and egalitarianism. From these learnings, students might accept the necessity and desirability of involvement in other states' matters, accordingly being more supportive of people coming from foreign countries.

Combined together, we expect enrollment in substantive courses on social theories to be positively associated with pro-immigrant attitudes, as stated in H1. To test the ideational pathways linking the courses and pro-immigrant attitudes, we generate three testable hypotheses linking exposure to social theories with the two attitudinal variables. Exposure to social theories will increase cosmopolitanism (H2a) while decreasing isolationism (H2b). Given the expected effects of exposure to social theories, we also expect an indirect impact on immigrant attitudes via the two attitudinal mediators (H3).

We formally state our additional hypotheses as follows:

H2a Taking more courses on social theories will be positively associated with cosmopolitanism.

H2b Taking more courses on social theories will be negatively associated with isolationism.

H3 Taking more courses on social theories will indirectly increase pro-immigrant sentiment through isolationism and cosmopolitanism.

Research design

Thus far, we have argued that not all ideas learned in post-secondary education promote pro-immigrant sentiment. Specifically, we expect courses on social theories will expose students to liberal ideas that will, in turn, lead to favorable attitudes toward immigrants. We have also discussed how these substantive courses might affect immigrant attitudes through cosmopolitan views and isolationism. Testing whether the exposure to different ideas from courses generates divergent immigration attitudes is empirically challenging due to potential selection effects. Analogous to the selection effects associated with educational attainment, individual-level unobservables associated with self-selecting into certain courses may confound the empirical association of social theory-based courses and positive views toward immigrants. For example, suppose individuals who are drawn

to social science based on academic interests (or other personal interests) are more likely to enroll in social science courses. In that case, the courses' impact on immigrant attitudes becomes more difficult to discern.

Admittedly, we do not overcome the identification problem in this article and, accordingly, discuss our results in terms of empirical associations. However, we leverage the rigid higher education system in South Korea with the intent of reducing potential bias associated with students choosing to be exposed to particular ideas (self-selection). Unlike many Western countries (Europe and the United States), where much of the research on pro-immigrant sentiment has been conducted thus far, South Korea maintains a traditional national exam system for entry into degree programs in university. The exam-based system strongly incentivizes students to select their university, degrees, and classes based on their exam scores and not simply personal interest.

Case study: South Korea

Koreans' investment in education, from primary to tertiary levels, is significantly higher than in most OECD countries.[6] The proportion of young adults with tertiary education in Korea is also higher compared to other OECD member countries. This emphasis on education is deeply rooted in the shared belief that earning a university degree from top universities—such as Seoul National University, Korea University, and Yonsei University—is crucial for socioeconomic mobility. This belief maintains a rigid, hierarchical order among higher education institutions in Korea whereby students are individually ranked by their academic abilities (Kim, 2008:242).

The screening process for university entrance generally comprises high school transcripts, the CSAT (College Scholastic Ability Test), and university exams (Higher Education, n.d.). The CSAT has been a common requirement for university application, although universities are permitted to set their own admission criteria (Kwon et al., 2017:66-67; Higher Education, n.d.). The CSAT is administered once a year and makes up a crucial portion of the university admission process. As such, students who earn the highest scores on the CSAT attend the most prestigious programs at the most prestigious universities. Because CSAT scores are a deciding factor for university admission, dissatisfied test-takers regularly choose to postpone entering university in the hopes of achieving better results the following year. In the CSAT administered in 2019, 28.3% of applicants were re-takers (Kim, 2019).

Compared to many Western countries, Korean high school students typically choose both major and university when applying for entrance. As such, students regularly compromise on their academic paths, choosing "safety" programs to attend more prestigious universities. This tendency has been reported in several studies. For example, Kwon et al. (2017: 74) point out that "For Korean students, the CSAT score is the first priority to consider when selecting which university to enter and what to major in, rather than their academic interests or aptitude. Even after entering colleges, many students still struggle to search for their career path, because students often choose their major based on the CSAT score that satisfies the admission requirement to the program, rather than choose the major they are interested in or like." Similarly, in a survey of the determinants of

[6] Korea in Education at a Glance, OECD Technical Report 2019 (OECD, 2019).

Korean students' college majors and career plans, Han (2018: 118) found that the decisions of majors are secondary to university selection.

We provide a running example for readers unfamiliar with the Korean education system. Yonsei University is one of the three most prestigious universities, known for its excellence in the fields of Medicine, Business, and Economics. Students with the top percentile scores on the CSAT can get into the fields of Medicine, Business, and Economics at Yonsei University. If students' CSAT scores are very high but just below the top percentile, they have a high chance of getting accepted for liberal arts majors, such as Media & Communication, Political Science & International Relations, Korean Language & Literature, and Education. Natural science majors, such as Dentistry, Chemical & Biomolecular Engineering, Computer Science, Mathematics, and Physics, are also available for those students with very high CSAT scores. Students with relatively lower scores on the CSAT may get accepted into Theology, Biochemistry, Architectural Engineering, Astronomy, and Food & Nutrition at Yonsei University. We provide a more extensive list of universities and majors in the Appendix.

We leverage this aspect of the Korean education system to mitigate selection effects associated with exposure to social theories and immigrant attitudes. To be clear, it is not to say that Korean students ignore their personal interests when deciding programs and majors. Our emphasis is that due to the high value attached to top universities, Korean students' college majors often do not reflect academic interest. In our population-based survey in Korean, we asked respondents if they selected their majors based on their personal interest in the academic field or their CSAT scores. We examine whether the direct and indirect impacts of courses on social theories introducing socially inclusive ideas on pro-immigrant attitudes are observed among respondents who selected majors based on exam scores and not personal interest in the subjects. Our expectation is that individuals who take courses on social theories, even those who chose their field of study based on exam scores, are more likely to express pro-immigrant sentiment than those who do not take these courses.

Lastly, we wish to provide readers with some context on the type of immigrants working in Korea. Like many advanced democracies (OECD countries), Korea has seen a high influx of low-skilled foreign workers compared to high-skilled ones. According to "Immigration Statistics" (Ministry of Justice, 2022), the number of low-skilled foreign workers in Korea between 2017 and 2021 was 8-11.6 times higher than that of professional foreign workers (Table 1). Data from the Survey on Immigration Status and Employment by Statistics Korea and the Ministry of Justice show that between 2012 and 2022, foreigners without college degrees accounted for 69-77% of the economically active foreigners (Statistics Korea, 2022).

Survey data

We conducted a population-based survey in South Korea through Macromill Embrain from December 16 to 20 in 2019. Macromill Embrain is a Korean polling firm with the most extensive online research panel in Korea. Our sample comprises adults (19 years or above) who resided in Korea at the time of the survey. The firm identified panelists who met these two criteria from its own panel and distributed invitation emails to the survey to them (N = 20,184). 25.76% accessed the survey. Among the panelists who accessed the survey, 33.95% completed the survey (N = 1765). 1660 responses were analyzed for the

Table 1 Types of immigrants in Korea

Worker Type	2017	2018	2019	2020	2021
Professional	47,404	46,851	46,581	43,258	45,143
Unskilled	534,076	548,140	520,680	409,039	361,526

Source Ministry of Justice, Republic of Korea. (2022). "Immigration Statistics."

study, excluding ineligible and partially completed surveys. Participants were randomly recruited from the firm's panel. They were selected by residence area (province-level), age, and gender in proportion to the national census. Our sample statistics are similar to the population census, except that our sample is younger and more educated (Statistics Korea, 2021). However, given the scope of our study, we are more narrowly interested in only respondents who took at least some courses in college.

Our survey instrument included several batteries covering basic demographics, general attitudinal questions about immigrants, and questions about coursework. We included two indexes designed to measure respondents' isolationist attitudes and cosmopolitan views. Below we describe all variables used in the analysis. We provide a translated version of the survey questions for the control variables in the Appendix.

Dependent Variable: Pro-Immigrant Sentiment We use seven immigrant survey questions for our dependent variable, *Pro-Immigrant Sentiment*. Respondents received the following prompt after completing demographic questions, "Do you strongly agree, somewhat agree, neither agree nor disagree, somewhat disagree, or strongly disagree with the following statements about immigrants in Korea." Respondents were given seven items measuring immigrant sentiment, and we list them in Table 2 for the reader and include the distributions for each item in the Appendix. All item responses are bunched around the neutral category and sparsely distributed in the "strongly agree/strongly disagree" categories. The average item response rate for strongly agree (in a pro-immigrant direction) was extremely low, with 2.66 percent of respondents. Given the limited variation, we code each item "1" if respondents strongly agreed or somewhat agreed to pro-immigrant statements and "0" if otherwise.[7] Then we sum the total number of ones across the seven items to construct our pro-immigrant sentiment index. The index ranges from 0 to 7.

We present the distribution of our index in Figure 2. It is worth noting that our sample is heavily skewed toward anti-immigrant attitudes, with nearly 50 percent of the sample coded as a 0 or 1. The sample mean is 1.91. Similarly, Shim and Lee (2018: p.197) report anti-labor immigrant attitudes in Korea, Japan, and Taiwan (the major destination countries in Asia).

Measures of Exposure to Ideas: Social Science, Arts & Humanities, Math & Science, and Engineering Classes One of the shortcomings of the literature is using education levels as a proxy of learned ideas. Our study uses enrollment in courses as a proxy measure for exposure to ideas. Following prior studies, we use enrollment in *Social Science Classes* and *Arts & Humanities Classes* as proxy measures of exposure to socially inclusive ideas.[8] *Math &*

[7] DiStefano et al. (2021) show that collapsing categories on sparsely distributed (less than four percent at the extreme categories) Likert scales yields a more accurate estimation of parameters than treating sparse data as continuous measures.

[8] See Chandler and Tsai (2001), Betts (1988), Guimond et al. (1989a, 1989b), Guimond and Palmer (1990, 1996), Hainmueller and Hiscox (2006), Lipset (1982), Elchardus and Spruyt (2009), Hanson et al. (2012), and Selznick and Steinberg (1969).

Table 2 Pro-immigrant sentiment index

'item1'	Immigrants enrich our culture
'item2'	Immigrants increase crime (reversed coding)
'item3'	Immigrants increase unemployment (reversed coding)
'item4'	Immigrants help solve the problem of Korea's aging population
'item5'	Immigrants play an important role in increasing tolerance and understanding of other countries /cultures /communities
'item6'	The government should provide immigrants with more rights (e.g., labor rights)
'item7'	The government should increase the number of immigrants coming in to live in Korea each year

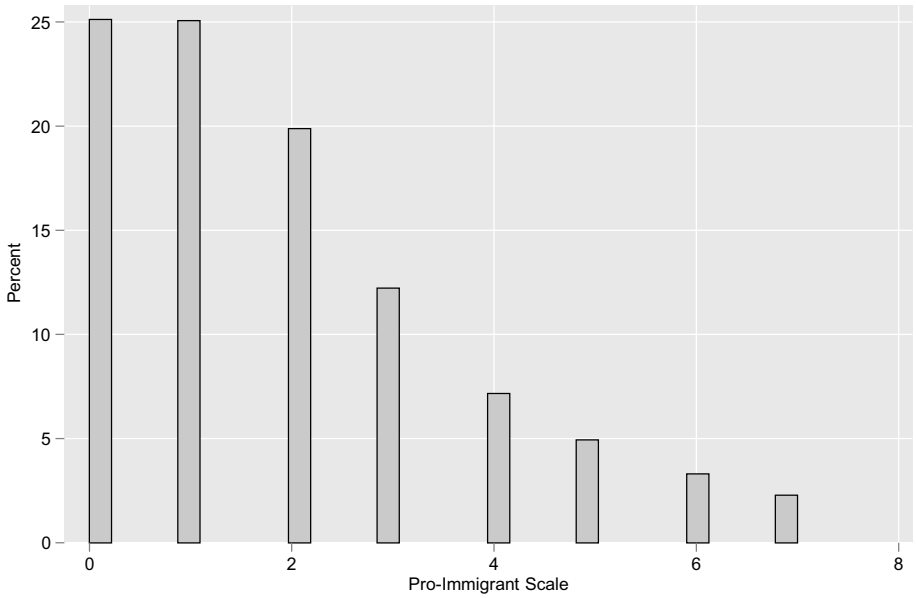


Fig. 2 Histogram of Pro-Immigrant Sentiment

Science Classes and *Engineering Classes* serve as proxy indicators of courses that provide limited exposure to social theories. In our survey, we asked respondents, "During college, how many courses did you take in [social sciences / arts & humanities / math & science / engineering]?" Responses to these questions were (1) "none," (2) "some," and (3) "many."

While we include all course measures in our statistical analysis, our primary independent variables of interest are social science and arts & humanities courses. Responses to the math & science and engineering questions offer an informal robustness check on our results. Theoretically, we do not have strong priors for how math & science or engineering courses would increase or decrease pro-immigrant sentiment because these courses do not generally study social theories. Hence, the positive association between enrolling in social science and arts & humanities courses and pro-immigrant sentiment would provide evidence in support of the ideational hypothesis, while the positive association between all the four course measures and pro-immigrant sentiment would be confounding, perhaps indicating that our measures are proxying skill, or possibly other factors, unrelated to ideas.[9]

[9] We present the distributions for course enrollments in the Appendix.

Attitudinal Mediators: Cosmopolitanism and Isolationism We use two indexes to measure our attitudinal mediations. Our first index, *Cosmopolitanism*, is comprised of six widely used questions tapping the extent to which respondents follow and appreciate diverse cultures. The second index, *Isolationism*, uses four common items measuring respondents' attitudes toward foreign policy, along with an interventionist-isolationist dimension. We include the individual question items for these indexes in the Appendix. We perform principal component factor analysis to combine the items from each of the indexes.

Control Variables We include a sparse set of control variables to reduce the potential risk of post-treatment bias in the analysis.[10] *Age* is a five-category variable. *Female* is a dummy variable with "0" representing men and "1" representing women. We include a four-point measure for *Educational Level*: (1) high school diploma or lower; (2) some college; (3) 4-year degree; and (4) graduate school degree or equivalent.

Modeling Strategy We estimate the direct effect of course enrollment on pro-immigrant sentiment and the indirect effects of enrollment via isolationism and cosmopolitanism using seemingly unrelated regression (SUR) models. Akin to structural equation models, SUR models offer a flexible and asymptotically efficient way to estimate models with multiple mediators (Preacher & Hayes, 2008; Zellner, 1962). Our SUR model consists of three linear OLS models. In the first two models, the two mediators serve as the dependent variables, and course enrollment and the control variables are located on the right-hand side of the linear equation. In the final model, pro-immigrant sentiment serves as the dependent variable, while course enrollment, the mediators, and the control variables are located on the right-hand side of the equation. We estimate the direct and indirect effects of course enrollment on immigrant sentiment using Baron and Kenny's (1986) approach: the attitudinal measures (isolationism and cosmopolitanism) were regressed on course enrollment and the control variables, and pro-immigrant sentiment was regressed on the attitudinal measures, course enrollment, and the control variables.

In their research on the socialization effects of academic disciplines, Elchardus and Spruyt (2009: 457) note, "The selection effects are very strong. There clearly is a relationship between the sociopolitical attitudes students have before embarking on higher education and the academic disciplines they select…Further research concerning the relationship between academic disciplines and sociopolitical attitudes should therefore focus on the processes of selection." Taking this point seriously, we believe Korea's rigid education system and emphasis on education offer desirable attributes for examining the ideational hypothesis. Specifically, the national exam system and fierce competition during the university admission process reduce the selection effect. Yet, it would be mistaken to assume that exam scores are the sole driver of major selection. Certainly, like in other countries, several factors, such as academic interests and other unobservables, also play an important role in selecting majors. Thus, we cannot simply assume that major selection is exogenous to individuals' perspectives and values. In other words, there is still a concern that while our mediators are correlated with social science and arts & humanities courses, the proposed causal relationship could be endogenous.

[10] The descriptive statistics are reported in the Appendix.

We attempt to reduce the selection bias by using two survey questions about degree determination: "Did you select your major in university (that you could get accepted into) based on your national exam score?" and "Did you select your major in university (that you could get accepted into) based on your personal interest?." Among the 1431 respondents who reported taking college courses, 757 of those (52%) reported that they chose their university and majors based on their university entrance exam scores and not their personal interest.

We wish to remind the reader that our aim is modest, as we seek to explore the plausibility of the ideational hypothesis rather than confirming it. Despite our efforts to improve causal identification, it is important to discuss two caveats related to the data and our modeling strategy. First, mediation analysis requires several assumptions (sequential ignorability, exogeneity) that may not be met with our research design. Thus, our results should be interpreted strictly as empirical associations. Second, while we believe our approach of using course enrollment as a proxy for ideas is novel, post-treatment bias (e.g., life events, social interactions, and shifts in ideology that can occur after university) remains a serious concern, and one that we cannot fully overcome in our design. We return to this discussion in the conclusion.

Empirical results

Table 3 presents our mediation model results using seemingly unrelated regressions (SUR). Columns 1 and 2 show the results of cosmopolitanism and isolationism as the dependent variables, respectively, while controlling for demographics (female, age, education level) as covariates. In column 3, we report the results of pro-immigrant sentiment with cosmopolitanism, isolationism, and the same three covariates included as right-hand side variables. Notably, in column 3, the coefficients on both attitudinal mediators are in the direction as expected based on the literature and statistically significant; a statistically significant and positive coefficient for cosmopolitanism and a statistically significant and negative coefficient for isolationism.

Our results show a positive and significant relationship between enrolling in social science courses and pro-immigrant sentiment (0.210). To provide substantive interpretation, comparing someone who has taken no social science courses (social science classes $= 1$) to someone who has taken many social science courses (social science classes $= 3$), our model predicts a 0.42-point increase in pro-immigrant sentiment. This corresponds to a 22 percent increase over the sample mean. This result is consistent with H1, which predicts that respondents who take more courses on social theories are more likely to express pro-immigrant sentiment. We also expected arts & humanities courses would exhibit a similar effect to that of social science courses, but our findings are notably weaker. Although enrolling in arts & humanities courses is positively correlated with pro-immigrant sentiment, the coefficient size is half that of social science courses and is not statistically significant.

Consistent with H2a and H2b, our results in columns 1 and 2 show that enrollment in social science courses is positively associated with cosmopolitanism (0.077) and negatively associated with isolationism (-0.127). Results from the Sobel-Goodman mediation tests of the indirect effect are statistically significant at the 0.05 level, providing support

Table 3 Estimates of cosmopolitanism, isolationism, and pro-immigrant sentiment

	Cosmopolitanism	Isolationism	Pro-Immigrant Sentiment
Social science classes	0.077 +	−0.127**	0.210*
	(0.042)	(0.041)	(0.093)
Arts & humanities classes	0.145***	−0.049	0.082
	(0.044)	(0.042)	(0.096)
Math & science classes	0.054	−0.073	−0.053
	(0.047)	(0.045)	(0.102)
Engineering classes	0.005	0.035	0.021
	(0.038)	(0.037)	(0.084)
Female	0.056	0.079	−0.505***
	(0.059)	(0.056)	(0.128)
Age	0.045*	−0.178***	0.031
	(0.022)	(0.022)	(0.051)
Education level	−0.056	−0.099*	0.140
	(0.049)	(0.047)	(0.107)
Cosmopolitanism			0.645***
			(0.082)
Isolationism			−0.591***
			(0.086)
Constant	3.162***	1.119***	−1.091*
	(0.179)	(0.171)	(0.490)
R^2	0.029	0.137	0.218
N	757	757	757
F	3.214***	16.963***	23.125***

Statistical significance denoted as: $+p < 0.1$; $*p < 0.05$; $**p < 0.01$; $***p < 0.001$

for the explanation that the attitudinal variables (cosmopolitanism and isolationism) mediate the effect of social science courses on pro-immigrant sentiment.[11]

Regarding the other course enrollments, only arts & humanities is found to be a significant predictor of one of our attitudinal variables, with greater enrollment in courses being positively associated with cosmopolitanism (0.145). Enrollments in engineering and math & science do not produce any statistically significant results.

Overall, our results are largely consistent with our expectations. Enrollment in social science classes is positively associated with pro-immigrant sentiment, even after accounting for the mediators, indicating a statistically significant direct effect. Similarly, social science classes is positively associated with cosmopolitanism and negatively associated with isolationism. The total indirect effect of enrollment in social science courses on pro-immigrant attitudes is positive and statistically significant at the 0.05 level. Again, we find that enrollment in arts & humanities is only weakly correlated with cosmopolitanism.

Finally, turning to testing H3, which suggests that taking more courses on social theories will indirectly increase pro-immigrant sentiment through isolationism and

[11] Results from the Sobel-Goodman can be found in the supplemental material.

Table 4 Estimates of direct and indirect effects of course enrollment on pro-immigrant sentiment

	Social Science	Arts & Humanities
Indirect via cosmopolitanism	0.050 +	0.093**
	(0.028)	(0.030)
Indirect via isolationism	0.075**	0.029
	(0.026)	(0.025)
Total indirect effect	0.125***	0.122**
	(0.042)	(0.043)
Direct effect	0.210*	0.082
	(0.092)	(0.095)
Total effect (direct + indirect)	0.334***	0.204*
	(0.100)	(0.103)
Ratio of indirect to direct	0.595	1.50
Proportion of total effect mediated	0.373	0.60
N	757	757

Statistical significance denoted as: $+p < 0.1$; $*p < 0.05$; $**p < 0.01$; $***p < 0.001$

cosmopolitanism, we use the results from our SUR model to estimate the direct and indirect effects of social science courses. Table 4 presents our indirect and direct results. The indirect effects of enrollment in social science courses via both mediators, cosmopolitanism (0.050) and isolationism (0.075), are positive and statistically significant, indicating support for H3. The additive total effect of social science classes on pro-immigrant sentiment is 0.334, or 0.373 of the proportion of total effect mediated.

In the Appendix, we check the robustness of our results using a variety of procedures: using a different measure of pro-immigration sentiment (a latent variable from factor analysis); analyzing the entire sample, including those who selected their major and university based on interest; restricting the sample to only those who majored in business, engineering, medicine, or science; adding more covariates to the analysis; and using majors instead of classes to measure exposure to ideas.

Analysis of individual components of pro-immigrant sentiment

Our measure of pro-immigrant sentiment contains several survey items touching on different aspects of immigrant sentiment. Although the results from our factor analysis show that all items are tapping into the same underlying latent variable, we disaggregate the dependent variable into three additive indexes based on the substantive content of the items.[12] We create a cultural variable by adding together item 1 'Immigrants enrich our culture' and item 5 'Immigrants play an important role in increasing tolerance and understanding of other countries /cultures /communities' (ranging between 0 and 2). We combine item 6 'The government should provide immigrants with more rights (e.g., labor rights)' and item 7 'The government should increase the number of immigrants coming in to live in Korea each year' to create a policy variable (ranging between 0 and 2). Lastly, we combine item 2 'Immigrants increase crime,' item 3 'Immigrants increase unemployment,' and item 4 'Immigrants help solve the problem of Korea's aging population' to create a

[12] See the Appendix for more information on the factor analysis results.

Table 5 Estimates of individual components of pro-immigrant sentiment

	Cultural (Items 1 & 5)	Policy (Items 6 & 7)	Socio-Economic (Items 2–4)
Social science classes	0.094*	0.074*	0.042
	(0.043)	(0.034)	(0.049)
Arts & humanities classes	0.023	0.015	0.044
	(0.044)	(0.035)	(0.050)
Math & science classes	−0.006	−0.014	−0.033
	(0.047)	(0.037)	(0.053)
Engineering classes	−0.032	0.055+	−0.002
	(0.039)	(0.031)	(0.044)
Female	−0.174**	−0.181***	−0.150*
	(0.059)	(0.047)	(0.068)
Age	−0.002	0.040*	−0.007
	(0.024)	(0.019)	(0.027)
Education level	0.004	0.033	0.103+
	(0.049)	(0.039)	(0.057)
Cosmopolitanism	0.276***	0.134***	0.234***
	(0.038)	(0.030)	(0.043)
Isolationism	−0.217***	−0.152***	−0.222***
	(0.039)	(0.031)	(0.045)
Constant	−0.243	−0.499**	−0.349
	(0.226)	(0.178)	(0.258)
R^2	0.162	0.142	0.115
N	757	757	757
F	16.093***	13.749***	10.777***

Statistical significance denoted as: $+p < 0.1$; $*p < 0.05$; $**p < 0.01$; $***p < 0.001$

socio-economic category (ranging between 0 and 3). Items 2-4 encompass a broad range of topics, but generally speak to economic and social concerns related to immigration.

We re-run our analysis using the same modeling strategy and specification used above. We present the direct-effect results for the individual components of pro-immigrant sentiment (that is, cultural, policy, and socio-economic dependent variables) in Table 5. We omit the regression results for cosmopolitanism and isolationism since those results remain unchanged when using different measures for pro-immigrant sentiment.

Broadly, the results for the individual components align with the main results. However, there are two notable differences worth mentioning. First, in the socio-economic model, the coefficient on social science classes is positive but not significant, indicating no direct effect. In fact, the coefficient is less than half the size compared to the cultural model. We are cautious about overly interpreting the results since we are dealing with a thin degree of variation. Our findings suggest that the empirical association between social science courses and pro-immigrant sentiment may be more related to the cultural tolerance and understanding component of education in these courses and less about specific socio-economic knowledge about immigrants. Second, looking at the policy model, we surprisingly find a weak direct effect of engineering courses that is positively associated with pro-immigrant policies. This finding cannot be adequately explained within our theoretical model, and thus further investigation is needed to understand this unexpected relationship.

Table 6 Direct and indirect effect estimates of course enrollment on pro-immigrant sentiment

	Cultural (Items 1 & 5)		Policy (Items 6 & 7)		Socio-Economic (Items 2-4)	
	Social Science	Arts & Humanities	Social Science	Arts & Humanities	Social Science	Arts & Humanities
Indirect indirect via cosmopolitanism	0.021 +	0.040**	0.010 +	0.019**	0.018 +	0.034**
	(0.011)	(0.013)	(0.006)	(0.007)	(0.010)	(0.012)
Indirect via isolationism	0.027**	0.011	0.019**	0.008	0.028*	0.011
	(0.010)	(0.009)	(0.007)	(0.007)	(0.011)	(0.010)
Total indirect effect	0.050**	0.051**	0.030**	0.027*	0.046**	0.045**
	(0.017)	(0.017)	(0.010)	(0.010)	(0.016)	(0.016)
Direct effect	0.094*	0.022	0.074*	0.015	0.042	0.044
	(0.042)	(0.044)	(0.034)	(0.035)	(0.049)	(0.050)
Total effect (direct + indirect)	0.143**	0.073	0.103**	0.042	0.088 +	0.089 +
	(0.045)	(0.047)	(0.035)	(0.036)	(0.050)	(0.052)
Ratio of indirect to direct	0.657	2.32	0.405	1.8	1.10	1.022
Proportion of total effect mediated	0.397	0.699	0.288	0.643	0.523	0.506

Statistical significance denoted as: $+p < 0.1$; $*p < 0.05$; $**p < 0.01$; $***p < 0.001$

We present our estimates of indirect and total effects in Table 6. Similar to the main results, the total indirect effects of social science and arts & humanities classes are positive and statistically significant. We also find that social science classes produces statistically significant total (indirect and direct) effects across the three components of pro-immigrant sentiment. However, the total effect of arts & humanities classes is only significant for the socio-economic component. We do not report the results for engineering and math & science classes since the indirect effect and total effects are not statistically significant.

Conclusion

In the context of the ongoing debates about immigration attitudes, there appears to be some general agreement that formal education socializes immigrant sentiment in a positive direction. Building on the ideational hypothesis, this article has sought to examine the types of ideas that promote pro-immigrant attitudes. In doing so, we have also addressed three important shortcomings of the extant literature on immigration attitudes. First, we argued that the types of ideas introduced to students during higher education affect immigrant attitudes. Using enrollment in social science and arts & humanities classes as measures of social theories and our original data from a survey sample of South Koreans, we found a positive and consistent association between social science courses and pro-immigrant attitudes. Interestingly, we find that enrollment in arts & humanities to be a poor predictor of immigrant sentiment. With the exception of indirectly affecting via cosmopolitanism, arts & humanities courses have no effect on immigrant sentiment. Courses that do not substantively cover social theories (like engineering and math & science) were uncorrelated with respondents' attitudes toward immigrants. Second, we presented a theoretical model that brings ideational-based theories of pro-immigrant sentiment and attitudinal-based explanations into a single, coherent framework. Our results indicate that social

science courses have a statistically significant direct effect on support for immigrants when attitudinal measures are omitted in the models. Additionally, we find an indirect effect of social science courses on pro-immigrant attitudes when they are included. Last, our research design attempts to isolate the effect of being exposed to socially inclusive ideas from unobservables related to potential selection effects associated with individuals' self-selecting into their fields of study. Using the Korean sample, we separated individuals who selected majors based on university entrance exam scores and those who selected majors based on personal interest in the subject. We found that social science courses' positive impacts on pro-immigrant sentiment are observed among those who chose majors based on university entrance exam scores.

In analyzing the relationship between higher education and immigrant attitudes, we have focused on a particular function of education: the transmission of information and knowledge to students. This brings us to suggestions for future research. As De Witte (1999: 65-66) proposes, education influences individual attitudes by promulgating values, developing sophisticated critical thinking skills, and offering resources that are valuable for job seeking in addition to transmitting information and knowledge. To have a full understanding of the causal linkages connecting education and immigrant attitudes, it is worth exploring whether the impact of courses on social theories also operates through the other educational processes and which process plays a greater role in changing immigrant attitudes. For example, prior work has shown that socialization can occur through peer and instructor effects (Gross & Fosse, 2012; Klein et al., 2005) in the classroom and through differences in pedagogical styles. We do not test for these alternative channels. Relatedly, we recommend that future work use different attitudinal mediators. We used isolationism and cosmopolitanism. There are other attitudinal variables that are also associated with opinions on immigrants. For example, Macdonald (2021) identifies authoritarianism, egalitarianism, and moral traditionalism as determinants of attitudes toward immigrants. Together with examining the other educational processes, using different mediators would offer important insights into factors affecting views on immigrants and linkages of education and the factors.

Finally, and perhaps most importantly, future research in this area needs to develop creative research designs to disentangle the effects of exposure to ideas from the effects of self-selection while also reducing post-treatment bias. We purposively selected South Korea for our study because many Koreans tend to choose their areas of study based on their exam scores, thus partially reducing the selection effect associated with students choosing studies based on pre-existing beliefs. However, we recognize that the effect of exposure is not cleanly identified in our design. Again, the purpose of our study is to explore the potential validity of the ideational hypothesis, not to confirm the theory. Our observational results are consistent with the hypothesis but still remain empirically suggestive, showing a correlation between types of classes, attitudinal mediators, and immigrant attitudes.

Future research should look for other country contexts or perhaps periods in time when self-selection into academic fields can be further removed from individuals' choices. In the same vein, scholars could study exposure to ideas at the university level. Some colleges and universities require their entire incoming cohort to take specific intro-level courses. Researchers could target these institutions and design a pre- and post-survey study. As a final suggestion, it may be possible to design a lab- or survey-experiment to isolate the effect of exposing participants to specific ideas. While we

think an experimental approach is feasible, randomized treatments need to be carefully planned in a way to capture the long-term process of socialization.

Appendix

Survey questions for control variables

Female Q: "What is your gender?" Response choices: (1) female; (2) male. Female is coded as "1" if a respondent selected female, and otherwise "0."

Age Q: "In what year were you born?" Recoded into 5-categories—(1) 20-29; (2) 30-39;(3) 40-49; (4) 50-59; (5) 60+.

Education Level Q: "What is the highest level of education you have completed?" Response choices: (1) no education; (2) completed elementary school; (3) completed middle school; (4) did not graduate from high school (attend / take time off / drop out); (5) high school graduate; (6) some 2- or 3- year college, but no degree (attend / take time off / drop out); (7) 2- or 3-year college degree; (8) some 4- or more year college, but no degree (attend / take time off / drop out); (9) 4- or more year college degree; (10) some post-college, but no degree (attend / take time off / drop out); (11) post-college graduate degree. Due to the lack of variation at the lowest levels of educational attainment, we collapsed the data into a four-point measure: (1) high school diploma or lower; (2) some college; (3) 4-year degree; and (4) graduate school degree or equivalent.

Tables and figures of variables

See Figs. 3 & 4 and Tables 7 and 8.

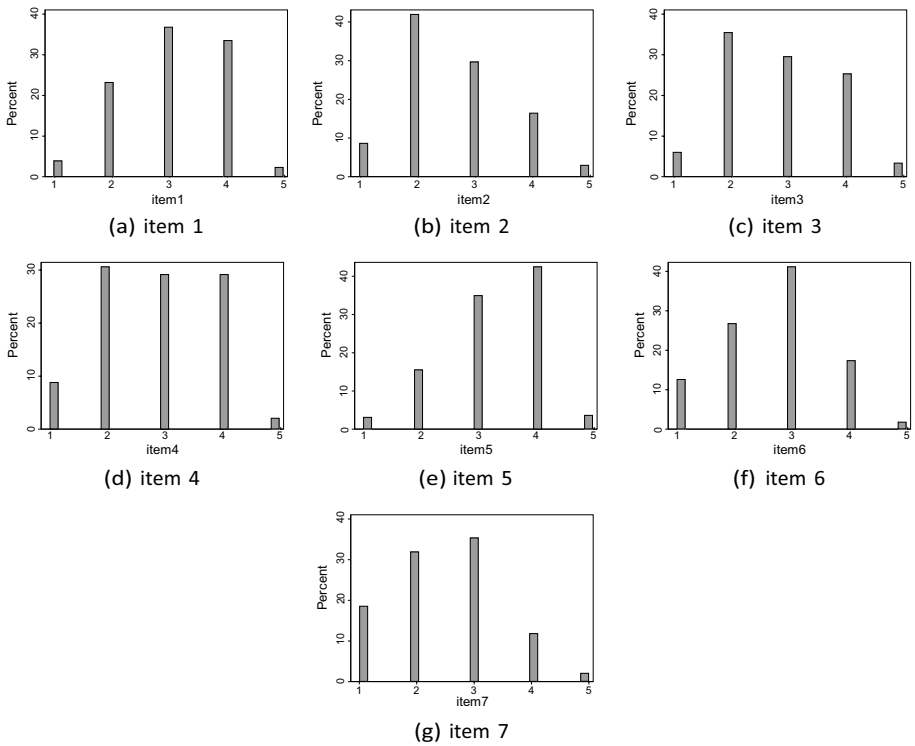
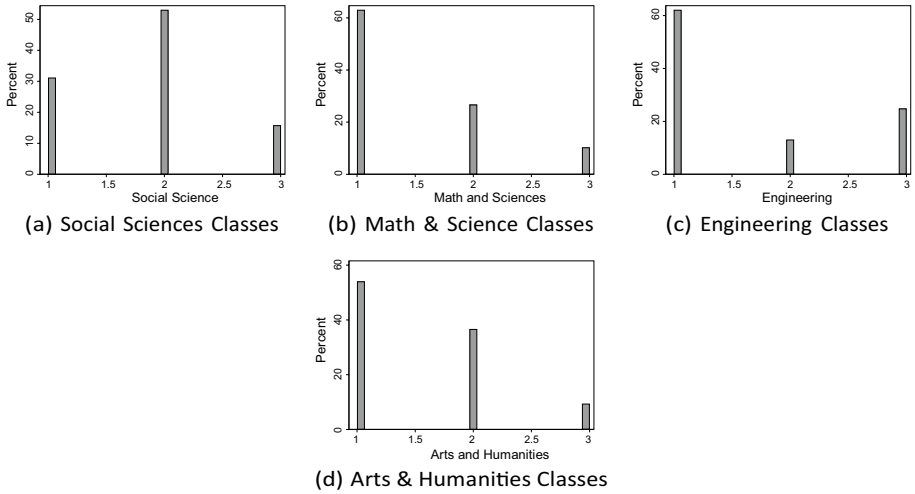


Fig. 3 Distribution of Pro-Immigrant Items



(a) Social Sciences Classes (b) Math & Science Classes (c) Engineering Classes

(d) Arts & Humanities Classes

Fig. 4 Distribution of Enrollment in Courses

Table 7 Table of descriptive statistics

Variable	Obs	Mean	Std. Dev	Min	Max
Pro-immigrant sentiment	1660	1.908	1.790	0	7
Social science classes	1431	1.846	0.668	1	3
Arts & humanities classes	1431	1.553	0.659	1	3
Math & science classes	1431	1.472	0.675	1	3
Engineering classes	1431	1.627	0.855	1	3
Isolationism	1660	0	2.434	0	4.042
Cosmopolitanism	1660	3.503	0.799	0	4.816
Education level	1660	2.59	0.851	1	4
Female	1660	0.480	0.500	0	1
Age (5-category)	1660	2.937	1.314	1	5
Unemployed	1660	0.066	0.248	0	1
Retired	1660	0.039	0.194	0	1
Income	1660	3.014	0.843	1	6
Married	1660	0.604	0.489	0	1

Table 8 Correlation of enrollment in courses

	Social Science	Arts & Humanities	Engineering	Math & Science
Social science	1			
Arts & humanities	0.1470	1		
Engineering	−0.2146	−0.1612	1	
Math & science	−0.0972	−0.0615	0.4798	1

Scales of attitudinal mediator variables and factor analysis

See Tables 9, 10, 11 and 12.

Table 9 Cosmopolitanism index

'item1'	I think reading about world events through newspapers, TV, and the Internet is worthwhile
'item2'	I am ready to learn about other cultures through listening, observation, thinking, and reflecting
'item3'	I think to be successful, one needs to be able to use materials, information, knowledge, etc., from other cultures
'item4'	I think if people have a positive attitude toward other communities, the world would be more peaceful
'item5'	I think I respect others' culture the way I respect mine
'item6'	I think it's good to spend time with people who are willing to talk and learn about other cultures

Responses to these questions were on a five-point Likert scale, ranging from "Strongly agree" to "Strongly disagree"

Table 10 Item-analysis: cosmopolitanism index

Item	Obs	Sign	Item-Test Correlation	Item-Rest Correlation	Average Interitem Covariance	Alpha
'item1'	1660	+	0.710	0.584	0.303	0.841
'item2'	1660	+	0.720	0.585	0.295	0.841
'item3'	1660	+	0.780	0.670	0.282	0.826
'item4'	1660	+	0.783	0.671	0.279	0.826
'item5'	1660	+	0.817	0.716	0.267	0.817
'item6'	1660	+	0.758	0.629	0.282	0.834
Test scale					0.285	0.855

Table 11 Isolationism index

'item1'	Korea should help poor countries in the world
'item2'	Korea needs to play an active role in solving conflicts around the world
'item3'	It will be best for the future of the country if we stay out of another country's conflict
'item4'	The Korean government should just try to take care of the well-being of Koreans rather than getting involved in other nations' affairs

Responses to these questions were on a five-point Likert scale, ranging from "Strongly agree" to "Strongly disagree"

Table 12 Item-analysis: isolationism index

Item	Obs	Sign	Item-Test Correlation	Item-Rest Correlation	Average Interitem Covariance	Alpha
'item1'	1660	+	0.701	0.447	0.271	0.636
'item2'	1660	+	0.771	0.559	0.222	0.564
'item3'	1660	−	0.703	0.447	0.269	0.636
'item4'	1660	−	0.700	0.430	0.271	0.648
Test scale					0.258	0.687

Additional covariates

See Table 13

Table 13 Model specification—additional covariates

	Cosmopolitanism	Isolationism	Pro-Immigrant Sentiment
Social science classes	0.078 +	−0.131**	0.218*
	(0.042)	(0.041)	(0.093)
Arts & humanities classes	0.157***	−0.060	0.083
	(0.044)	(0.042)	(0.097)
Math & science classes	0.051	−0.078 +	−0.047
	(0.047)	(0.045)	(0.102)
Engineering classes	−0.000	0.040	0.018
	(0.038)	(0.037)	(0.084)
Female	0.043	0.096 +	−0.508***
	(0.059)	(0.057)	(0.129)
Age	0.021	−0.163***	0.020
	(0.027)	(0.026)	(0.061)
Unemployed	−0.104	0.323**	−0.156
	(0.106)	(0.101)	(0.233)
Retired	0.104	0.006	−0.556
	(0.180)	(0.173)	(0.394)
Income	0.016	0.003	−0.009
	(0.011)	(0.011)	(0.025)
Married	0.081	−0.031	0.132
	(0.068)	(0.065)	(0.148)
Education level	−0.072	−0.095*	0.136
	(0.050)	(0.047)	(0.109)
Cosmopolitanism			0.643***
			(0.082)
Isolationism			−0.582***
			(0.086)
Constant	3.139***	1.056***	−1.061*
	(0.184)	(0.176)	(0.498)
R^2	0.037	0.150	0.222
N	757	757	757
F	2.600**	11.907***	16.277***

Statistical significance denoted as: $+p < 0.1$; $*p < 0.05$; $**p < 0.01$; $***p < 0.001$

Alternative dependent variable: factor analysis

See Tables 14, 15, and 16.

Table 14 Pro-immigrant sentiment index

'item1'	Immigrants enrich our culture
'item2'	Immigrants increase crime
'item3'	Immigrants increase unemployment
'item4'	Immigrants help solve the problem of Korea's aging population
'item5'	Immigrants play an important role in increasing tolerance and understanding of other countries /cultures /communities
'item6'	The government should provide immigrants with more rights (e.g., labor rights)
'item7'	The government should increase the number of immigrants coming in to live in Korea each year

Table 15 Item-analysis: pro-immigration index

Item	Obs	Sign	Item-Test Correlation	Item-Rest Correlation	Average Interitem Covariance	Alpha
'item1'	1660	+	0.607	0.397	0.043	0.650
'item2'	1660	+	0.527	0.336	0.048	0.666
'item3'	1660	+	0.563	0.357	0.046	0.661
'item4'	1660	+	0.597	0.390	0.044	0.652
'item5'	1660	+	0.634	0.417	0.042	0.645
'item6'	1660	+	0.622	0.453	0.044	0.636
'item7'	1660	+	0.580	0.427	0.047	0.646
Test scale					0.045	0.685

Table 16 Mediation model (DV: pro-immigrant sentiment (factor))

	Cosmopolitanism	Isolationism	Pro-Immigrant Sentiment
Social science classes	0.077 +	− 0.127**	0.081*
	(0.042)	(0.041)	(0.033)
Arts & humanities classes	0.145***	− 0.049	0.021
	(0.044)	(0.042)	(0.035)
Math & science classes	0.054	− 0.073	− 0.013
	(0.047)	(0.045)	(0.037)
Engineering classes	0.005	0.035	0.035
	(0.038)	(0.037)	(0.030)
Female	0.056	0.079	− 0.192***
	(0.059)	(0.056)	(0.046)
Age	0.045*	− 0.178***	0.046*
	(0.022)	(0.022)	(0.018)
Education level	− 0.056	− 0.099*	0.034
	(0.049)	(0.047)	(0.039)
Cosmopolitanism			0.169***
			(0.030)
Isolationism			− 0.168***
			(0.031)
Constant	3.162***	1.119***	− 0.965***
	(0.179)	(0.171)	(0.177)
R^2	0.029	0.137	0.175
N	757	757	757
F	3.214***	16.963***	17.645***

Statistical significance denoted as: $+p < 0.1$; $*p < 0.05$; $**p < 0.01$; $***p < 0.001$

Alternative measure to exposure to ideas

See Table 17.

Table 17 Academic majors—alternative measure to exposure to ideas

	Cosmopolitanism	Isolationism	Pro-Immigrant Sentiment
Social science	0.059	− 0.087	0.342 +
	(0.090)	(0.086)	(0.194)
Foreign languages	0.108	0.059	− 0.147
	(0.095)	(0.091)	(0.205)
Humanities	0.237 +	0.027	0.217
	(0.121)	(0.116)	(0.263)
Fine arts & music	0.126	0.244 +	− 0.273
	(0.151)	(0.145)	(0.327)
Female	0.061	0.045	− 0.474***
	(0.056)	(0.054)	(0.121)
Age	0.040 +	− 0.179***	0.031
	(0.023)	(0.022)	(0.051)
Education level	− 0.015	− 0.136**	0.166
	(0.048)	(0.046)	(0.104)
Cosmopolitanism			0.660***
			(0.082)
Isolationism			− 0.602***
			(0.085)
Constant	3.478***	0.868***	− 0.782 +
	(0.143)	(0.138)	(0.441)
R^2	0.015	0.124	0.216
N	757	757	757
F	1.575	15.087***	22.855***

Statistical significance denoted as: $+p < 0.1$; $*p < 0.05$; $**p < 0.01$; $***p < 0.001$

Different samples

See Tables 18 and 19.

Table 18 Estimating the effects of social science and arts & humanities among those who majored in business, medicine, science, and engineering

	Cosmopolitanism	Isolationism	Pro-Immigrant Sentiment
Social science classes	0.016	− 0.167**	0.283*
	(0.055)	(0.051)	(0.109)
Arts & humanities classes	0.170*	0.031	0.142
	(0.067)	(0.062)	(0.133)
Female	0.045	0.014	− 0.337*
	(0.070)	(0.065)	(0.139)
Age	0.025	− 0.173***	0.072
	(0.028)	(0.026)	(0.058)

Table 18 (continued)

	Cosmopolitanism	Isolationism	Pro-Immigrant Sentiment
Education level	−0.040	−0.021	0.096
	(0.058)	(0.054)	(0.114)
Cosmopolitanism			0.548***
			(0.089)
Isolationism			−0.466***
			(0.096)
Constant	3.279***	0.829***	−1.043*
	(0.197)	(0.183)	(0.504)
R^2	0.016	0.109	0.188
N	530	530	530
F	1.675	12.780***	17.213***

Statistical significance denoted as: $+p < 0.1$; $*p < 0.05$; $**p < 0.01$; $***p < 0.001$

Table 19 Full sample

	Cosmopolitanism	Isolationism	Pro-Immigrant Sentiment
Social science classes	0.084**	−0.098***	0.148*
	(0.032)	(0.029)	(0.066)
Arts & humanities classes	0.149***	−0.028	0.058
	(0.032)	(0.029)	(0.067)
Math & science classes	−0.022	−0.025	−0.031
	(0.035)	(0.032)	(0.072)
Engineering classes	0.027	0.005	0.044
	(0.030)	(0.027)	(0.061)
Female	0.117*	0.045	−0.484***
	(0.045)	(0.041)	(0.094)
Age	0.062***	−0.156***	0.051
	(0.017)	(0.015)	(0.036)
Education level	0.010	−0.069*	0.091
	(0.036)	(0.032)	(0.074)
Cosmopolitanism			0.560***
			(0.056)
Isolationism			−0.650***
			(0.062)
Constant	2.868***	0.873***	−0.629+
	(0.134)	(0.122)	(0.331)
R^2	0.039	0.098	0.205
N	1431	1431	1431
F	8.290***	22.137***	40.743***

Statistical significance denoted as: $+p < 0.1$; $*p < 0.05$; $**p < 0.01$; $***p < 0.001$

As an additional robustness test, we check our main results against the full sample of all 1,431 respondents who took college courses (Table 19).

Social science and humanities course content in Korea

In Fig. 5, we illustrate the goals of selected humanities and social science majors at Korean universities to show that courses offered in these fields contain ideas relevant to pro-immigration attitudes. We selected two majors for each field of study: History and Philosophy for humanities, and Political Science and Sociology for social science. The universities selected are Seoul National University, Sogang University, Konkuk University, and Chungang University, renowned universities in South Korea. Seoul National University is the most prestigious university in South Korea.

The curricula of these majors stress expanding and deepening students' knowledge in the respective field and relevant fields, broadening their perspectives, respecting diversity, and developing certain sets of skills (e.g., critical thinking and effective expression). For example, the Philosophy departments at Seoul National University and Sogang University are dedicated to teaching students modern philosophy and philosophical traditions from both the East and the West, and developing their philosophical thinking and expression skills. The Sociology department at Chungang University emphasizes understanding the complex nature of the class, labor, politics, family, women, and culture in the era of globalization, so it aims to equip students with relevant knowledge and analytical skills.

University and major ranking in Korea

Figure 6 displays rankings of selective universities and majors in the fields of liberal arts and natural science in South Korea based on 2019 CSAT scores. The rankings were determined using the 2019 college application reference tables created by Megastudy. This South Korean education firm created the reference tables based on 2019 CSAT scores and an analysis of their accepted students and university entrance exam results over the past five years.

This figure shows that SNU is ranked first and second with 16 majors in liberal arts, including Business, Political Science & International Relations, and Economics. KHU's natural science majors listed in the 5th rank include Biomedical Engineering, Information Display, Pharmacology, Chemistry, and Biology.

College applicants typically use this type of reference table to determine which universities and majors to apply for. To give an example, according to this figure, 6 universities (SNU, YU, KU, SGU, SKKU, and HYU) offer majors in Business. If students' CSAT scores are very high, they may want to consider applying to SNU (1st), YU (2nd), or KU (2nd). Otherwise, they may be better suited to applying to other universities, such as SGU, SKKU (4th), and HYU (5th). Referring to the second-ranking, even if students have an academic interest in Business and they can get accepted into either YU or KU, they may choose to apply to other majors at SNU (e.g., Consumer Science and History Education), if they aim to attend the most prestigious school.

	Humanities		Social Science	
University	History	Philosophy	Political Science	Sociology
Seoul National University	The department of Western History studies Western history by region and time period and examines major issues in history to enhance students' understanding of the development of Western culture and their historical thinking skills. Also, it explores the connections between Western, Eastern, and Korean history and their significance in world history.	The department conducts research on and teaches students modern philosophy and philosophical traditions from the East and the West. It aims to help students acquire comprehensive knowledge of philosophy while developing higher-level philosophical thinking and expression skills.	The department aims to nurture students who possess a macro perspective and professional knowledge based on the following principles: foster creativity, critical thinking, and knowledge of humanities and social sciences; emphasize fields exploring the interrelations between world politics and domestic politics; offer advanced courses in subfields.	The department examines human social relationships, from the small-scale interactions of everyday life to the global systems, in a scientific manner. It explores various fields within society and analyzes the structure of modern society while making predictions about future changes.
	https://whistory.snu.ac.kr/node/2	http://phil.snu.ac.kr/board/html/menu1/sub01_1.html	http://psir.snu.ac.kr/korean/undergraduate.php	https://sociology.snu.ac.kr/about/
Sogang University	History study explores the past experiences of individuals, societies, nations, and the world. In this era of rapid change, this study plays a critical role in identifying and anticipating the meaning and direction of human life. Its perspective and methodology help to understand the problems of human beings and society, establish the causal relationship of events, and collect, analyze, and interpret historical materials.	The department offers a range of courses aimed at enhancing students' philosophical insight, impressions, and worldviews. By exploring major philosophical issues and classics from both Eastern and Western philosophy, the department seeks to increase students' knowledge and develop students' philosophical thinking and expression skills.	Political science studies everything related to politics. It is an open discipline and requires a wide range of knowledge about social phenomena, so those who major in political science can see social phenomena from various perspectives. One important subfield within political science is International Politics, which focuses on political phenomena at the global level.	Sociology encompasses a diverse range of inquiry activities, from seeking solutions to social issues and building theories to illuminating the social underpinnings of human activity. The department also seeks to find policy alternatives for social issues by tracing different cultures and their interactions and examining the characteristics and effects of macroscopic changes.
	https://history.sogang.ac.kr/history/history01_2.html	https://philosophy.sogang.ac.kr/philosophy/philosophy01_1.html	https://politics.sogang.ac.kr/politics/politics01_1.html	https://sociology.sogang.ac.kr/sociology/sociology01_1.html
Konkuk University	The department aims to nurture historians who can discover and systematize the historical and cultural heritage of humanity and the nation, as well as experts, practitioners, and intellectuals in related fields. It prioritizes research and education on Korean history, while emphasizing Eastern and Western history and museum-related education to establish Korean history's status in world culture.	The department specializes in modern philosophy while studying a diverse range of Eastern and Western philosophies. The department's faculty members are actively involved in research and education that intersects with relevant disciplines and covers a wide range of research areas, meeting the academic needs of the present age in fields such as science, art, culture, psychology, and ecology.	The department is committed to deepening students' understanding of politics and state power within modern democratic societies and teaching domestic and international laws and systems. In addition, the department aims to broaden their perspectives and knowledge of the world through various programs, such as mock United Nations competitions.	None.
	https://khistory.konkuk.ac.kr/html.do?siteId=KHISTORY&menuSeq=8764	http://philo.konkuk.ac.kr/html.do?siteId=PHILO&menuSeq=8636	https://kupol.konkuk.ac.kr/html.do?siteId=POL&menuSeq=7903	
Chungang University	History offers crucial wisdom and perspective for a profound comprehension of the present and prospects for the future. It also provides valuable knowledge and information that are necessary for the cultural era of the 21st century.	The department seeks to nurture: (1) independent thinkers who are not bound by the authority through extensive and deep philosophical deliberation, (2) creative students who have a comprehensive understanding of science, ethics, and art, (3) individuals who can serve communities, and (4) open-minded individuals who embrace the traditions and ideas of all times and places and respect cultural diversity.	The department seeks to enable students to build a global perspective and contribute to national and global development using their knowledge of political science and social science. In particular, it aims to develop analytical thinking, effective communication, creative problem-solving, and specialized expertise. These competencies are fostered with community spirit and passion.	The department equips students with professional knowledge and analytical skills to examine and understand the complex nature of and change in class, labor, politics, family, women, and culture, which arise from social changes brought about by globalization, the rise of the information society, and the growth of service industries.
	http://history.cau.ac.kr/02_info/info_01a.asp	http://spacl.dsso.kr/sub1_1.php	http://politics.cau.ac.kr/01_info/info_02a.php	https://sociology.cau.ac.kr/01_info/info_01a.php

Note: This figure illustrates the goals of selected humanities and social science majors at four Korean universities: History, Philosophy (Humanities), Political Science, and Sociology (Social Science). The website for each major can be found at the bottom of its corresponding cell.

Fig. 5 Humanities and Social Science in Korea

	Liberal Arts	Natural Science
1	<**SNU**: Business, Political Science & International Relations, Economics, Psychology, Agricultural Economics & Rural Development, Sociology>	<**SNU**: Medicine> <**YU**: Medicine> <**CUK**: Medicine> <**SKKU**: Medicine> <**KU**: Medicine> <**GCU**: Medicine> <**HYU**: Medicine> <**KHU**: Medicine>
2	<**SNU**: Consumer Science, History Education, English Language Education, Child Development & Family Studies, Geography, Korean Language Education, Social Welfare, Social Studies Education, Geography, Education> <**YU**: Business, Economics> <**KU**: Business, Economics, Public Administration>	<**SNU**: Mechanical Engineering, Computer Science, Electrical & Computer Engineering, Chemical & Biological Engineering, Materials Science & Engineering, Industrial Engineering, Biological Sciences, Chemistry, Physics> <**AJU**: Medicine> <**EWW**: Medicine> <**CAU**: Medicine> <**YU**: Dentistry> <**IHU**: Medicine> <**DKU**: Medicine> <**DU**: Medicine> <**KU**: Cyber Security> <**KHU**: Dentistry, Korean Medicine> <**EJU**: Medicine>
3	<**YU**: Media & Communication, Statistics & Data Science, Public Administration, Psychology, Sociology, Political Science & International Relations, English Language & Literature, History, Korean Language & Literature, Library & Information Science, Cultural Anthropology> <**KU**: Statistics, Media & Communication, Political Science & International Relations, Psychology, Korean Language Education, Education, English Language & Literature, Sociology, English Language Education, History Education, Food & Resource Economics> <**SKKU**: Global Business Administration>	<**SNU**: Mathematics Education, Aerospace Engineering, Applied Biology & Chemistry, Astronomy, Chemistry Education, Architecture, Nuclear Engineering, Civil & Environmental Engineering, Biology Education, Food & Animal Biotechnology, Physics Education, Fashion & Textiles, Nursing> <**GCU**: Korean Medicine> <**YU**: Chemical & Biomolecular Engineering, Computer Science, Electrical & Electronic Engineering, Mechanical Engineering, Mathematics, Physics, Materials Science & Engineering, Biotechnology, Industrial Engineering, Chemistry> <**KU**: Chemical & Biomolecular Engineering, Electrical & Electronic Engineering, Mechanical Engineering, Biotechnology, Computer Science, Materials Science & Engineering, Mathematics Education, Chemistry, Mathematics, Architecture> <**SKKU**: Semiconductor Display Engineering> <**KKU**: Veterinary Medicine> <**HYU**: Automotive Engineering, Energy Engineering, Electronic Engineering> <**DKU**: Dentistry> <**DU**: Korean Medicine>
4	<**YU**: Education, Chinese Language & Literature, Social Welfare, Philosophy, French Language & Literature, Russian Language & Literature, German Language & Literature, Child Development & Family Studies> <**KU**: Chinese Language & Literature, Korean Language & Literature, History, French Language & Literature, Geography Education, Korean History, Hispanic Language & Literature, Philosophy, German Language & Literature, Health Administration> <**SGU**: Business, Economics> <**SKKU**: Global Leader, Business, Global Economics> <**HYU**: Public Administration, Media & Communication, Information System, Policy Studies>	<**SNU**: Earth Science Education, Plant Science, Food & Nutrition, Forest Sciences> <**YU**: Biochemistry, Systems Biology, Architectural Engineering, Earth System Sciences, Astronomy, Urban Planning and Engineering, Nursing, Atmospheric Sciences, Food & Nutrition> <**KU**: Physics, Biomedical Engineering, Earth & Environmental Sciences, Food Bioscience & Technology, Environmental Science & Ecological Engineering, Biosystems & Biomedical Sciences, Health & Environmental Science, Nursing> <**SKKU**: Electronic & Electrical Engineering, Mathematics Education, Biomedical Engineering> <**SGU**: Chemical & Biomolecular Engineering, Mechanical Engineering, Electronic Engineering, Computer Science, Chemistry, Mathematics, Life Sciences, Physics> <**HYU**: Polymer Science & Engineering, Materials Science & Engineering, Mathematics, Mathematics Education, Biotechnology, Biological Sciences, Computer Science, Mechanical Engineering, Industrial Engineering, Chemistry, Organic & Nano System Engineering, Nuclear engineering, Architecture, Physics> <**CAU**: Industrial Security> <**AJU**: Military Digital Convergence>
5	<**YU**: Theology> <**KU**: Russian Language & Literature, Japanese Language & Literature, Classical Chinese, Home Economics Education> <**SGU**: American Culture, Chinese Culture, European Languages & Culture> <**SKKU**: Education> <**SNE**: Elementary Education> <**HYU**: Business, Korean Language Education, Political Science & International Relations, English Language Education, Sociology, Tourism> <**HUFS**: Language & Trade, Language & Diplomacy>	<**SKKU**: Computer Education> <**KHU**: Biomedical Engineering, Information Display, Pharmacology, Chemistry, Biology> <**HYU**: Earth Resources & Environmental Engineering, Urban Planning & Engineering, Architectural Engineering, Civil & Environmental Engineering> <**UOS**: Statistics, Polymer Science & Engineering, Computer Science, Mechanical & Information Engineering> <**KKU**: Mathematics Education, Chemistry, Energy, Smart ICT Convergence, Smart Vehicle Engineering> <**KAU**: Air Transportation & Logistics, Aeronautical Science & Flight Operation> <**CUK**: Nursing> <**GCU**: Nursing> <**CAU**: Nursing, Architecture> <**HIU**: Architecture>

Fig. 6 University and Major Ranking by CSAT Scores. Note: This figure lists selective universities and majors in liberal arts and natural science that rank in the top 5 based on 2019 CSAT scores. The rankings were determined using the 2019 college application reference tables of Megastudy, an education company in South Korea. Megastudy created the reference tables based on 2019 CSAT scores and an analysis of their accepted students and university entrance exam results over the past five years. Initials of universities and majors are in angle brackets.

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Author contributions
Both authors contributed equally to developing and translating the survey instrument, fielding the survey, and writing the manuscript. Both read and approved the final manuscript.

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Availability of data and materials
Following the IRB protocol approved by both authors' institutions, the survey data cannot be shared outside the research team. Supporting materials are reported at the end of the manuscript.

Declarations

Competing interests
We have no conflicts of interest to disclose.

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