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Socioeconomic Disparities in Career Expectations and Readiness Among Polish Adolescents: Insights from PISA 2022 Data

Michał Sitek / Instytut Badań Edukacyjnych w Warszawie, Instytut Filozofii i Socjologii PAN
e-mail: m.sitek@ibe.edu.pl
ORCID: 0000-0001-9022-6211

Jerzy Bielecki / Instytut Badań Edukacyjnych w Warszawie
e-mail: j.bielecki@ibe.edu.pl
ORCID: 0000-0002-5932-6967

Abstract

This study investigates how career and educational expectations align with school tracks in Poland's secondary schooling, using PISA 2022 data. We examine students in general, technical, and sectoral schools, analyzing how alignment is shaped by socioeconomic status (SES), parental involvement, academic achievement, and career information-seeking. Structural equation modeling shows that SES and parental engagement improve alignment, especially in vocational tracks, where institutional support is weaker. Math performance is also key, particularly in technical schools. In contrast, career guidance and information-seeking activities have limited effects, possibly due to variation in activity types. Many 3-year sectoral vocational students aspire to careers requiring higher education, leading to notable misalignment. The findings call for track-sensitive career support to reduce inequality and support informed decision-making.

Keywords: **Career guidance, career expectations, career readiness, PISA.**

Społeczno-ekonomiczne zróżnicowanie oczekiwań zawodowych i gotowości do podejmowania kariery polskich nastolatków: Wnioski z badania PISA 2022

Streszczenie

Artykuł opisuje zgodność między oczekiwaniami edukacyjnymi i zawodowymi a typem szkoły w zróżnicowanym systemie ponadpodstawowym w Polsce, wykorzystując dane PISA 2022. Analizujemy uczniów liceów ogólnokształcących, techników i szkół branżowych I stopnia, skupiając się na roli statusu społeczno-ekonomicznego (SES), zaangażowania rodziców, wyników z matematyki i aktywności związanych z doradztwem zawodowym. Modelowanie równań strukturalnych pokazuje, że SES i wsparcie rodziców wspierają zgodność oczekiwań z typem szkoły, szczególnie w technikach i szkołach branżowych. Wyniki

z matematyki mają znaczenie głównie w technikach. Działania z zakresu doradztwa i innych form poszukiwania informacji o możliwościach rozwoju kariery, mają ograniczony wpływ, a wielu uczniów szkoły branżowej I stopnia planuje studia wyższe, co prowadzi do niezgodności. Wyniki wskazują na potrzebę ścieżkowo zróżnicowanego doradztwa zawodowego.

Słowa kluczowe: **Poradnictwo zawodowe, oczekiwania zawodowe, gotowość zawodowa, PISA.**

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1. INTRODUCTION

Imagine a 15-year-old graduate just finishing primary school. She's bright, curious, and dreams of becoming a doctor—but she's just enrolled in a vocational school because her parents, unsure about future costs, encouraged a "practical" path. Her current track makes it unlikely she'll ever pursue medicine. Such cases are not uncommon.

In Poland, students must choose between general (LO), technical (TECH), or vocational (BS I) secondary schools at the end of primary school—decisions that often shape access to higher education and future labor market outcomes. While some mismatch between aspirations and realities is developmentally acceptable, growing evidence suggests that early misalignment can systematically disadvantage students from lower socioeconomic backgrounds (Schneider & Stevenson, 1999; Buchmann & Park, 2009). These students often receive less guidance, make less informed choices, and face barriers in adjusting their plans later.

This study examines how socioeconomic disparities shape the alignment between students' career expectations and the educational pathways they pursue. Drawing on nationally representative data from PISA 2022, we define misalignment as the gap between what students expect to do in the future and what their current school track realistically prepares them for. Misalignment has been linked to lower academic engagement, underemployment, and broader social inequality.

Our study focuses on Poland's stratified and moderately early tracking education system, where institutional design, family background, and career support services intersect. While prior research has documented alignment patterns in Western countries, there is limited evidence from Central and Eastern Europe, where different policy environments and social dynamics shape student decision-making. We contribute to this literature by analyzing how alignment patterns vary across school tracks and are shaped by educational programs/type of school, socioeconomic status (SES), parental involvement, and career information-seeking activities. Our central research questions are: How does the school track shape alignment between students' educational trajectories and career expectations? In what ways does socioeconomic background—especially parental involvement—affect this alignment? Does active career exploration improve alignment and are these effects dependent on the school track?

Using a structural equation modeling approach, we provide timely evidence from a nationally representative cohort of students entering secondary education. Our results show that while institutional placement is a strong predictor of alignment, family resources and academic performance play critical roles, especially in vocational and technical tracks where structural support is weaker. In contrast, career guidance shows a limited impact, likely due to the fragmented or uneven quality of these activities. These findings have both national and international relevance. They point to the need for track-sensitive, equity-oriented career support, particularly for students from disadvantaged backgrounds, who are most vulnerable to misalignment early in their educational journeys.

The following sections review theoretical perspectives on alignment and tracking, describe the Polish context, and present our analytical strategy. We then discuss our findings and conclude with implications for policy and practice aimed at reducing inequality and improving student decision-making.

2. LITERATURE REVIEW

In stratified education systems, adolescents' educational tracks often diverge from their future occupational aspirations in ways that can adversely affect both individual trajectories and broader social mobility. This section reviews key theoretical and empirical work on (1) the definition and significance of alignment, (2) the role of socioeconomic status (SES) in shaping aligned expectations, (3) the impact of institutional tracking, (4) the potential of career guidance interventions, and (5) prevailing research gaps, with a particular emphasis on the Polish context.

2.1 Defining Alignment and Its Importance

In the sociology of education, alignment typically denotes the congruence between students' educational plans and the level of education required for their intended occupations (Ahearn, 2021; Kim et al., 2019; Schneider & Stevenson, 1999). Aligned expectations—where a student's educational pathway corresponds to the qualifications needed for their aspirational occupation—have been linked to higher academic engagement, greater persistence in education, and improved labor market

outcomes (Beal & Crockett, 2010; Mello, 2008). By contrast, misalignment (under- or over-alignment) often entails suboptimal decisions, potentially leading to lower rates of college enrollment, underemployment, and reduced earnings (Schmitt-Wilson & Faas, 2016; Quintini, 2011). Although some degree of uncertainty is both common and developmentally appropriate in adolescence, repeated findings indicate that students who sustain misaligned or unclear expectations face increased risks of dropping out or ending up in precarious employment (Ahearn, 2021; Kim et al., 2019).

2.2 Socioeconomic Status (SES) and Alignment

Socioeconomic status (SES) is one of the strongest influences on whether students' educational paths align with their career expectations. To understand how SES shapes these decisions, we draw on three key theoretical perspectives: status attainment theory, cultural capital, and rational choice theory.

Theories of status attainment have long emphasized that young people do not make these decisions alone. Instead, their choices are shaped by "significant others"—parents, teachers, and peers—who pass on not just advice, but also access to information, networks, and cultural knowledge (Sewell et al., 1969; Morgan, 2005). In high-SES families, this influence often works in students' favor. These parents tend to possess what Bourdieu (1986) called cultural capital: insider knowledge about how institutions work, what kinds of careers require which qualifications, and how to navigate the path from school to university to professional life. Their children are often guided towards ambitions that match the requirements of those careers—what researchers call "aligned expectations" (Schneider & Stevenson, 1999). By contrast, students from lower SES backgrounds often lack access to these resources. Some families may be unfamiliar with higher education pathways, whereas others may view long-term schooling as financially risky (Armstrong & Hamilton, 2013). According to the rational choice theory, these students often prioritize immediate job prospects over further education, especially when the costs of continuing seem high and the benefits are uncertain (Breen & Goldthorpe, 1997; Hanson, 1994). The result is a pattern that many studies have observed: disadvantaged students are more likely to be "under-aligned"—aspiring to careers that require more education than their current track offers—or to set more limited goals from the outset. In either case, structural inequality is reproduced through the education system itself (Ackermann & Benz, 2023; Buchmann & Park, 2009; Valdés, 2022).

2.3 Educational Tracking

Tracking systems—how and when students are sorted into academic or vocational pathways—play a central role in shaping career alignment. Of relevance is how the age of first selection, system flexibility, and socioeconomic background intersect to influence students' options. These systems vary widely in Europe. In countries such as Austria and Germany, tracking begins as early as 10 years of age. In Czechia and Slovakia, it starts around 11. In contrast, countries such as Poland, France, and Spain delay tracking until age 15, while Nordic countries such as Denmark, Finland, and Sweden avoid formal tracking altogether, offering a common general education pathway until age 16. However, when tracking occurs early or when transitions between tracks are difficult, students' educational options can become locked in. Students in vocational tracks who later aspire to tertiary-level careers often face roadblocks: they may lack access to college-preparatory coursework or the credentials required for university entry (Ackermann & Benz, 2023; Morgan et al., 2013). These constraints are often felt most acutely by lower-SES students, who also report fewer interactions with career guidance counselors and limited access to planning resources (Holland 2015; Ahearn 2021). As a result, tracking can reinforce inequality rather than reduce it. Schneider and Stevenson (1999) capture this dilemma in their description of how tracking can "decouple" students' aspirations from their educational reality, especially when vocational pathways fail to clearly map onto higher education or long-term careers.

2.4 Career information seeking

Career guidance is often seen as a tool for helping students align their aspirations with realistic educational and labor market pathways. In theory, guidance programs provide tailored information about job requirements, labor market trends, and the academic steps needed to reach particular careers (Covacevich et al., 2021a; Freelin & Staff, 2020). These interventions can reduce both under- and over-alignment by helping students understand what credentials are actually needed for their goals. Importantly, guidance can play a compensatory role, particularly for students in vocational tracks or from lower-SES backgrounds who may have fewer family or social network resources to draw on (Morgan et al., 2012; Sabates et al., 2011). However, research has shown that not all students benefit equally. Students from higher SES families or academic tracks often have the means to act on new information. Thus, they are more likely to translate guidance into concrete plans. In contrast, disadvantaged students may still face uncertainty, institutional barriers, or limited options even after receiving support (Ahearn, 2021; Cedefop, 2018). In other words, career guidance is only a part of the solution. Its effectiveness depends heavily on the starting position of the student within the system. Interventions that assume equal access or readiness can unintentionally widen existing disparities (Kim et al. 2019). Understanding this dynamic is essential for evaluating how—and for whom—guidance works.

2.5 Research on Misalignment and Measurement

When researchers discuss students' career goals and how well they align with their educational paths, they often distinguish between two key concepts: misalignment and mismatch. These terms are related, but refer to different stages of the education-to-work journey.

Misalignment occurs during adolescence. It refers to a gap between a student's career aspirations and the level of education typically required to achieve that goal. In contrast, mismatch describes what happens later in adulthood, when someone's actual educational credentials do not align with the demands of their current job (Chowdhury et al., 2024). Schneider and Stevenson (1999) are among the most widely used approaches for measuring misalignment. They compared students' self-reported educational expectations to standard occupational requirements, such as those defined in frameworks like the O*NET database, to identify who was "over-aligned" (expecting more education than needed) or "under-aligned" (expecting less than needed).

Some studies have also used a third category, uncertainty. Some adolescents do not know what they want to do or what level of education they need (Ahearn, 2021; Greve et al., 2021). While this kind of uncertainty can be a normal part of development, research shows that when it persists, it may be linked to lower academic achievement and weaker outcomes in thelabor market (Staff et al., 2010; Yates et al., 2010).

In early tracking education systems, in which students are placed in academic or vocational tracks early, researchers often measure alignment by asking a simple but important question: does the student's current school track realistically lead to the kind of job they hope to have? (Sabates et al., 2011). For example, a student in a vocational program who wants to become a doctor may be under-aligned because their current path does not support that level of qualification. Obviously, some students can eventually become doctors; however, this requires gaining additional formal education qualifications. On the flip side, an academic-track student who plans to work in a job that does not require a university degree might be considered over-aligned (Kim et al., 2019; Yates et al., 2011). Understanding these patterns—and who is most likely to experience these risks—can help identify where support is needed most.

3. RESEARCH GAPS AND HYPOTHESES

While scholars have made substantial progress in understanding the misalignment between students' educational paths and career expectations, several important questions remain, particularly regarding when and how misalignment emerges and how institutional structures shape it.

First, most studies examine misalignment at later stages of the educational journey, such as during the final years of high school or adulthood. This leaves a critical gap in our understanding of how expectation gaps form earlier, just as students begin secondary school and navigate new academic environments. Second, the research has been geographically concentrated. Much of our knowledge comes from the U.S., the U.K., or select Western European countries. Few studies have examined how misalignment operates in Central and Eastern Europe, where tracking may interact with institutional and socioeconomic dynamics. Third, the effects of career guidance remain unclear. While guidance is often viewed as a tool to improve alignment, recent research suggests that its impact may vary depending on students' socioeconomic background and school context. High-SES students tend to benefit more, while others may lack the resources or institutional support to act on new information. Finally, many existing studies treat school systems as uniform. Yet students experience guidance, support, and structural barriers differently depending on the educational track they are placed in. Greater attention to this institutional heterogeneity is needed to understand when and for whom misalignment emerges—and how it might be addressed.

To respond to these gaps, our study tests three hypotheses that explore how socioeconomic status, school tracking, and career exploration influence the alignment between students' aspirations and their educational trajectories. Unlike prior research, we explicitly examine how these relationships vary across institutional pathways in Poland.

H1: School Track and Alignment

Students in general secondary schools (LO) will exhibit higher alignment than those in vocational tracks (TECH and BS I), reflecting differences in program orientation, academic preparation, and access to future educational opportunities (Buchmann & Park, 2009; Ackermann & Benz, 2023).

This hypothesis considers how track-specific structures shape student choices and constraints.

H2: Socioeconomic Status and Parental Involvement

Higher SES and stronger parental engagement will be associated with greater alignment across tracks, consistent with theories of status attainment and rational decision-making (Sewell et al., 1969; Breen & Goldthorpe, 1997).

We examine whether family resources help students pursue more realistic academic and career goals.

H3: Career Exploration and Guidance

Engagement in career-related information seeking will positively affect alignment, with stronger effects expected among sectoral school (purely vocational) students.

This hypothesis tests whether guidance can help close alignment gaps for students facing institutional and informational disadvantages.

By focusing on Poland this study highlights how alignment patterns differ not just by student background, but also by institutional context. In doing so, it contributes to a more nuanced understanding of educational inequality—one that is attentive to the heterogeneous effects of structure, support, and choice across tracks.

3.1 Institutional context of Poland's educational system

To understand how alignment between career expectations and educational pathways takes shape, it's essential to consider the institutional environment in which students make these decisions. In this study, this means looking closely at the design of Poland's secondary education system—how it structures opportunity, tracks students, and supports (or limits) their ability to revise their plans.

Students in Poland make track-based decisions relatively early. After completing eight years of primary school, 14- and 15-year-olds must choose between a four-year general secondary program (LO), which prepares them for university, or vocational options such as five-year technical programs (TECH) and shorter three- or two-year sectoral schools (BS I and BS II)[1] . These decisions shape not only educational prospects but also long-termlabor market trajectories, and require access to clear, timely information about schools, jobs, and future trends (Cedefop & Educational Research Institute [IBE], 2023). Most students opt for the general or technical tracks—over 80% in 2022/2023—both of which can lead to higher education. Sectoral programs, chosen by about 12% of students, combine vocational training with limited general education and typically lead directly to employment (Cedefop & IBE, 2023).

The post-graduation landscape reflects these institutional divisions. Over 80% of LO graduates enrol in university within two years, compared to 47–52% of TECH graduates, many of whom combine study and work. In contrast, most BS I graduates enter the labor market immediately, though 15–20% take adult education or additional qualification courses to change paths (IBE, 2024). These outcomes are tracked through administrative data sources including Poland's Social Insurance Institution (ZUS) and the higher education POL-on database. Labor market indicators further illustrate these mismatches. According to PIAAC 2023, Poland has an over-qualification rate of 13.5% (well below the OECD average of 23%) and an under-qualification rate of 3.7%, with approximately 34% of graduates working outside their field of study (OECD, 2024).

To help students navigate these choices, Polish schools are required to offer career guidance at every level. Since a 2019 regulation by the Ministry of National Education (Journal of Laws of 2019, Item 325), schools have implemented activities ranging from preschool job visits to structured guidance in secondary school. Seventh- and eighth-grade students receive at least 10 hours of guidance per year, and secondary school programs must provide an additional 10 hours total. These services are typically delivered by teachers, counselors, or external partners such as labor offices (IBE, 2024). In theory, this system is designed to adapt to local needs; career fairs, class discussions, and parent engagement are all encouraged, but in practice, implementation varies widely. And while the policy framework is ambitious, evidence of impact is limited. Despite widespread access to guidance, we still know relatively little about whether these interventions help students make informed, realistic choices about their futures (IBE, 2024).

4. DATA AND METHODS

4.1 Data

This study uses data from the 2022 cycle of the Programme for International Student Assessment (PISA), administered by the OECD. PISA assesses the competencies of 15-year-old students in reading, mathematics, and science and collects extensive background information on students, their families, and schools.

Our analytic sample includes 4,916 ninth-grade students in Poland, drawn from a nationally representative sample of schools. We excluded students who were still in primary education or already enrolled in the 10th grade at the time of the survey. The PISA sampling procedure follows a two-stage stratified design. Schools are first sampled with probabilities proportional to size, followed by random sampling of students within selected schools.

Data were collected using computer-based cognitive assessments and background questionnaires. Our analysis uses student background data, mathematics plausible values, and derived indicators relevant to students' educational and occupational expectations.

5. VARIABLES AND MEASUREMENT

5.1 Dependent Variables: Alignment Measures

We employ two measures of alignment to capture the extent to which students' educational and occupational expectations correspond to their current school track. School Track is a categorical variable distinguishing three Polish secondary pathways:

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[1] More specifically, the Polish system includes pre-primary, 8-year primary, 4-5 years of secondary, and 1-2.5 years of postsecondary education. Secondary options are: 4-year general secondary (LO, ISCED 344), 5-year technical vocational (TECH, ISCED 354), 3-year sectoral vocational (BS I, ISCED 353), and 2-year sectoral vocational (BS II, ISCED 354). Vocational programs taught in technical and sectoral schools cover over 200 professions, with 60% of students in apprenticeships (Cedefop & Educational Research Institute [IBE], 2023).

4-year general secondary (LO), 5-year technical vocational (TECH) and 3-year sectoral vocational (BS I) schools, of which only TECH and LO give direct access to tertiary education (after passing qualifying exams), while BS I is designed to lead directly to the labour market. In certain model specifications, track serves as a mediating variable (to evaluate how it influences alignment), whereas in others it is used as a stratifying factor for subgroup comparisons. We define alignment by comparing students' educational and occupational expectations to the normative outcomes typically associated with their current school track. We used the PISA questions that ask about educational and occupational expectations for this[2].

For educational alignment, we use the International Standard Classification of Education (ISCED) framework. We consider LO students aligned if they expect to attain tertiary education (ISCED Levels 5–8), TECH students if they expect at least post-secondary non-tertiary or professional tertiary education (ISCED Level 4+), and BS I students if they anticipate no more than secondary vocational education (ISCED Level 3.3 or 3.4). The distribution of expectations and assumed alignment are presented in Figure 1A.

Occupational alignment is based on the International Standard Classification of Occupations (ISCO). LO and TECH students are considered aligned if they expect to enter high-skilled or professional roles (ISCO groups 0–5), whereas BS I students are aligned if they anticipate mid- or lower-skilled occupations (ISCO groups 4–9). Students without a clear idea about their future occupation are coded as misaligned, following PISA coding and practices used by Greve et al. (2011). While an "uncertain" category was considered, this approach simplified the modelling process and maintained analytical clarity. This is illustrated in Figure 1B.

Taken together, these variables serve as early indicators of vertical mismatch risk in students' future educational and labour market trajectories. To illustrate how alignment is operationalized across school types, the figures below present the distribution of educational and occupational expectations by ISCED level and ISCO groups. Shading indicates alignment, based on the criteria defined above.

Figure 1A ***Educational expectations by school type and ISCED level with marked alignment assumptions***

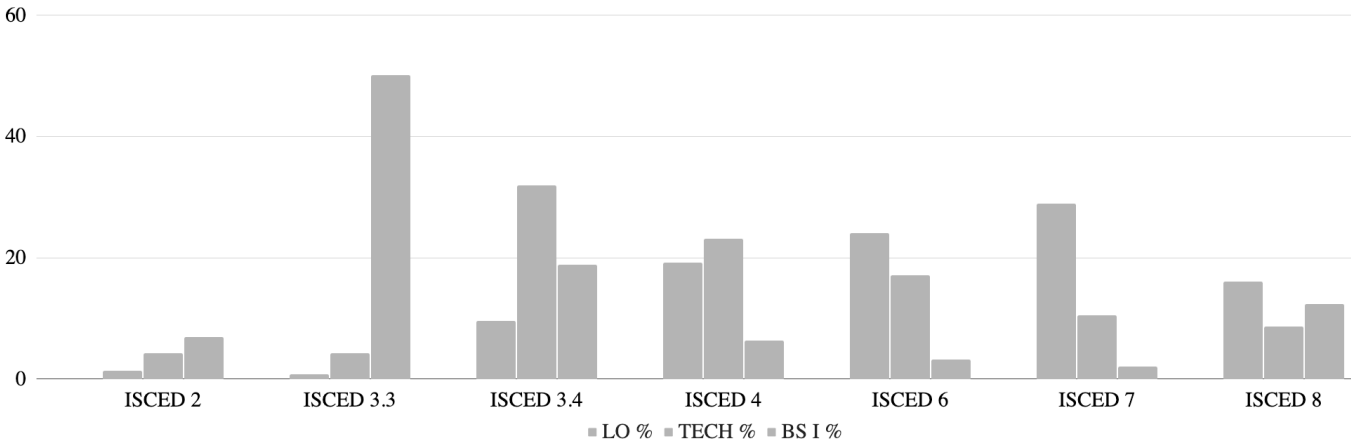
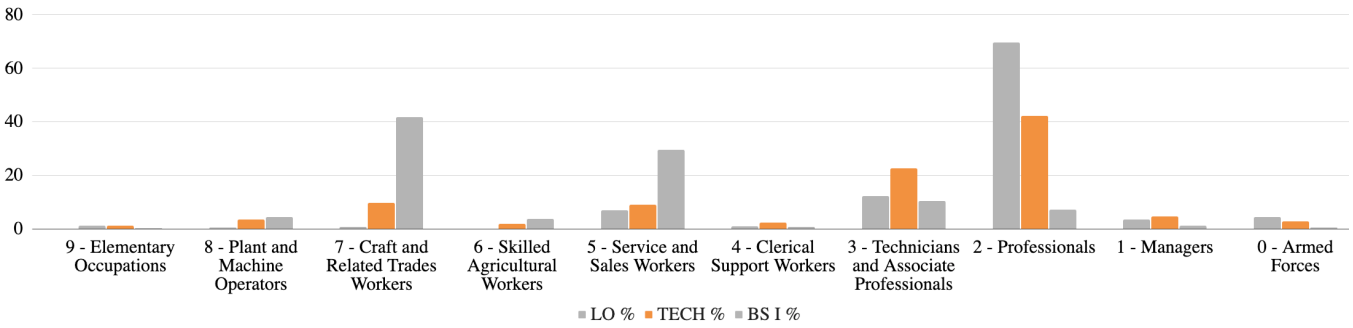


Figure 1B ***Occupational alignment by school type and ISCED level with marked alignment assumptions***



[2] Students were asked about their expected educational attainment – marking the list of possible educational levels they expect to complete. For occupational expectations, students were asked about what kind of job they expect to have when they are about 30 years old and answers were human-coded based the ISCO-08 classification system.

5.2 Predictors

We include a range of background and school-related factors that may influence alignment outcomes.

Socioeconomic Status (ESCS). A standardized OECD index combining parental education, parental occupation, and household possessions, with higher values indicating more socioeconomic advantage. The index is based on three components with equal weights: highest parental occupation status (HISEI), highest education of parents in years, and home possessions (see OECD, 2024; 406–408 for technical details).

Mathematics Performance. Operationalized through ten plausible values for math literacy in PISA. Multiple imputation is used to incorporate these plausible values into the analyses (technical details on the computations of the scores can be found in OECD, 2024). In our analyses we use centered and standardized values. We focus our analysis exclusively on PISA mathematics scores as a proxy for general skills. While reading and science literacy scores are available they are highly correlated with math performance. By focusing on math we avoid redundancy and multicollinearity issues.

Gender. A binary indicator (1 = female) to capture gender differences.

5.3 Mediators

We focus on two mediators a mediating factor between SES, performance and gender and alignment outcomes.

Career Guidance Engagement (INFO). INFO reflects students' proactive behavior in exploring future educational and occupational paths. It is constructed from five survey items that ask students how frequently they have attended job fairs or career days, spoken with a school career counselor, participated in job shadowing or internships, searched online for career or education information, and consulted teachers about career plans. An Item Response Theory (IRT) Generalized Graded Response Model (GGRM) is applied to these items, yielding a standardized latent trait, where higher scores indicate more frequent engagement in career exploration[3].

Parental Interest and Involvement (PINT). PINT captures parents' engagement with their children's educational progress and career planning. It draws on six questionnaire items assessing how often parents discuss school performance ("talk about educational plans", "express interest in schoolwork", "encourage academic achievement", "offer help with academic difficulties", and "inquire about future goals". As with INFO, responses are modelled using a GGRM to generate a continuous standardized score, where higher values represent greater parental involvement.

The table below shows descriptive statistics of all the variables used with the breakdown by track/type of school.

Table 1 ***Descriptive statistics (overall and by school)***

Variable	Full Sample	LO	TECH	BS I
EDU_ALI	0.86	0.90 (0.30)	0.93 (0.25)	0.48 (0.50)
OCC_ALI	0.73	0.79 (0.41)	0.68 (0.47)	0.67 (0.47)
ESCS	-0.12 (0.88)	0.23 (0.81)	-0.32 (0.82)	-0.81(0.70)
PINT	-0.00 (0.82)	0.11 (0.76)	-0.05 (0.84)	-0.31 (0.90)
INFO	0.00 (0.82)	-0.02 (0.77)	0.01 (0.87)	0.05 (0.91)
MATH	0.00 (1.0)	51.73 (8.07)	47.59 (7.91)	39.11 (6.40)
FEMALE	0.47	0.60 (0.49)	0.35 (0.48)	0.32 (0.47)
TYP_SZK: LO	0.49	–	–	–
TYP_SZK: TECH	0.33	–	–	–
TYP_SZK: BS I	0.18	–	–	–

Reported statistics are weighted estimates with imputed missing values. Missingness ranged from ESCS (2.3%), INFO (15.2%), PINT (12.3%), and OCC_ALI (22.8% primarily due to students not reporting occupational expectations). PISA original scores were divided by 10, to ease the computations (original averages are 3 digit numbers).

Source: Own computations based on PISA 2022 data for Poland (9th grade only)

[3] Item Response Theory (IRT) measures hidden traits, such as interest, by analyzing survey answers. Using the Generalized Graded Response Model‡, we account for response intensity (e.g., "never" vs "often") to convert multiple questions into one precise score per student. This approach is particularly valuable for scales with missing-by-design features, such as the PISA information seeking behavior questions, which employed a within-construct matrix sampling design (see OECD, 2024 for details of the design).

6. ANALYTICAL STRATEGY

6.1 Model

Our analytical approach theorizes how students' alignment is shaped by background factors, institutional placements, and mediators. We estimate two complementary path models, each corresponding to one of the two DAGs presented in Figure 2A and Figure 2B.

Figure 2A ***Model 1: Pooled Mediation Model***

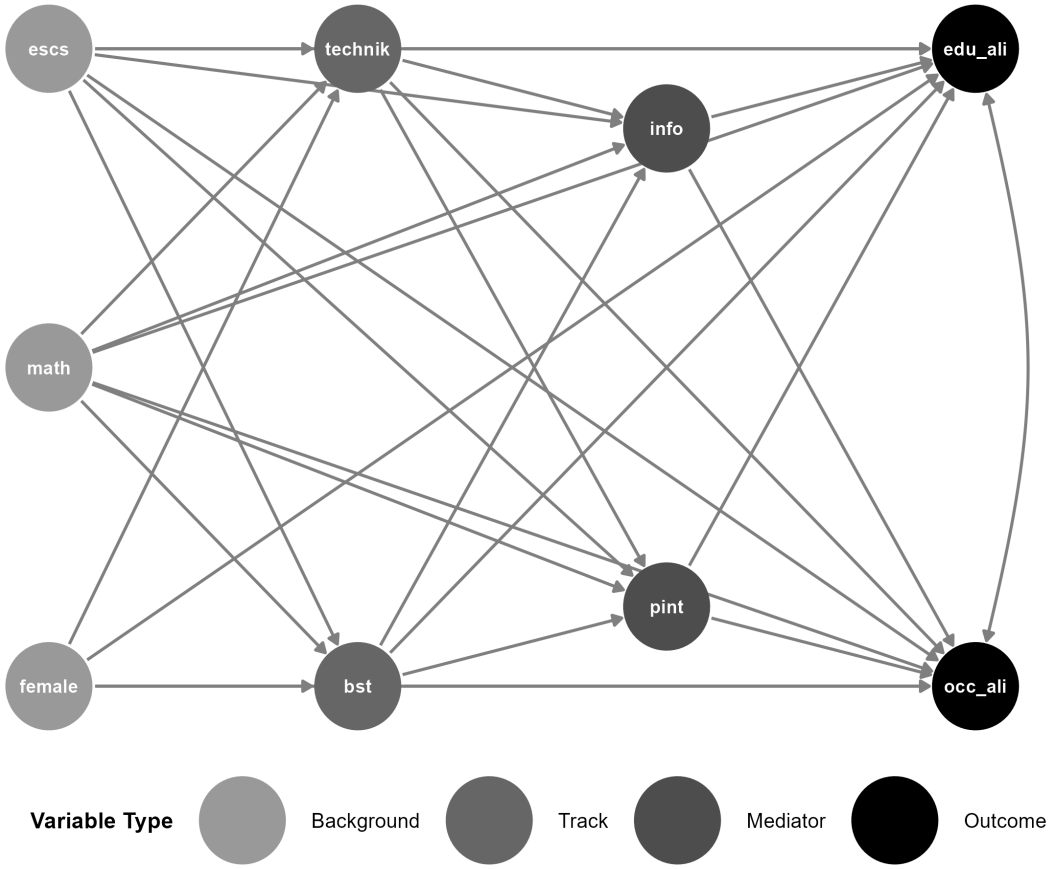
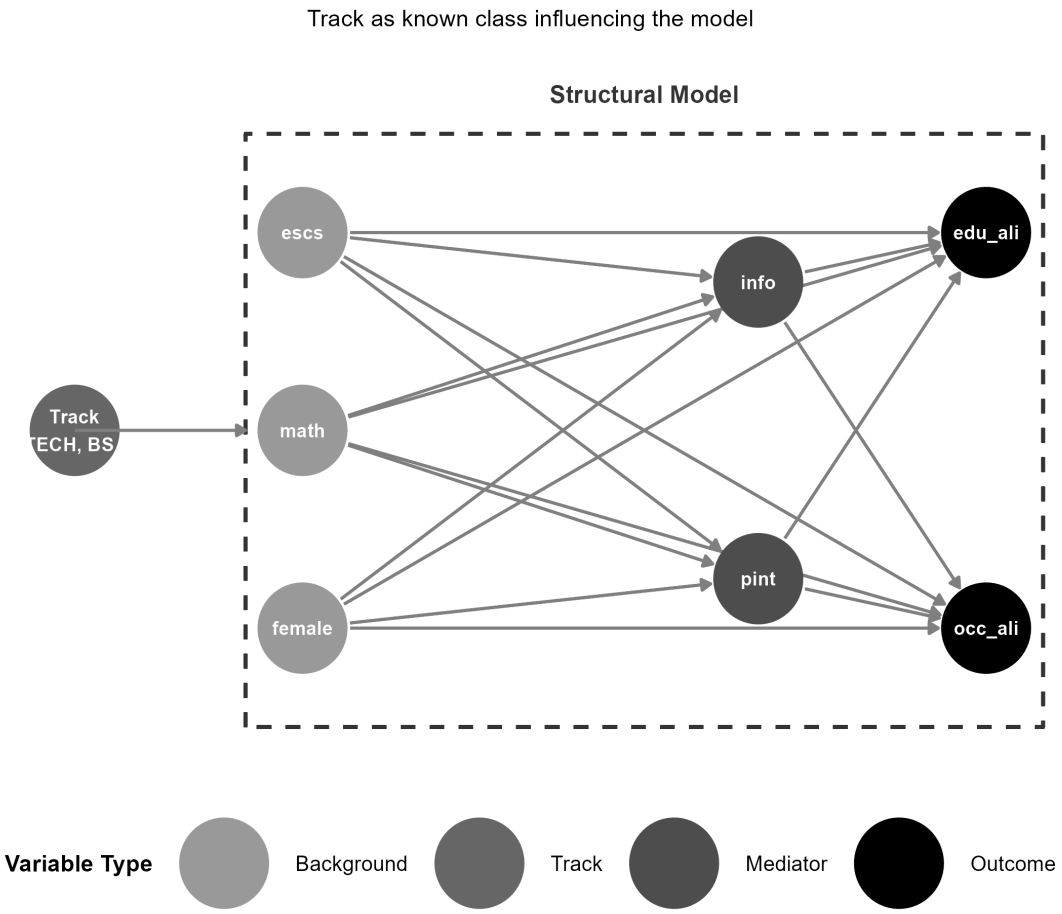


Figure 2B ***Model 2: Mixture known class model***



6.2 Model 1: A Unified Look at How Background and School Track Shape Alignment

Model 1 (see Figure 2A for visual presentation) takes all the students together and explores how their family background, academic performance, and the type of school they attend influence whether their educational and career plans align with their current path[4]. Here, we think of the school track as a stepping stone: it's shaped by things like a student's socioeconomic status (SES), math skills, and gender, and in turn, it affects how well their plans line up with reality. We also look at two key supports—career guidance activities (such as job fairs or counsellor talks) and parental involvement (such as chats about school or future goals)—to see how they connect background to alignment. The outcomes we're interested in are whether students' education plans (EDU_ALI) and career goals (OCC_ALI) align with their current school track. We also check the presence of any overlap between these two that we cannot see directly but which may still affect the results[5].

This approach helps us figure out how a student's school track—chosen based on their background and grades—opens up (or limits) access to information and support, which then shapes how realistic their plans are. We assume here that the school track comes first and influences their expectations. However, we also recognize that sometimes students' dreams and goals might influence the track in which they end up. For example, a student with big ambitions and pushy parents might aim for

[4] In technical terms, Model 1 is a structural equation model (SEM) where school track is a mediator regressed on socioeconomic status (ESCS), mathematics plausible values, and gender. Mediators INFO (career guidance engagement) and PINT (parental involvement) are regressed on ESCS, math, gender, and track. The outcome variables EDU_ALI and OCC_ALI are regressed on all prior variables, with residual covariance estimated between them to account for unobserved shared factors. Paths decompose the total effects into direct and indirect components.

[5] From a causal inference standpoint, treating track as an antecedent assumes that alignment follows placement. However, expectations may precede and influence track choice, driven by student agency (e.g., self-concept, motivation) and parental influence, reflecting socioeconomic structures (e.g., parental education, occupational status, cultural capital). This suggests alignment may be endogenous, complicating causal claims.

a general secondary school (LO), while another might feel pressured for vocational training (BS I) due to family circumstances. So, their expectations aren't just a result of their track—they can also steer them towards it, shaped by their confidence, drive, and family support, which often tie back to wealth, education, or social know-how. While this model keeps the track fixed to study its effects, we know it's part of a bigger picture where personal choices and family background play a role in both the track and how well everything lines up.

6.3 Model 2: Zooming Into Differences Across School Types

Model 2 (see Figure 2B) switches things up by looking at each school type—general (LO), technical (TECH), and sectoral (BS I)—separately. Instead of treating the school track as a middle step, we explore how SES, math scores, and gender affect parental involvement and career guidance within each track, and how those shape alignment. Every connection is calculated only for that school type, allowing us to see if the same factors work differently depending on where the student is. For example, does career guidance help students in the vocationally oriented BS I track more than those in other types of schools? Unlike Model 1, we don't link everything through the track itself—this avoids assuming the track is just a simple result of background and prevents mixing up the story[6].

This setup gives us a clearer, more reliable way to see how background and student traits affect alignment, respecting that a student's track might partly come from their own goals or family push. It lets us spot differences—like whether guidance really helps BS I students line up their plans, or if LO students are already set thanks to extra support at home. We were unable to track the overlap between educational and career alignment here because of some limitations in the calculations, but it still paints a detailed picture of how each school type creates its own world of opportunities and challenges. This complements Model 1 by showing not only the average story but also how each track changes the game.

7. HYPOTHESES

Together, these models tested the three core hypotheses.

H1: School tracking affects alignment outcomes through its influence on access to information.
H2: Socioeconomic status influences alignment indirectly via parental interest and involvement.
H3: Career information-seeking behavior improves alignment between education and career aspirations.

The two path models were designed to address the three hypotheses from complementary perspectives. Model 1 provides a unified mediation framework to test H1, H2, and H3 by estimating how background characteristics shape alignment indirectly through school track, parental involvement (PINT), and career exploration behavior (INFO). This model enables the decomposition of total effects and assesses how institutional placement structures access alignment-relevant resources, in line with H1, while also capturing indirect pathways from SES via PINT (H2), and from INFO to alignment outcomes (H3). By contrast, Model 2 addresses potential endogeneity in Model 1 by treating track as a stratifying variable and estimating all paths within the tracks. This allows us to test whether the mechanisms hypothesized in H2 and H3 differ across institutional contexts, offering a more nuanced understanding of the alignment processes across the tracks. Together, these models offer both a general picture of mediated pathways and a context-sensitive account of how alignment unfolds within different educational tracks.

8. RESULTS

To understand how educational and occupational alignment is shaped by individual and institutional factors, we estimated two statistical models using PISA 2022 data. The first (Model 1) analyzes the full sample, treating school track as a mediating variable. The second (Model 2) examines each track—general (LO), technical (TECH), and sectoral vocational (BS I)—as a separate case, allowing us to compare how alignment functions in each institutional context.

Both models report standardized coefficients, which show how strongly each factor—such as socioeconomic background, academic performance, or parental involvement—is associated with students' alignment outcomes. The estimates reflect the effect of each variable while holding others constant. The tables include both direct and indirect effects. Table 2 presents

[6] Model 2 uses a known-class mixture approach, estimating paths (ESCS, math, gender → PINT, INFO → EDU_ALI, OCC_ALI) within each track (LO, TECH, BS I), with coefficients varying by class. Unlike multi-group SEM, it avoids regressing on track to prevent collider bias—where conditioning on a variable affected by predictors distorts relationships. Therefore it is superior to subgroup analyses or analyses involving interaction terms. Covariance between EDU_ALI and OCC_ALI is omitted due to estimation constraints.

the results of Model 2, a known-class structural equation model that estimates how predictors of alignment operate within each school track: general (LO), technical (TECH), and sectoral vocational (BS I). This model uses observed class membership to stratify the sample, allowing specific parameters to vary across tracks, while keeping the overall model structure consistent.

As explained in the methods section, while the model estimates track-specific effects, it treats the structural model as shared across the groups. This means that we can observe how key relationships (e.g., between SES and alignment) vary by track, without assuming each track has a fundamentally different causal structure.

Table 2 ***Structural Equation Model Results – Model 1 (Standardized Effects)***

Predictor	Direct Effect on EDU_ALI	Indirect Effect on EDU_ALI	Total Effect on EDU_ALI	Direct Effect on OCC_ALI	Indirect Effect on OCC_ALI	Total Effect on OCC_ALI
ESCS	0.11 (0.02) ***	0.01 (0.01)	0.12 (0.02) ***	0.03 (0.02)	0.02 (0.00) ***	0.05 (0.02) *
MATH	0.20 (0.02) ***	0.10 (0.01) ***	0.30 (0.02) ***	0.067 (0.02) *	0.00 (0.012)	0.07 (0.02) **
FEMALE	0.09 (0.02) ***	−0.022 (0.01)	0.07 (0.02) **	0.14 (0.03) ***	0.01 (0.00) **	0.16 (0.02) ***
PINT	0.13 (0.02) ***	—	0.13 (0.02) ***	0.07 (0.01) ***	—	0.07 (0.01) ***
INFO	0.03 (0.02)	—	0.03 (0.02)	0.01 (0.02)	—	0.01 (0.02)
TECH (track)	0.32 (0.02) ***	—	0.32 (0.02) ***	−0.08 (0.02) **	—	−0.08 (0.02) **
BS I (track)	−0.30 (0.02) ***	—	−0.30 (0.02) ***	0.003 (0.03)	—	0.00 (0.03)

Standardized coefficients (STDYX) from a pooled structural equation model based on multiply imputed PISA 2022 data. EDU_ALI = educational alignment; OCC_ALI = occupational alignment; ESCS = economic, social, and cultural status; PINT = parental involvement; INFO = career information-seeking. Standard errors are in parentheses. Direct effects represent the estimated relationship between the predictor and outcome, holding other variables constant. Indirect effects capture mediation through PINT and/or INFO. Total effects are the sum of direct and indirect effects. Analyses account for complex survey design and weights.

p < .05. p < .01. p < .001.

Source: Own computations based on PISA 2022 data for Poland (9th grade only)

Table 3 ***Model 2 Results: Structural Equation Model Results – Model 2 (Known-Class SEM by Track)***

Class 1 – TECH Track						
Predictor	**Direct Effect on EDU_ALI**	**Indirect Effect**	**Total Effect on EDU_ALI**	**Direct Effect on OCC_ALI**	**Indirect Effect**	**Total Effect on OCC_ALI**
ESCS	0.15 (0.03) ***	0.020 (0.00) **	0.17 (0.03) ***	−0.03 (0.02)	0.01 (0.00) **	−0.02 (0.02)
MATH	0.09 (0.04) *	−0.00 (0.00)	0.09 (0.04) *	−0.00 (0.03)	−0.00 (0.00)	−0.00 (0.03)
FEMALE	0.05 (0.04)	−0.00 (0.00)	0.04 (0.04)	0.11 (0.03) **	−0.00 (0.00)	0.11 (0.03) **
PINT	0.15 (0.03) ***	—	0.15 (0.03) ***	0.09 (0.03) **	—	0.09 (0.03) **
INFO	0.08 (0.04)	—	0.08 (0.04)	0.05 (0.03)	—	0.05 (0.03)
Class 2 – BS I Track						
Predictor	**Direct Effect on EDU_ALI**	**Indirect Effect**	**Total Effect on EDU_ALI**	**Direct Effect on OCC_ALI**	**Indirect Effect**	**Total Effect on OCC_ALI**
ESCS	0.10 (0.05) *	0.01 (0.00) *	0.12 (0.05) *	0.09 (0.03) **	0.00 (0.00)	0.09 (0.03) **
MATH	0.21 (0.05) ***	0.00 (0.00)	0.21 (0.05) ***	0.11 (0.03) **	0.00 (0.00)	0.11 (0.03) **
FEMALE	0.06 (0.06)	0.00 (0.00)	0.06 (0.05)	0.19 (0.03) ***	0.003 (0.003)	0.19 (0.03) ***
PINT	0.11 (0.04) **	—	0.11 (0.04) **	0.02 (0.02)	—	0.02 (0.02)
INFO	0.06 (0.04)	—	0.06 (0.04)	−0.02 (0.03)	—	−0.02 (0.03)
Class 3 – LO Track						
Predictor	**Direct Effect on EDU_ALI**	**Indirect Effect**	**Total Effect on EDU_ALI**	**Direct Effect on OCC_ALI**	**Indirect Effect**	**Total Effect on OCC_ALI**
ESCS	−0.11 (0.06)	−0.00 (0.01)	−0.11 (0.06) *	−0.12 (0.08)	0.00 (0.00)	−0.12 (0.08)
MATH	0.19 (0.06) **	0.03 (0.01) *	0.22 (0.06) ***	−0.06 (0.06)	0.00 (0.01)	−0.055 (0.06)
FEMALE	0.02 (0.05)	0.01 (0.01)	0.04 (0.05)	−0.14 (0.08)	0.00 (0.00)	−0.13 (0.08)
PINT	0.19 (0.05) ***	—	0.19 (0.05) ***	0.08 (0.04)	—	0.08 (0.09)
INFO	−0.07 (0.05)	—	−0.07 (0.05)	0.04 (0.05)	—	0.04 (0.05)

Standardized coefficients (STDYX) from a pooled structural equation model based on multiply imputed PISA 2022 data. EDU_ALI = educational alignment; OCC_ALI = occupational alignment; ESCS = economic, social, and cultural status; PINT = parental involvement; INFO = career information--seeking. Standard errors are in parentheses. Direct effects represent the estimated relationship between the predictor and outcome, holding other variables constant. Indirect effects capture mediation through PINT and/or INFO. Total effects are the sum of direct and indirect effects. Analyses account for complex survey design and weights.
p < .05. p < .01. p < .001.

Source: Own computations based on PISA 2022 data for Poland (9th grade only)

Below we organize the interpretation of results around the three core hypotheses.

8.1 Alignment Patterns by Track (Descriptive Overview, H1)

Our first hypothesis predicted that school track would play a central role in shaping alignment. As we have already seen in Figures 1 and 2 of the data and methods section, alignment varies sharply by school type. Students in general secondary schools (LO) report the highest rates of alignment—90.2% in terms of expected educational attainment, and 79.1% for expected occupations. In contrast, sectoral school (BS I) students showed a much lower educational alignment (48.6%) and somewhat lower occupational alignment (67.3%). Technical school (TECH) students fell in between, with high educational alignment (93.3%) and middling occupational alignment (68.1%).

Expectations follow track-specific patterns: most LO students anticipate tertiary-level education and professional jobs; BS I students are more likely to expect vocational training and service or trade roles; and TECH students show a mix of post-secondary aspirations and technician-level occupations. However, misalignment existed in all groups. A subset of BS I students expect to enter professional careers that typically require a university degree—suggesting "over-alignment" —while some LO or TECH students anticipate entering lower-skilled jobs, signaling "under-alignment".

While the descriptive results offer a snapshot of broad alignment patterns across tracks, they do not account for other factors that may shape expectations—such as socioeconomic background, academic ability, or parental support. The statistical models that follow help isolate these influences and reveal how alignment operates once these confounding variables are considered. Both models confirm important differences by track. In the pooled model, students in TECH schools were more likely to be educationally aligned than those in LO ($\beta = 0.32$), though they were less aligned with their expected occupations ($\beta = -0.084$). Students in BS I were substantially less aligned in terms of education ($\beta = -0.301$), while their occupational alignment did not differ from LO after controlling for other factors.

Model 2 deepens this picture by isolating track-specific patterns. In BS I, socioeconomic background and math achievement were both strong predictors of alignment, suggesting that students in less academically selective tracks rely more on their personal and family resources to chart their futures. In LO, surprisingly, the effect of SES on alignment was negative. This may reflect what researchers call a ceiling effect: many students in LO may already expect to attend university, so the additional SES advantage offers little extra predictive value—or may even reflect over-ambition relative to the track's actual structure.

These results affirm Hypothesis 1 and support the broader theoretical claim that institutional placement creates structural opportunities and constraints. But alignment is not automatic. In more vocational settings, students must lean more heavily on support systems—especially academic ability and family resources—to bridge the gap between aspirations and available pathways.

8.2 Socioeconomic Background and Parental Involvement (H2)

Our second hypothesis focused on whether socioeconomic background improves alignment, particularly when mediated through parental involvement. This reflects theories of status attainment, which emphasize the transmission of resources, knowledge, and encouragement from families to children as a pathway to educational success.

Model 1 confirms this pattern. Socioeconomic status (ESCS) is positively associated with educational alignment ($\beta = 0.111$) and to a lesser extent with occupational alignment ($\beta = 0.032$). However, much of this influence operates indirectly through parental engagement (PINT). Students who reported more frequent discussions with their parents about school, aspirations, or academic progress were more likely to show alignment in both educational and occupational domains. Model 2 highlights how this relationship differs by school track. In both TECH and BS I, higher-SES families are more involved—and this involvement is strongly linked to better alignment. These results suggest that in vocational or semi-academic tracks, parental engagement serves as a compensatory mechanism, helping students navigate pathways that may lack strong institutional guidance or flexibility.

In LO, by contrast, ESCS does not significantly predict parental involvement. This may indicate that once students enter academically selective tracks, parental support becomes more evenly distributed, or that school norms and structures play a greater role in shaping students' decisions. Math achievement also contributes to alignment, particularly in BS I and TECH. This reinforces the idea that individual academic strength, combined with family support, can help buffer students from the constraints of more rigid tracks—and potentially expand their perceived opportunities.

These findings provide strong support for Hypothesis 2. Socioeconomic background promotes alignment, especially when filtered through parental engagement. But the strength and character of this pathway vary by institutional context, further emphasizing the importance of designing support systems that are responsive to track-specific realities.

8.3 The Role of Career Guidance and Information-Seeking (H3)

Our third hypothesis explored whether career guidance and information-seeking behaviors help students align their educational paths with career expectations. This variable (INFO) includes diverse activities—from attending job fairs and speaking with counsellors to browsing career websites or doing online research. However, these activities vary widely in quality and depth, and their effects are not always easy to capture in a single composite measure. In particular, aggregating exploratory behaviors (like browsing) with more structured activities (like job shadowing) may reduce the precision of this indicator, potentially obscuring more targeted effects. This may help explain the relatively modest effects observed in our models.

Descriptively, students in LO were most likely to report online research, while BS I students engaged more often in experiential activities such as job fairs or internships. Yet despite higher participation, TECH students were the least aligned, raising important questions about the effectiveness and targeting of guidance efforts.

In Model 1, the direct effect of INFO on either form of alignment was minimal and statistically insignificant. Only small indirect effects were observed, suggesting that information-seeking—at least as measured here—does not strongly shape student expectations when considered across the full sample. Model 2 reveals a more differentiated story. In TECH, INFO was positively associated with both educational and occupational alignment, suggesting that guidance may be more useful when paired with semi-academic, career-oriented curricula. In BS I, effects were weak or even slightly negative. This may reflect a mismatch between the guidance provided and the actual opportunities available to students in this track. In LO, INFO had a negative direct association with educational alignment ($\beta = -0.070$), which may indicate that information-seeking sometimes reflects confusion, doubt, or planning uncertainty rather than effective exploration.

These results offer only partial support for Hypothesis 3. While career guidance has the potential to support alignment —especially in TECH—its impact appears limited by both the institutional context and the heterogeneity of the guidance experiences themselves. Simply increasing guidance activities may not be sufficient. Instead, what matters is whether these experiences are timely, relevant, and embedded in pathways students actually have access to.

9. DISCUSSION AND CONCLUSIONS

This study examined how institutional placement, socioeconomic background, parental involvement, and career information-seeking shape the alignment between educational pathways and occupational expectations among Polish secondary students. Using data from PISA 2022 and two complementary modeling strategies—a pooled mediation model (Model 1) and a track-specific known-class model (Model 2)—we provide a layered view of how alignment functions within a tracked educational system.

9.1 Track Matters: Structural Constraints and Opportunities (H1)

Across both models, school track emerged as the most powerful predictor of alignment. Students in general secondary schools (LO) showed the highest rates of alignment, while misalignment was most pronounced in sectoral vocational programs (BS I). Technical school (TECH) students fell in between.

Model 1 revealed that BS I placement predicted lower alignment even after controlling for background and achievement. Model 2 added nuance by showing that the effects of background vary within tracks. In LO, for instance, the limited influence of SES may reflect ceiling effects: high-SES students may already be highly aligned or pursuing ambitious but track-inconsistent goals. These findings support H1 and emphasize that institutional placement structures students' opportunities but does not fully determine them. Individual and family resources remain critical.

9.2 The Role of Socioeconomic Resources and Parental Support (H2)

SES was a consistent but context-dependent predictor. In the pooled model, SES was positively associated with educational alignment, with modest effects on occupational alignment. Model 2 showed stronger effects in TECH and BS I, where navigating constraints appears to rely more heavily on family resources.

Parental involvement (PINT) emerged as a key mechanism in both models. Frequent engagement—conversations about school, aspirations, and academic progress—was linked to better alignment. In LO, involvement levels were relatively stable across SES groups. In other tracks, however, SES shaped not only the amount of parental support but also its effectiveness in supporting alignment.

These results affirm H2 and reinforce the status attainment theory: when formal guidance is weak or inconsistent, family involvement becomes a vital compensatory force, especially in less academically oriented tracks.

9.3 Career Guidance: Limited but Uneven Impact (H3)

The effects of career information-seeking (INFO) were mixed and track-dependent. Model 1 showed no significant direct effects, though small indirect effects—especially on educational alignment—were present.

Model 2 revealed that INFO was positively associated with alignment in TECH, where students may be better positioned to act on guidance. In BS I, however, INFO had weak or even negative associations, suggesting that guidance alone cannot overcome structural limitations. In LO, the negative association may reflect a reactive use of guidance by students facing uncertainty.

Overall, H3 is only partially supported. Career guidance has potential, but its effectiveness is shaped by the track in which it is delivered and by the broader resources students bring with them.

9.4 Implications for Policy and Practice

These findings point to the need for track-sensitive interventions. Based on our results, In LO, personalized counselling may help students—especially high-SES ones—refine overly ambitious plans and ensure realistic trajectories. In TECH, structured

post-secondary bridges and academic planning can enhance the value of guidance and increase alignment. In BS I, where many students aspire to tertiary careers despite limited structural pathways, expanded guidance, stronger family-school partnerships, and flexible transition options are essential. Across all tracks, parental involvement remains a powerful, underused lever. Schools can strengthen partnerships with families through mentoring, planning sessions, and communication tools that bring families into the decision-making process.

9.5 Limitations and Directions for Future Research

This study captures alignment as a snapshot, though student aspirations evolve over time. The survey data has potential biases (e.g., self-reported data reliability, missingness that may relate to students' motivation, etc.). Moreover, because PISA data are cross-sectional, causal inference is limited. School track is not randomly assigned and that opens the door to bias. Although we take into account math performance, SES and gender, there might be other factors at play. We also don't have information on how alignment changes or how guidance and parental support unfold over time. While our models account for track placement, we cannot fully isolate the influence of prior achievement or motivational traits that shape both track selection and career expectations.

Future studies should explore:

- Longitudinal designs that track students from track selection onward;
- Qualitative research on how students—especially in vocational programs—form, revise, and act on their goals;
- Broader psychological predictors of alignment, including self-efficacy and goal certainty.

Although this study focuses on Poland, our findings offer broader insight into how institutional design shapes alignment. In systems with similar structures, the same policies may work differently depending on when tracking occurs, how flexible transitions are, and how guidance is delivered. Our results show that institutional features produce not only inequalities between students but also differences within them, depending on their placement.

To summarize, alignment is not just about ambition or school type. It reflects a dynamic interplay of institutional structures, available support, and student agency. Reducing misalignment—especially for students facing structural disadvantages—requires context-sensitive strategies that recognize this complexity: expanding guidance system, engaging families, and building more flexible, inclusive pathways into the future.

Data access statement: PISA 2022 data, accompanied by detailed technical documentation, can be accessed on the OECD PISA website. Detailed information about the methods used can be obtained from the authors.

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