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Disparities in mental health and its determinants among Québec high school students by language of instruction

DATA ANALYSIS OF THE QUÉBEC HEALTH SURVEY OF HIGH SCHOOL STUDENTS

LANGUAGE AS DETERMINANT OF HEALTH AND QUALITY OF SERVICES

Québec

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Bureau d'information et d'études en santé des populations

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Acronyms and abbreviations

ADHD	Attention Deficit Hyperactivity Disorder
ELHSS	English-language high school students
FLHSS	French-language high school students
HR	Health region
ISQ	Institut de la statistique du Québec
MDMA	3,4-methylenedioxymethamphetamine (ecstasy)
MID	Minimal important difference
MSSS	Ministère de la Santé et des Services sociaux
OTC	Over-the-counter
PAS	Psychoactive drug substances
QSCDK	Québec Survey of Child Development in Kindergarten
QHSHSS	Québec Health Survey of High School Students
WHO	World Health Organization

Highlights

This paper provides a comparative analysis of several mental health indicators and determinants by language of instruction. All data discussed in this analysis is from the Québec Health Survey of High School Students 2016–2017.

For most of the indicators analyzed, there is no disparity between students in English and French high schools. When there is a gap between the two groups, it can be to the disadvantage of students taught in either language.

For example, a **greater proportion** of students in English high schools reported that they:

- Had been medically diagnosed with depression
- Had been medically diagnosed with an eating disorder
- Did not feel healthy
- Slept less than recommended during the school week
- Had poor social support from their family
- Had low overall self-efficacy
- Had been bullied at school, on the way to school, or online during the school year
- Had been attacked by gang members at school or on the way to school during the school year

In contrast, a **lower proportion** of students in English high schools reported that they:

- Had been medically diagnosed with ADHD
- Had taken medication to help them calm down or focus in the previous 2 weeks
- Had used alcohol excessively (5 or more consecutive drinks) at least once in the previous 12 months
- Had used an electronic cigarette
- Had poor social support from their community
- Had been violent with their romantic partner at least once in the previous 12 months
- Were likely to drop out of school

While the results do show some disparities based on language of instruction (English or French), all high school students can experience mental health problems and situations that are detrimental to their well-being.

Summary

Background

Adolescence is an important transition stage where multiple social, psychological, and biological factors can affect long-term health and well-being. It's during this period that mental health issues come to light. Survey and surveillance data show that such issues are on the rise among adolescents in Québec.

Language minority status is a recognized determinant of population health and well-being. Speakers of minority languages are more likely to experience language barriers when seeking and receiving healthcare services, which can affect their health. Various studies have reported disparities between English- and French-speaking Quebecers, particularly with respect to perinatal health, unintentional injury mortality, and lifestyle issues. However, the gaps are not always to the disadvantage of the anglophone minority. Canadian studies comparing the mental health of minority and majority language groups have reported mixed results and have not been able to establish a relationship between language and mental health.

Goals and methods

This report examines adolescents attending English and French schools in Québec and compares the two groups on aspects related to mental health and its determinants to see if there are any gaps between them.

All data discussed in this analysis is from the Québec Health Survey of High School Students 2016–2017, conducted by the Institut de la statistique du Québec at the request of the Ministère de la Santé et des Services sociaux. This data covers mental and physical health as well as determinants of mental health related to lifestyle habits, risk behaviours, and social adjustment.

The study sample consists of 62,277 respondents out of approximately 388,000 students, including students from secondary 1 through 5 (grades 7 to 11) attending English and French public and private high schools in Québec. Students in adult education or attending schools in the Terres-Cries-de-la-Baie-James and Nunavik regions were not included in the study. Also excluded from the analysis were students enrolled in vocational training centres, Indigenous language schools, institutions operated by the federal government or other provincial ministries, and schools where 30% or more of students have disabilities or severe behavioural problems.

The high school's language of instruction is used to distinguish the two language groups (English and French), regardless of mother tongue or language spoken at home.

We used the estimation method to compare health and well-being indicators between the two groups of students. The estimation method uses effect measures (e.g., risk difference or relative risk) and their confidence intervals to draw comparisons between two groups. In this study, we analyze both effect measures (risk difference and relative risk) because each provides a different, but complementary, interpretation. Effect measures and their confidence intervals are compared with a reference value, i.e., the minimal important difference. The extent to which the confidence interval exceeds the minimal important difference indicates the likelihood that the observed difference is "important" for health purposes.

RESULTS

Mental health by language of instruction

Mental health covers the following: languishing mental health (i.e., poor emotional and functional well-being), psychological distress, conditions diagnosed by a physician or health professional (e.g., anxiety disorders, eating disorders, ADHD), and use of prescription drugs for anxiety, depression, or concentration. The results suggest that students in English high schools are less likely to be diagnosed with ADHD or to take medication to help them calm down or focus. Conversely, they are more likely to suffer from depression or anxiety disorders. There is no evidence of disparity in any other area.

Determinants of mental health

The determinants of mental health discussed in this report have been grouped into five themes:

- Perception of physical health
- Lifestyle habits: physical activity, sleep, weight, and body image
- Risk behaviours: tobacco use, alcohol use, drug use, and risky sexual behaviours
- Social adjustment: support, self-esteem and social skills, and dropout risk
- Violence: bullying, aggressive behaviour, and relationship violence

The results reveal gaps in five health determinant indicators favouring students in English high schools and six favouring students in French high schools. Some health indicators for which disparities are observed refer to the same theme. For example, a higher proportion of students in English schools reported a lack of support from their family, but a lower proportion of them reported a lack of support from their community (there was no gap in social support from friends or at school).

Some themes show disparities for only one of the two language groups. For example, a higher proportion of students in English high schools slept less than recommended and had low overall self-efficacy. Meanwhile, students in French high schools were significantly more likely to drop out. They were also more likely to binge drink and vape.

The indicators with the biggest gaps were related to violence at school or on the way to school; students in English schools were considerably more likely to experience such violence. This is consistent with the results of the previous survey (2010–2011), where students in English schools were twice as likely than those in French schools to report experiencing violence at school or on the way to school or being bullied online.

CONCLUSIONS AND LIMITATIONS OF THE STUDY

Overall, the results do not allow us to determine whether the mental health of students in English high schools is better or worse than that of students in French high schools. There is no conclusive evidence that minority language education affects mental health in any way. These findings are consistent with other research conducted in Canada and elsewhere.

However, one important caveat to consider when interpreting these results is the use of language of instruction as the language variable in the absence of survey data on mother tongue and language spoken at home. The results may have been different if mother tongue or language spoken most often at home had been used instead. The presence of English speakers in French schools and vice versa means that using the language of instruction likely led to biases when estimating the observed differences in health and well-being indicators. Nevertheless, in the absence of data on mother tongue and language spoken at home, language of instruction is the variable that best represents the realities of the two language communities.

1 Introduction

1.1 The issue

1.1.1 Language minority status and mental health

Language has been identified as a determinant of individual health and well-being (Bowen, 2001). Past research shows that there are often disparities in health and health determinants among people who do not know or have limited knowledge of the dominant language of a community compared to the rest of the population (Bouchard *et al.*, 2009; Bouchard *et al.*, 2009a; Bouchard *et al.*, 2009b; Desjardins, 2003; Picard & Allaire, 2005). Minority language speakers often have poor access to social resources in their own language, and their health and well-being can suffer as a result (Bouchard and Desmeules, 2011). For example, disparities between English speakers (anglophones) and French speakers (francophones) in Québec have been reported in several studies on perinatal health (Auger, Park, & Harper, 2012; Tu, Bilodeau-Bertrand, & Auger, 2018), avoidable mortality (Trempe *et al.*, 2013), unintentional injury mortality (Burrows, Auger, & Lo, 2016), life expectancy (Auger *et al.*, 2012), lifestyle habits (Lussier & Trempe, 2013), and even socioeconomic status (Lussier, 2012). However, such gaps are not always to the detriment of English speakers, despite their language minority status in Québec.

Studies comparing the mental health of minority and majority language groups have produced mixed results and do not support a relationship between language and mental health (Burrows *et al.*, 2013; Chartier *et al.*, 2014; Puchala *et al.*, 2013; Vasiliadis *et al.*, 2012). However, speakers of minority languages may face language barriers when accessing healthcare and other services (Bouchard & Desmeules, 2011; Bowen, 2001; Puchala *et al.*, 2013). This is especially true for mental health, where good communication between patient and health professional is essential (Bouchard & Desmeules, 2011).

1.1.2 Increase in mental health problems and mental disorders among Québec adolescents

In recent years, survey and surveillance data have revealed an increase in mental health problems among adolescents in Québec (Traoré *et al.*, 2018). The prevalence of mental disorders for people aged 10–14 years went up from 11% in 2010–11 to 15% in 2016–17. The proportion of high school students with high levels of psychological distress also jumped from 21% to 29% over the same period. This is consistent with the proportion of high school students diagnosed with anxiety, depression, and/or an eating disorder (12–20%) and those diagnosed with ADHD (13–23%) (QHSHSS via Infocentre de santé publique du Québec).

Adolescence is a critical transition period that can have a lifelong impact on health. Many mental health problems are said to arise in adolescence (Kessler *et al.*, 2007). Nearly half of mental disorders that persist into adulthood appear before the age of 14, and three quarters are thought to manifest before the age of 25 (Kessler *et al.*, 2005).

In addition to age, multiple social, psychological, and biological factors influence an individual's mental health in positive or negative ways (protective and risk factors). Some recognized risk factors include stress, poverty, low education, social insecurity, harsh working conditions, discrimination, social exclusion, poor lifestyle habits, exposure to violence, and poor physical health (WHO, 2018). Mental disorders are often linked to unhealthy lifestyle habits such as physical inactivity, smoking, binge drinking, and sleep deprivation (Ministère de la Santé et des Services sociaux, 2017). Some risk factors come into play very early in a person's life and contribute to the subsequent development

of psychological disorders (Desjardins *et al.*,2008; Du Roscoät *et al.*, 2016). Protective factors, on the other hand, promote mental health and well-being and include basic personal characteristics (resilience, self-esteem, physical activity), social support, social inclusion (sense of community), and positive environments (Desjardins *et al.*, 2008).

1.1.3 VULNERABILITY OF YOUTH IN MINORITY LANGUAGE COMMUNITIES

Health and social disparities are quite common for language minorities. Studies have shown that a higher proportion of Canada's francophone minority (living outside Québec) do not feel healthy and are older, less educated, and poorer than the anglophone majority. They are also more likely to have two or more chronic diseases, to smoke, to binge drink, and to be obese (Bouchard *et al.*, 2009a). The anglophone minority of Québec (excluding Montréal) has a similar profile (Bouchard & Desmeules, 2013). Despite being more likely to have a university degree, Québec anglophones have higher unemployment rates than francophones and are more likely to have low incomes, especially outside large urban centres (Lussier, 2012; Corbeil, 2010).

Young anglophones are also vulnerable. Results from the 2017 Québec Survey of Child Development in Kindergarten (QSCDK) show that children who are native English speakers are more likely to be at risk in four out of five domains of child development: physical health and well-being, social skills, cognitive and language development, and communication skills and general knowledge (Groleau, 2019). Beyond kindergarten, the previous edition of the QHSHSS (2010–2011) found that students in English schools were more likely than students in French schools to report having experienced violence at school or on the way to school or being bullied online (Baron *et al.*, 2016). Students studying in English are more likely than students studying in French to have low self-esteem and high psychological distress. Moreover, mental health conditions such as anxiety, depression, and eating disorders are more prevalent among students in English schools than students in French schools (Baron *et al.*, 2016).

1.2 Purpose

This report uses data from the Québec Health Survey of High School Students (QHSHSS) to compare specific aspects of mental health and its determinants among English- and French-speaking students in Québec in order to determine if there are any gaps between the two groups. The analysis covers mental and physical health as well as determinants of mental health related to lifestyle habits, risk behaviours, and social adjustment. Since the QHSHSS does not include data on mother tongue or language spoken at home, the two groups were defined based on language of instruction, i.e., English or French. The aim of this study is not to analyze the impact of language of instruction on student health and well-being, nor to assess the quality of the English and French education systems, but rather to compare the two language groups using language of instruction as a proxy for mother tongue. The limitations of using this proxy are discussed later in the report.

2 Methods

2.1 Data sources and sample population

All data discussed in this report is from the Québec Health Survey of High School Students 2016–2017 (QHSHSS). This survey was conducted by the Institut de la statistique du Québec (ISQ) at the request of the Ministère de la Santé et des Services sociaux (MSSS). The target population for this study was all Québec high school students. The study sample includes students from secondary 1 through 5 attending English and French public and private high schools in Québec. Students in adult education or attending vocational training centres or schools in the Terres-Cries-de-la-Baie-James and Nunavik health regions were excluded from the study. Also excluded from the analysis were students enrolled in Indigenous language schools, non-network institutions operated by the federal government or other provincial ministries, and schools where 30% or more of students have disabilities or severe behavioural problems. The study population comprises of 388,106 students, or about 98% of all Québec high school students in the youth sector. A total of 62,277 students completed the QHSHSS, for an overall weighted response rate of 91% (Plante *et al.*, 2018).

2.2 Variables analyzed

2.2.1 Language variable

Since the QHSHSS does not include data on mother tongue or home language, the variable used to define the language communities in this study is language of instruction. In Québec, this can be French, English, or an Indigenous language. The language of instruction is the language in which students are taught in all subjects except second language and Indigenous language and culture courses. Students in welcome classes or French language support classes are considered to be studying in French. Students in French immersion classes are considered to be studying in English (MEES, 2015).

Students are divided into two groups based on language of instruction—English or French—regardless of their first language or language spoken at home (Table 1). In this document, students attending high schools where the language of instruction is English are referred to as English-language high school students (ELHSS), and students attending high schools where the language of instruction is French are referred to as French-language high school students (FLHSS). Accordingly, students whose first or home language is English attending schools where the language of instruction is French are classified as FLHSS. Likewise, students whose first or home language is French attending schools where the language of instruction is English are classified as ELHSS.

Table 1 Distribution of high school students by language of instruction based on the QHSHSS

	QHSHSS 2016–2017	
	Number of students in target population (N)	**Proportion (%)**
Language of instruction		
French	349,937	90.2
English	38,169	9.8
Total	388,106	100.0

2.2.2 SOCIODEMOGRAPHIC DATA AND THEMES

Demographic, socioeconomic, and academic data on high school students are presented by language of instruction. The selected QHSHSS indicators are linked to mental health themes and determinants. The determinants analyzed were selected based on the literature (Bouchard, Batista, & Colman, 2018; Desjardins, *et al.*, 2008; Doré & Caron, 2017; Du Roscoät *et al.*, 2016; World Health Organization, 2018). The selected indicators were grouped into the following themes:

- Mental and physical health
- Determinants of mental health:
  - Lifestyle habits: sleep, weight, body image
  - Risk behaviours: smoking, drinking, drug use, and sexual behaviours
  - Social adjustment: social environment, self-esteem and social skills, dropout risk, and violence

2.3 Statistical analysis

The data presented in this report are raw proportions with 95% confidence intervals. We used bootstrap resampling with 500 weights to calculate the interval for QHSHSS 2016–2017. Proportions are based on all high school students, except for sexual behaviour indicators, which covers all students aged 14 and over, who make up 70% of the target population. Data with coefficients of variation greater than 15% are not presented in this report, as these estimates are not considered sufficiently accurate (Plante *et al.*, 2018). Such data is identified by an "NP" (not presented) in the tables. High values indicate a health problem or risk behaviour.

Instead of statistical tests using the null hypothesis principle (and p-values), we used the estimation method to compare health and well-being indicators between ELHSS and FLHSS. This method has been strongly recommended (Cumming, 2014; Gardner & Altman, 1986) to avoid fundamental problems in interpreting p-values in connection with null hypothesis tests[1] (Wasserstein & Lazar, 2016; Wasserstein, Schirm, & Lazar, 2019). The estimation method uses confidence intervals for comparisons. It eliminates the step of sorting by statistical significance and therefore requires an assessment of the magnitude or importance of all measured results. The estimation method has long been established in the medical field (Ci & Rule, 1987; Gardner & Altman, 1986) and is recommended for interpreting clinical trials (Guyatt *et al.*, 1995).

2.3.1 RISK DIFFERENCE AND RELATIVE RISK

The estimation method uses effect measures[2] (e.g., risk difference or relative risk) and confidence intervals. In this study, the **risk difference** is the difference between the proportion of respondents with a health problem or risk behaviour in the FLHSS and ELHSS groups. A positive difference is therefore unfavourable to FLHSS while a negative difference is unfavourable to ELHSS. The **relative risk** is obtained by dividing the proportion of respondents with a health problem or risk behaviour in the FLHSS group by that of the ELHSS group. A relative risk greater than 1 is unfavourable to FLHSS while lower than 1 is unfavourable to ELHSS. Note that in this study, we analyze both effect measures (risk difference and relative risk) because each provides a different, but complementary, interpretation (Spiegelman & VanderWeele, 2017). Confidence intervals for estimates were calculated

[1] For example, in null hypothesis tests, the p-value confounds effect size and sample size (it becomes small if the measure of association is large or if the sample sizes of study populations are large). P-values have low reproducibility and do not reflect the likelihood that a hypothesis is true or not (Cumming, 2014; Greenland, 2016; Wasserstein, 2016).

[2] In this report, the terms "effect size measure" and "effect measure" are used interchangeably.

using bootstrap weight techniques with Sudaan software. Charts illustrating effect measures and confidence intervals are provided in the appendix for visual interpretation.

Effect measures and confidence intervals are compared with a reference value, i.e., the minimal important difference (MID[3]) (Copay *et al.*, 2007). The extent to which the confidence interval exceeds the MID indicates the likelihood that the observed difference is "important" for health purposes. So the estimation method considers both effect size (through the magnitude of the estimated value) and variance (through the range of confidence intervals) (Cumming, 2014; Gardner & Altman, 1986). A significant advantage of this method is that it can identify effects that are unlikely to be important versus measured effects where there is too much uncertainty to reach a clear conclusion. Examples are provided in Section 2.3.3 (B and C).

Since the literature does not provide MIDs for public health indicators, we used the medical community's distribution method (Copay *et al.*, 2007; Cella *et al.*, 2002) to determine MID values. We examined the distribution of difference and relative risk values to identify MID values that were neither too exclusive nor too inclusive. The exact values were determined by "qualitative judgment," that is, by discussion and consensus among the authors, who have extensive expertise in surveillance and public health. Thus, a difference of +/- 10 percentage points between proportions of FLHSS and ELHSS (absolute difference of 10%) is considered "important" for health purposes. As for relative risk, a FLHSS/ELHSS ratio ≥ 1.2 or ≤ 0.8 (i.e., a 20% proportional difference) is considered important.

2.3.2 Level of certainty

As a few authors have suggested (Batterham & Hopkins, 2006; Page, 2014; Lo & Lasnier, 2020), the results of the estimation approach can be quantitatively summarized by calculating the level of certainty. This value approximates the likelihood that the observed risk difference or relative risk value exceeds the MID value and is therefore "important." Level of certainty is calculated using a mathematical integration of the probability distribution of the measured effect (Batterham & Hopkins, 2006; Lemire, 2021; Lo & Lasnier, 2020). Level of certainty values help us identify indicators where an important difference between ELHSS and FLHSS is highly likely. This analysis uses three levels of certainty (Brahman, 1991; Anderson, 2019) conducive to suggesting interventions:

1) Level of certainty of 80–100% for at least one of the effect measures: With these indicators, there is enough certainty to conclude that there is an important difference between the two language groups.
2) Level of certainty of 10–80% for at least one of the effect measures and no level of certainty of 80–100% for either measure: The result is inconclusive, with too much statistical variability to conclude whether there is an important difference or not. A larger sample size would be required to reach a more definitive conclusion.
3) Level of certainty of 0–10% for both effect measures: The results strongly suggest that there is no important difference between ELHSS and FLHSS for this health indicator.

The exact values defining these levels of certainty (0%, 10%, 80%, 100%) were determined by "qualitative judgment," as with MID. It should be noted that the estimation approach is dependent on the choice of MID and certainty level categories, and is therefore inherently subjective. Changing these values could lead to different conclusions.

[3] Also known as the "minimal clinically important difference" (MCID).

2.3.3 EXAMPLES OF THE ESTIMATION APPROACH

Here are some examples of health indicator results from our analysis that illustrate how the estimation method works.

A) The proportion of high school students who took medication to help them calm down and focus (Indicator #8, Table 3, Figure 1A and 1B):

- The risk difference (FLHSS - ELHSS) is 20.9%. This exceeds the MID (10%) with 99.9% certainty. The confidence interval is therefore almost entirely above the MID. Because the level of certainty is greater than 80%, we can conclude that there is an important difference between the two groups for the risk difference.
- The relative risk (FLHSS / ELHSS) is 1.5. This exceeds the MID value (1.2) with 99.8% certainty. Again, the confidence interval is almost entirely above the MID. Because the level of certainty is greater than 80%, we can conclude that there is an important difference between the two groups for the relative risk.
- Since there is an important difference for at least one of the two effect measures, we can conclude that this indicator points to an unfavourable health disparity for FLHSS.

B) The proportion of high school students with high psychological distress (Indicator #2, Table 3, Figures 1A and 1B):

- The risk difference (FLHSS - ELHSS) is -2.5%. In absolute terms, this is less than the MID (10%) and the level of certainty is 0%. Only a very small portion of the confidence interval exceeds the MID. Because the level of certainty is 0–10%, we can conclude that there is no important difference between the two groups for the risk difference.
- The relative risk (FLHSS / ELHSS) is 0.9. This is within the MID limits (0.8; 1.2) and the certainty level is 0.5%. Only a very small part of the confidence interval exceeds the MID. Because the level of certainty is 0–10%, we can conclude that there is no important difference between the two groups for the relative risk.
- Since there is no important difference for either of the two effect measures, we can conclude that there is no important difference for this indicator. ELHSS and FLHSS have similar values for this health indicator.

C) Proportion of high school students who have smoked a whole cigarette (Indicator #17, Table 6, Figure 3A and 3B):

- The risk difference (FLHSS - ELHSS) is 1.1%. This is less than the MID (10%) and the level of certainty is 0%. Almost none of the confidence interval exceeds the MID. Because the level of certainty is 0–10%, we can conclude that there is no important difference between the two groups for the risk difference.
- The relative risk (FLHSS / ELHSS) is 1.1. This is within the MID limits (0.8; 1.2) and the certainty level is 22.2%. Much of the confidence interval is therefore above the MID. Because the level of certainty is 10–80%, we can conclude that the relative risk result is inconclusive.
- Since there is no important difference for the risk difference and the relative risk result is inconclusive, we can conclude that this indicator's result is inconclusive. While the risk difference does not indicate a gap, there is still a non-negligible possibility that the relative risk does.

3 Results

For each indicator subgroup (except demographic and socioeconomic data), the results are presented in the following order: indicators favouring ELHSS, indicators favouring FLHSS, indicators with no significant gap between the two language groups, and indicators where the data is insufficient to identify a gap. Items are presented in this order regardless of how the indicators are listed in the table. Note that the type of difference measure (risk difference, relative risk, or both) is not discussed in this section, but is provided in the last column of each table.

3.1 Demographic and socioeconomic data

Table 2 presents demographic, socioeconomic, and academic data on students by language of instruction.

Table 2 Demographic, socioeconomic, and academic data by language of instruction

	Language of instruction	
	French % (95% CI)	**English % (95% CI)**
Sex		
Boys	50.5 (50.1–50.9)	55.4 (51.6–59.2)
Girls	49.5 (49.1–49.9)	44.6 (40.8–48.4)
Age		
12 and under	11.0 (10.4–11.6)	NP
13	19.6 (19.0–20.4)	17.1 (13.9–20.9)
14	20.0 (19.3–20.8)	20.7 (16.8–25.2)
15	19.9 (19.2–20.6)	20.4 (16.9–24.3)
16	18.4 (17.7–19.1)	18.9 (15.7–22.6)
17 or older	11.0 (10.4–11.6)	11.1 (8.5–14.4)
Place of birth		
Canada	87.3 (86.6–88.0)	92.9 (91.1–94.3)
Outside Canada	12.7 (12.0–13.4)	7.1 (5.7–8.9)
Grade level		
Secondary 1	21.8 (21.2–22.4)	NP
Secondary 2	21.0 (20.4–21.6)	18.9 (14.2–24.7)
Secondary 3	21.3 (20.7–21.9)	21.7 (16.6–27.8)
Secondary 4	18.7 (18.2–19.3)	20.7 (16.4–25.8)
Secondary 5	17.2 (16.6–17.7)	20.4 (15.9–25.8)
Family status		
Two parents	62.6 (61.8–63.3)	68.4 (65.3–71.4)
Stepfamily	9.4 (9.0–9.8)	6.3 (5.2–7.7)
Single parent	13.0 (12.5–13.5)	12.7 (10.8–14.9)
Shared custody	13.4 (13.0–13.8)	10.2 (8.8–11.8)
Highest level of education of parents		
Below high school diploma	4.7 (4.4–5.0)	3.5 (2.6–4.7)
High school diploma	10.5 (10.1–11.0)	12.0 (10.2–14.1)
College or university degree	84.8 (84.2–85.4)	84.5 (81.9–86.8)
Employment status of parents		
Two working parents	78.0 (77.5–78.6)	73.9 (71.4–76.2)
One working parent	18.3 (17.8–18.8)	22.9 (20.9–25.0)
Perception of family's financial situation		
More affluent than class average	27.8 (27.3–28.3)	33.7 (31.2–36.2)
As affluent as class average	59.6 (59.0–60.2)	55.9 (53.4–58.4)
Less affluent than class average	12.6 (12.1–13.0)	10.4 (9.2–11.9)

3.2 Mental health

ELHSS were less likely to have been diagnosed with ADHD than FLHSS across Québec (16% vs. 24%) (Table 3 and Figure 1). They were also less likely to report having taken medication to help them calm down or focus in the two weeks before the survey (38% vs. 59%).

However, ELHSS were more likely than FLHSS to have been diagnosed with depression (10% vs. 6%) or to have an eating disorder (3% vs. 2%).

There is no significant gap in the proportion of ELHSS and FLHSS diagnosed with an anxiety disorder or experiencing high psychological distress.

In regard to languishing mental health[4] and the use of depression and anxiety medication, the results are inconclusive; no significant gap could be identified between the two language groups (Table 3 and Figure 1).

Table 3 Mental health by language of instruction

#(*)		Language of instruction		Statistical comparison
		French % (95% CI)	English % (95% CI)	
	Mental health			
1	Languishing mental health	6.3 (5.9–6.7)	7.2 (5.6–9.2)	~
	Psychological distress			
2	High psychological distress	29.1 (28.3–29.8)	31.6 (28.5–34.8)	---
	Mental health disorders diagnosed by a physician or health professional			
3	Anxiety disorders	17.1 (16.6–17.6)	18.7 (16.6–21.0)	---
4	Depression	5.4 (5.1–5.7)	9.8 (8.3–11.6)	RR↓
5	Eating disorders	2.1 (1.9–2.3)	3.3 (2.6–4.3)	RR↓
6	ADHD diagnosed by a physician or health professional	23.7 (23.1–24.4)	15.9 (14.0–18.1)	RR↑
	Prescription drugs taken for anxiety or depression or to calm down and focus			
7	Medication taken for depression or anxiety in the previous 2 weeks	15.3 (14.4–16.3)	14.0 (10.9–17.8)	~
8	Medication taken to calm down or focus in the previous 2 weeks	59.2 (58.0–60.4)	38.3 (32.2–44.8)	RD↑ RR↑

*A number is assigned to each indicator to make it easier to identify the effect measures in Figure 1.

RD↑ Health disparity unfavourable for FLHSS. The risk difference between the two language groups (proportion of FLHSS – proportion of ELHSS) is greater than 10% with a level of certainty of more than 80%.

RD↓ Health disparity unfavourable for ELHSS. The risk difference between the two language groups (proportion of FLHSS – proportion of ELHSS) is less than -10% with a level of certainty of more than 80%.

RR↑ Health disparity unfavourable for FLHSS. The relative risk between the two language groups (proportion of FLHSS / proportion of ELHSS) is greater than 1.2 with a level of certainty of more than 80%.

RR↓ Health disparity unfavourable for ELHSS. The relative risk between the two language groups (proportion of FLHSS / proportion of ELHSS) is less than 0.8 with a level of certainty of more than 80%.

--- No important difference (risk difference or relative risk).

~ Inconclusive – Too much statistical variability to determine whether or not there is an important gap.

[4] Languishing mental health refers to poor emotional well-being (positive emotions, satisfaction, and interest in life) and functional well-being (i.e., social well-being [such as social contribution, achievement, and social integration] and psychological well-being [such as personal fulfilment, self-acceptance, autonomy, and positive relationships]) (Traoré *et al.*, 2018).

3.3 Determinants of mental health

3.3.1 Perception of physical health

As shown in Table 4 and Figure 1, ELHSS were more likely to feel unhealthy than FLHSS (6% vs. 4%).

Table 4 Perception of physical health

#(*)		Language of instruction		Statistical comparison
		French % (95% CI)	English % (95% CI)	
	Perception of health			
9	Proportion of students who do not perceive themselves as healthy	4.1 (3.8–4.4)	5.7 (4.7–6.9)	RR↓

* A number is assigned to each indicator to make it easier to identify the effect measures in Figure 1.

RR↓ Health disparity unfavourable for ELHSS. The relative risk between the two language groups (proportion of FLHSS / proportion of ELHSS) is less than 0.8 with a level of certainty of more than 80%.

3.3.2 Lifestyle habits

Active recreation and transportation

No important gap was observed between ELHSS and FLHSS not engaging in active recreation and transportation (65% vs. 69%) (Table 5 and Figure 2).

Sleep

According to the National Sleep Foundation, children ages 6–13 should sleep 9–11 hours, adolescents ages 14–17 should sleep 8–10 hours, and young adults ages 18–25 should sleep 7–9 hours (Hirshkowitz *et al.*, 2015; Tremblay *et al.*, 2016). Half of ELHSS (51%) sleep fewer hours than the minimum recommended for their age during the school week, while the proportion observed among FLHSS is 32%. This large gap narrows on weekends, but overall ELHSS sleep less than FLHSS (Table 5 and Figure 2).

Weight and body image

There is no important gap between the proportion of ELHSS and FLHSS who are obese (7% vs. 7%), overweight (22% vs. 21%), or dissatisfied with their body shape (54% vs. 55%) (Table 5 and Figure 2).

Table 5 Lifestyle habits

#(*)		Language of instruction		Statistical comparison
		French % (95% CI)	English % (95% CI)	
	Active recreation and transportation during the school year			
10	No active recreation and transportation	68.6 (67.7–69.4)	64.8 (62.0–67.4)	---
	Sleep			
11	Less sleep than recommended during school week	35.7 (34.9–36.4)	53.4 (50.3–56.5)	RD↓ RR↓
12	Less sleep than recommended on weekends	44.9 (44.3–45.5)	43.2 (40.2–46.3)	---
	Weight			
13	Proportion of overweight high school students (overweight + obesity)	20.7 (20.1–21.2)	22.4 (20.3–24.7)	---
14	Proportion of obese high school students	6.7 (6.4–7.0)	6.6 (5.4–8.0)	---
	Satisfaction with appearance			
15	Proportion of high school students not satisfied with their weight (body shape)	55.4 (54.5–56.2)	54.4 (51.0–57.8)	---

* A number is assigned to each indicator to make it easier to identify the effect measures in Figure 2.

RD↓ Health disparity unfavourable for ELHSS. The risk difference between the two language groups (proportion of FLHSS – proportion of ELHSS) is less than -10% with a level of certainty of more than 80%.

RR↓ Health disparity unfavourable for ELHSS. The relative risk between the two language groups (proportion of FLHSS / proportion of ELHSS) is less than 0.8 with a level of certainty of more than 80%.

--- No important difference (risk difference or relative risk).

~ Inconclusive – Too much statistical variability to determine whether or not there is an important gap.

3.3.3 RISK BEHAVIOURS

Tobacco use

There is an important gap in the proportion of students who had used e-cigarettes in the previous 30 days, with ELHSS less likely to have done so than FLHSS (23% vs. 30%).

For other tobacco use indicators, such as the proportion of students who have ever tried smoking a cigarette or who have smoked a whole cigarette, no important differences could be established between ELHSS and FLHSS due to statistical variability (Table 6 and Figure 3).

Alcohol use

ELHSS were much less likely than FLHSS to have used alcohol excessively (5 or more consecutive drinks) in the previous 12 months.

There are no important gaps in the other indicators of alcohol use, whether for students having drunk alcohol in their lifetime or in the previous 12 months (Table 6 and Figure 3).

Drug use

There is no significant gap in the proportion of ELHSS and FLHSS who had used drugs in their lifetime or in the 12 months before the survey. The same observation was made for students who had used cannabis in the previous 12 months.

No significant gaps were found between the two language groups for other types of drugs, such as MDMA (ecstasy) and drugs taken without prescription for their psychoactive effect (Table 6 and Figure 3), as the results are inconclusive.

Problem alcohol and drug use

Table 6 and Figure 3 do not indicate a significant gap between ELHSS and FLHSS having used alcohol or drugs in the previous 12 months.

No significant gap in negative consequences related to substance use could be found between the two language groups because the results were inconclusive.

Table 6 Psychoactive substance use

#(*)		Language of instruction		Statistical comparison
		French % (95% CI)	English % (95% CI)	
	Cigarette smoking			
16	Proportion of high school students who have tried to smoke a cigarette	20.5 (19.8–21.2)	18.9 (16.1–22.0)	~
17	Proportion of high school students who have smoked a whole cigarette	11.5 (11.0–12.1)	10.4 (8.5–12.7)	~
18	Proportion of high school students who have used an electronic cigarette	29.7 (29.0–30.4)	23.4 (20.5–26.5)	RR↑
	Alcohol use			
19	Proportion of high school students who have used alcohol	55.6 (54.9–56.4)	50.4 (46.3–54.5)	---
20	Proportion of high school students who have used alcohol in the previous 12 months	53.2 (52.5–53.9)	47.3 (43.3–51.4)	---
21	Proportion of high school students who have used alcohol excessively (5 or more consecutive drinks) at least once in the previous 12 months	35.1 (34.5–35.8)	26.7 (23.4–30.4)	RR↑
	Drug use			
22	Proportion of high school students who have used drugs	19.9 (19.2–20.5)	19.7 (16.8–22.9)	---
23	Proportion of high school students who have used drugs in the previous 12 months	20.1 (19.4–20.5)	19.9 (17.2–22.9)	---
24	Proportion of high school students who have used cannabis in the previous 12 months	18.2 (17.6–18.8)	17.6 (14.9–20.7)	---
25	Proportion of high school students who have used MDMA in the previous 12 months	2.8 (2.6–3.0)	2.3 (1.8–3.1)	~
26	Proportion of high school students who have used over-the-counter drugs to get an effect in the previous 12 months	2.9 (2.7–3.1)	3.5 (2.6–4.7)	~

Table 6 Psychoactive substance use (continued)

#(*)		Language of instruction		Statistical comparison
		French % (95% CI)	English % (95% CI)	
	Problem alcohol and drug use in the previous 12 months			
27	Proportion of high school students who are polysubstance users of psychoactive drugs substances	18.3 (17.7–18.9)	17.1 (14.6–20.0)	---
28	Proportion of high school students who have had at least one negative consequence because of their alcohol or drug use	8.4 (8.0–8.8)	9.3 (7.5–11.4)	~
29	Proportion of high school students who have had psychological problems because of their alcohol or drug use	3.7 (3.5–3.9)	4.4 (3.3–5.9)	~

* A number is assigned to each indicator to make it easier to identify the effect measures in Figure 3.

RD↑ Health disparity unfavourable for FLHSS. The risk difference between the two language groups (proportion of FLHSS – proportion of ELHSS) is greater than 10% with a level of certainty of more than 80%.

RR↑ Health disparity unfavourable for FLHSS. The relative risk between the two language groups (proportion of FLHSS / proportion of ELHSS) is greater than 1.2 with a level of certainty of more than 80%.

--- No important difference (risk difference or relative risk).

~ Inconclusive – Too much statistical variability to determine whether or not there is an important difference.

Sexual behaviours

Among FLHSS aged 14 and older, 28% reported having had consensual vaginal sex, and 6% reported having had consensual anal sex at least once in their lifetime. Among ELHSS, 18% reported having had consensual vaginal sex, and 5% reported having had consensual anal sex at least once in their lifetime.

According to Table 7, about 40% of students aged 14 and older having had consensual vaginal sex at least once had not used a condom the last time they had consensual vaginal sex. There is no significant difference between the two language groups (Figure 3).

Both groups were more likely to report not using a condom for anal sex than for vaginal sex. Although the difference between the two groups appears to be significant—61% for ELHSS vs. 51% for FLHSS—low levels of certainty make it impossible to draw any conclusions.

Table 7 Sexual behaviours

#(*)		Language of instruction		Statistical comparison
		French % (95% CI)	English % (95% CI)	
	Sexual behaviours among students 14 and older			
30	Proportion of high school students (or their partners) who did not use a condom the last time they had consensual vaginal sex	39.7 (38.3–41.0)	39.7 (32.6–47.3)	---
31	Proportion of high school students (or their partners) who did not use a condom the last time they had consensual anal sex	50.8 (48.2–53.4)	61.0 (52.1–69.2)	~

* A number is assigned to each indicator to make it easier to identify the effect measures in Figure 3.

--- No important difference (risk difference or relative risk).

~ Inconclusive – Too much statistical variability to determine whether or not there is an important difference.

3.3.4 SOCIAL ADJUSTMENT

Social support

ELHSS were more likely than FLHSS to report a lack of support from their family (3% vs. 2%). Conversely, they were less likely to report a lack of support from their community (13% vs. 17%).

There is no gap between ELHSS and FLHSS with respect to social support at school (Table 8, Figure 4). As for social support from friends, evidence of a significant gap between the two language groups is inconclusive.

Table 8 Social support

#(*)		Language of instruction		Statistical comparison
		French % (95% CI)	English % (95% CI)	
	Poor social support			
32	Family support	1.9 (1.8–2.1)	3.0 (2.4–3.8)	RR↓
33	Friend support	5.1 (4.8–5.4)	6.8 (5.6–8.2)	~
34	School support	9.7 (9.1–10.2)	9.6 (7.9–11.7)	---
35	Community support	17.1 (16.4–17.9)	13.2 (11.0–15.6)	RR↑

* A number is assigned to each indicator to make it easier to identify the effect measures in Figure 4.

RR↑ Health disparity unfavourable for FLHSS. The relative risk between the two language groups (proportion of FLHSS / proportion of ELHSS) is greater than 1.2 with a level of certainty of more than 80%.

RR↓ Health disparity unfavourable for ELHSS. The relative risk between the two language groups (proportion of FLHSS / proportion of ELHSS) is less than 0.8 with a level of certainty of more than 80%.

--- No important difference (risk difference or relative risk).

~ Inconclusive – Too much statistical variability to determine whether or not there is an important difference.

Self-esteem and social skills

Table 9 and Figure 4 show that a greater proportion of ELHSS had low levels of overall self-efficacy[5] (28% vs. 21%).

However, there is no significant gap in the proportion of ELHSS and FLHSS with low self-esteem. For indicators of social competence, such as empathy and perseverance, the results are inconclusive.

[5] Overall self-efficacy is an individual's belief in their ability to complete a task, learn something, meet a challenge, or make a change. It motivates people to do what it takes to achieve their goals. It's also about having confidence in yourself and your ability to contribute (Traoré *et al.*, 2018).

Table 9 Self-esteem and social skills

#(*)		Language of instruction		Statistical comparison
		French % (95% CI)	English % (95% CI)	
	Self-esteem and social skills			
36	Low self-esteem	25.0 (24.5–25.6)	26.9 (24.5–29.4)	---
37	Low empathy	7.0 (6.6–7.5)	5.4 (4.3–6.8)	~
38	Low overall self-efficacy	20.9 (20.4–21.5)	28.3 (26.1–30.6)	RR↓
39	Low level of perseverance	17.3 (16.8–17.8)	20.2 (18.3–22.3)	~

* A number is assigned to each indicator to make it easier to identify the effect measures in Figure 4.

RR↓ Health disparity unfavourable for ELHSS. The relative risk between the two language groups (proportion of FLHSS / proportion of ELHSS) is less than 0.8 with a level of certainty of more than 80%.

--- No important difference (risk difference or relative risk).

~ Inconclusive – Too much statistical variability to determine whether or not there is an important difference.

Dropout risk

Relative to FLHSS, a smaller proportion of ELHSS reported being at high risk of dropping out of school (12% vs. 18%).

However, there is no significant gap between the two groups in terms of students having repeated at least one grade in elementary or high school (academic delay). The results for academic engagement and self-assessment of academic performance are inconclusive (Table 10 and Figure 4).

Table 10 Dropout risk

#(*)		Language of instruction		Statistical comparison
		French % (95% CI)	English % (95% CI)	
	Dropout risk			
40	Academic delay	16.1 (15.1–17.1)	9.0 (6.9–11.5)	---
41	Low academic engagement	18.2 (17.6–18.8)	15.9 (13.7–18.3)	~
42	High dropout risk	18.2 (17.3–19.0)	11.8 (9.4–14.6)	RR↑
43	Below average self-assessment of academic performance	14.7 (14.3–15.1)	12.0 (10.2–14.0)	~

* A number is assigned to each indicator to make it easier to identify the effect measures in Figure 4.

RR↑ Health disparity unfavourable for FLHSS. The relative risk between the two language groups (proportion of FLHSS / proportion of ELHSS) is greater than 1.2 with a level of certainty of more than 80%.

--- No important difference (risk difference or relative risk).

~ Inconclusive – Too much statistical variability to determine whether or not there is an important difference.

Violence

Table 11 and Figure 5 show that ELHSS were more likely than FLHSS to report being bullied at school or on the way to school during the school year, with 50% having experienced at least one of the bullying behaviours in the survey, compared to 30% of FLHSS. ELHSS were also more likely to report experiencing gang violence at school or on the way to school (5% vs. 4%) or being bullied online (9% vs. 6%). There are no significant gaps in the proportion of ELHSS and FLHSS reporting behaviours of direct or indirect aggression.

ELHSS were less likely to be emotionally, physically, or sexually abusive to their partners than FLHSS (19% vs. 25%).

As for relationship violence, evidence of a gap between the two language groups is inconclusive due to statistical variability. The same goes for forced sexual intercourse.

Table 11 Violence

#(*)		Language of instruction		Statistical comparison
		French % (95% CI)	English % (95% CI)	
	Bullying during the school year			
44	Victim of bullying at school or on the way to school during the school year, excluding cyberbullying	30.2 (29.5–30.8)	49.5 (46.4–52.6)	**RD↓ RR↓**
45	Victim of cyberbullying during the school year	5.8 (5.5–6.1)	8.5 (7.1–10.1)	**RR↓**
46	Victim of bullying at school, on the way to school, or online during the school year	32.0 (31.4–32.7)	51.2 (48.4–54.0)	**RD↓ RR↓**
47	Proportion of high school students who were attacked by gang members at school or on the way to school during the school year	3.5 (3.3–3.7)	5.2 (4.3–6.2)	**RR↓**
	Aggressive behaviours			
48	Direct aggression behaviour (at least one instance)	32.5 (31.9–33.1)	38.0 (35.2–40.9)	---
49	Indirect aggression behaviour (at least one instance)	63.6 (63.0–64.2)	57.0 (53.8–60.1)	---
	Relationship violence			
50	Proportion of students who were violent with their romantic partner at least once in the previous 12 months	24.7 (23.9–25.5)	18.9 (16.1–22.1)	RR↑
51	Proportion of students whose romantic partner was violent with them at least once in the previous 12 months	36.7 (35.8–37.6)	31.6 (28.0–35.4)	~
52	Proportion of high school students who have had at least one forced sexual encounter	5.9 (5.5–6.2)	6.5 (5.2–8.1)	~

* A number is assigned to each indicator to make it easier to identify the effect measures in Figure 3.

RD↑ Health disparity unfavourable for FLHSS. The risk difference between the two language groups (proportion of FLHSS – proportion of ELHSS) is greater than 10% with a level of certainty of more than 80%.

RD↓ Health disparity unfavourable for ELHSS. The risk difference between the two language groups (proportion of FLHSS – proportion of ELHSS) is less than -10% with a level of certainty of more than 80%.

RR↑ Health disparity unfavourable for FLHSS. The relative risk between the two language groups (proportion of FLHSS / proportion of ELHSS) is greater than 1.2 with a level of certainty of more than 80%.

RR↓ Health disparity unfavourable for ELHSS. The relative risk between the two language groups (proportion of FLHSS / proportion of ELHSS) is less than 0.8 with a level of certainty of more than 80%.

--- No important difference (risk difference or relative risk).

~ Inconclusive – Too much statistical variability to determine whether or not there is an important difference.

4 Discussion

4.1 Methodological limitations

4.1.1 Language variable used: language of instruction

In this study, language of instruction was used as the language variable in the absence of data on mother tongue and home language in the QHSHSS. The results may have been different if mother tongue or language spoken most often at home had been used instead.

Since 1977, the *Charter of the French Language* (Bill 101) has required all immigrants in Québec from the rest of Canada or abroad to send their children to French-language public elementary and high schools (Québec, 1977). Immigrants and the children of anglophone and allophone immigrants attending French schools are therefore included in the category of French-language students. Moreover, certain provisions of the law allow francophone children to study in English. Data from Ministère de l'Éducation et de l'Enseignement supérieur indicates that in 2015, 83% of students in French elementary and high schools were native French speakers, whereas only 63% of students in English schools were native English speakers (Olivier, 2017). Due to the presence of anglophones in French schools and francophones in English schools, as well as allophones in both types of schools, using language of instruction as a proxy for mother tongue results in biases in the classification of English- and French-speaking students in our analysis and could potentially introduce biases in the estimation of differences in health and well-being indicators.

This limitation highlights data availability issues and the challenges of selecting and defining language variables for health databases and sociodemographic and health surveys. There are several language variables and their availability varies by data source (Lussier, 2019). Language communities vary in size depending on the variable used to define them, which has an impact when calculating indicators of health and its determinants (Lussier, 2019). For example, according to 2016 census data, the size of Québec's English-speaking community changes depending on the variable used: 8% by mother tongue, 10% by home language, and 12% by first official language spoken (Lussier, 2019). The language indicator used to define language groups is therefore very important. Some indicators may have drawbacks depending on the aims of the study, as is the case here with language of instruction. As noted earlier, only 63% of students attending English schools in Québec are native English speakers (Olivier, 2017). This is a similar proportion to that observed in the general population for language spoken at home, which is the most widely used variable in health studies. Only 65% of people in Québec who speak English at home are native English speakers (Lussier, 2019). Based on these considerations, language of instruction is still, despite its drawbacks, a relevant variable for this study, and has already been used to define language communities in similar studies analyzing QHSHSS data (Baron *et al.*, 2016; Boulais, 2014; Boulais, 2016).

4.1.2 Statistical analysis: data interpretation by estimation method

Despite the advantages of the estimation approach given the significant limitations of hypothesis testing, there is still an element of subjectivity to be considered when interpreting the results of this method. In the absence of knowledge in the scientific literature, the minimal important difference (MID) and level of certainty thresholds were partly based on qualitative judgments, i.e., on discussion and consensus among the authors of the study, who have extensive expertise in surveillance and public health. This qualitative judgment may resemble clinical judgment (Jones, 2002). It should be noted, however, that the MID is critical to interpreting all health indicator analyses. For example, to be accurate, any effect size assessment or power analysis requires a MID, whose value therefore extends beyond the estimation approach.

The use of levels of certainty does not represent a new method per se, but rather a quantitative expression of the estimation method, which seeks to gauge the proportion of the probability distribution that exceeds the MID. However, the selected levels of certainty are rough guidelines only and should not be used as rigid thresholds as this would lead to problems similar to those in null hypothesis testing.

Because the MID and levels of certainty are subjective, we have been transparent in presenting all effect measures and their confidence intervals in the appended charts so readers can interpret the results according to their own parameters (e.g., MID and level of certainty thresholds) if they wish.

There is a major knowledge gap in the literature regarding established MID values and levels of certainty. Their development will require thought and discussion in the public health community. Cost-benefit analyses based on disease burden, years of life, or economic cost could be conducted to establish these values. Consensus among public health agencies (e.g., INSPQ) is probably required. This work is beyond the scope of the current study, but work has begun on the matter at INSPQ.

It should be noted that the elements of the estimation method are not new. Effect size assessment, MID, and confidence intervals are all well established concepts. But the estimation approach emphasizes these elements in order to reach a conclusion without resorting to hypothesis testing and the dichotomous sorting of associated p-values. With continued use in public health, strategies for applying and interpreting the estimation method will become increasingly sophisticated and refined. The method has been implemented in surveillance practices and is increasingly used in the public health system (Tissot *et al.*, 2021; Lemire, 2021; Lo & Lasnier, 2020).

4.1.3 SURVEY DATA

All data presented in this analysis is drawn from the QHSHSS, a weighted sample survey. The QHSHSS features excellent coverage of the target population and a very high response rate (Plante *et al.*, 2018). However, all answers are self-reported. That means that the values in this report may be biased due to poor recollection (recall bias) or the desire to project a certain social image (social desirability bias) (Berthelot *et al.*, 2013).

4.1.4 CONFOUNDING BIAS

The use of bivariate inference testing in this study carries significant risk of confounding bias that could have been mitigated by a multivariate modelling strategy. However, the raw data is still appropriate and serves the purposes of this study.

4.2 Observed differences

This study of health disparities between ELHSS and FLHSS in Québec found important differences between the two groups on several indicators, some favouring ELHSS and others not.

For example, **ELHSS were proportionately more likely than FLHSS** to report that they:

- Had been medically diagnosed with depression
- Had been medically diagnosed with an eating disorder
- Did not perceive themselves as healthy
- Slept less than recommended during the school week

- Had poor social support from their family
- Had low overall self-efficacy
- Had been bullied at school, on the way to school, or online during the school year
- Had been attacked by gang members at school or on the way to school during the school year

Conversely, **ELHSS were proportionally less likely than FLHSS** to report that they:

- Had been medically diagnosed with ADHD
- Had taken medication to help them calm down or focus in the previous 2 weeks
- Had used alcohol excessively (5 or more consecutive drinks) at least once in the previous 12 months
- Had used an electronic cigarette
- Had poor social support from their community
- Had been violent with their romantic partner at least once in the previous 12 months
- At high risk of dropping out of school

No important differences were found in the proportions of ELHSS and FLHSS reporting that they:

- Had experienced high psychological distress
- Had been medically diagnosed with an anxiety disorder
- Did not engage in active recreation or transportation
- Had less sleep than recommended on weekends
- Were overweight
- Were obese
- Were not satisfied with their weight (body shape)
- Had used alcohol
- Had used alcohol in the previous 12 months
- Had used drugs
- Had used drugs in the previous 12 months
- Had used cannabis in the previous 12 months
- Being polysubstance users of psychoactive drugs
- Had not used a condom the last time they had consensual vaginal sex
- Had poor social support at school
- Had low self-esteem
- Had a history of direct aggression behaviour (at least one instance)
- Had a history of indirect aggression behaviour (at least one instance)
- Were academically delayed

Due to high statistical variability, we were unable to determine whether or not there is an important difference between the proportions of ELHSS and FLHSS reporting that they:

- Had languishing mental health
- Had taken medication for anxiety or depression
- Had tried smoking a cigarette, if only for a few puffs
- Had smoked a whole cigarette
- Had had at least one negative consequence because of their alcohol or drug use in the previous 12 months
- Had had psychological problems because of their alcohol or drug use in the previous 12 months
- Had not used a condom the last time they had consensual anal sex
- Had had at least one forced sexual encounter
- Had poor social support from friends
- Had low self-confidence
- Had low empathy
- Had low perseverance
- Had low academic engagement
- Assessed their academic performance as below average

This report compares selected indicators of mental health and its determinants among high school students by language of instruction (English and French). Overall, the results do not indicate that the mental health of ELHSS is better or worse than that of FLHSS. This finding is consistent with the data of Bouchard et al, (2018) who created a mental health profile of French-speaking Canadians aged 15 to 24 living in minority language situations and concluded that there was no evidence that language minority status had any specific effect on youth mental health and illness. The few studies that have examined mental health problems in minority and majority language populations to see if there are any gaps between them were also inconclusive (Chartier *et al.*, 2014; Puchala *et al.*, 2013). With such sparse and disparate findings, further study is needed to better understand how language minority status affects mental health, access to and use of care, and the support available to language-minority youth. (Beaton *et al.*, 2018).

Nevertheless, some results are worth mentioning. As indicated above, eight indicators are unfavourable to ELHSS, and seven to FLHSS. Some of these indicators reflect issues common to both language groups, i.e., both groups have vulnerabilities in areas such as social support, mental health, and violence. But in other areas, only one of the two language groups is found to be vulnerable. For example, only ELHSS were found to be vulnerable in the areas of sleep, self-esteem, and perceived health, whereas FLHSS were more vulnerable with respect to dropout risk and risk behaviours.

The largest gaps were observed in violence-related indicators, particularly violence at school or on the way to school, which ELHSS experienced to a greater extent than FLHSS. This is consistent with the results of the previous survey (2010–2011), where students in English schools were twice as likely as those in French schools to report experiencing violence at school or on the way to school or being bullied online (Baron *et al.*, 2016). The reasons behind this pattern are not clear and should be explored in a future study.

5 Conclusion

This study presents a selection of indicators reflecting the mental health of ELHSS and FLHSS in Québec and some of its determinants. When considering mental health as a whole, the data does not support a one-sided conclusion that a gap exists between the two groups. Furthermore, many of the mental health indicators analyzed, such as depression, ADHD, eating disorders, and the use of medication to calm down and focus, show uneven results, some favouring ELHSS and others FLHSS.

Significant disparities were found between the two groups for certain indicators and determinants related to lifestyle habits and health behaviours. This is particularly true for specific social adjustment indicators, including violence and bullying. For instance, ELHSS seem to be bullied more than FLHSS.

In the end, although the results do point to certain disparities in psychological well-being between ELHSS and FLHSS, mental health problems and their determinants can affect all youth. Some students, such as allophones or students who speak neither English nor French at home, cannot be distinguished in this study and may face greater adversity. While there are ways to help certain vulnerable groups of adolescents, the main levers promoting mental health and limiting risk behaviours and social adjustment problems remain the same: strong support from family and friends and at school, self-esteem building, encouragement to stay in school, and a safe and healthy environment to thrive in.

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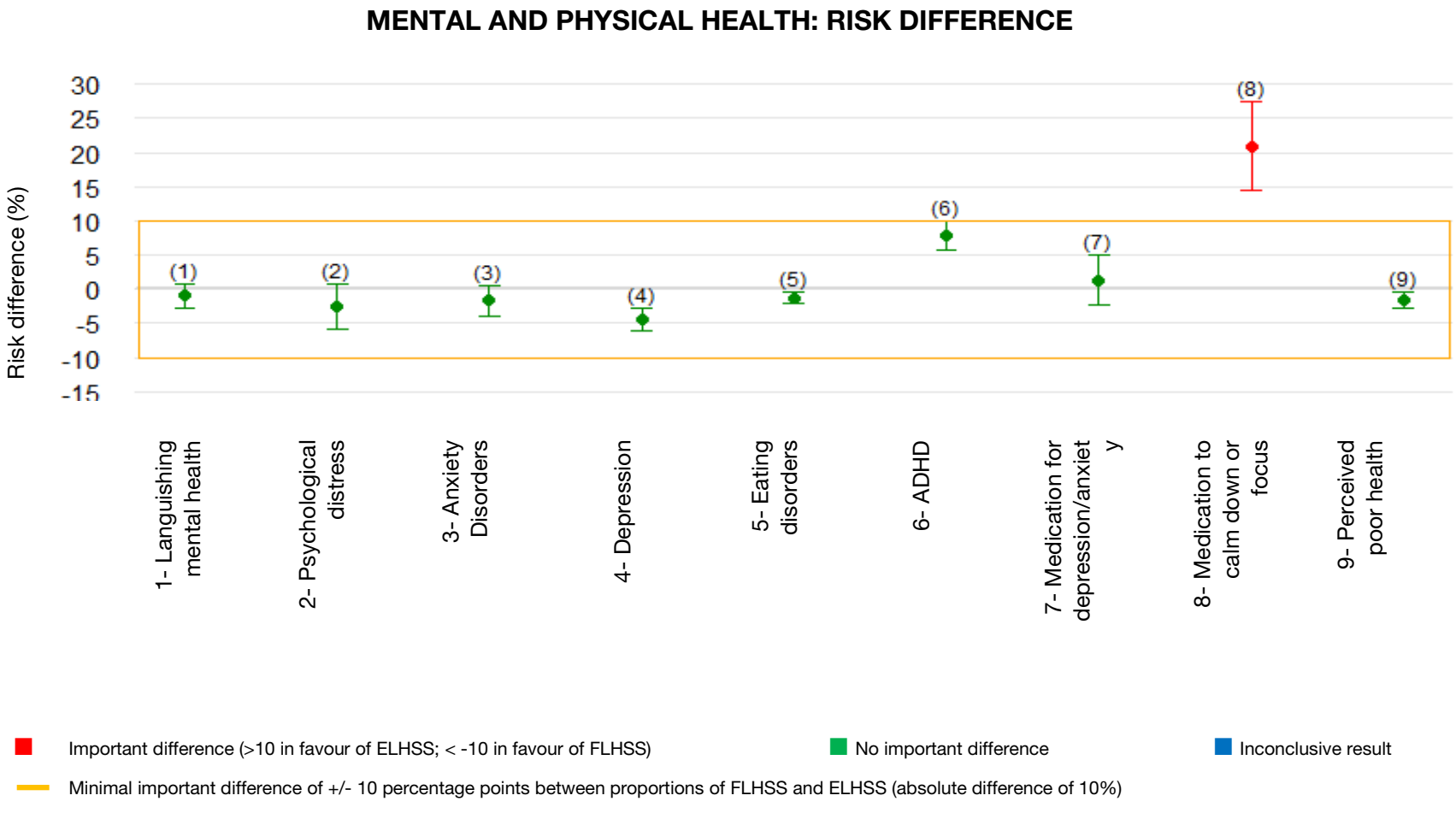
Appendix

Figure 1 Mental and physical health

A) Statistical inferences using the risk difference estimation method (FLHSS - ELHSS) with 95% confidence interval



B) Statistical inferences using the relative risk estimation method (FLHSS - ELHSS) with 95% confidence interval

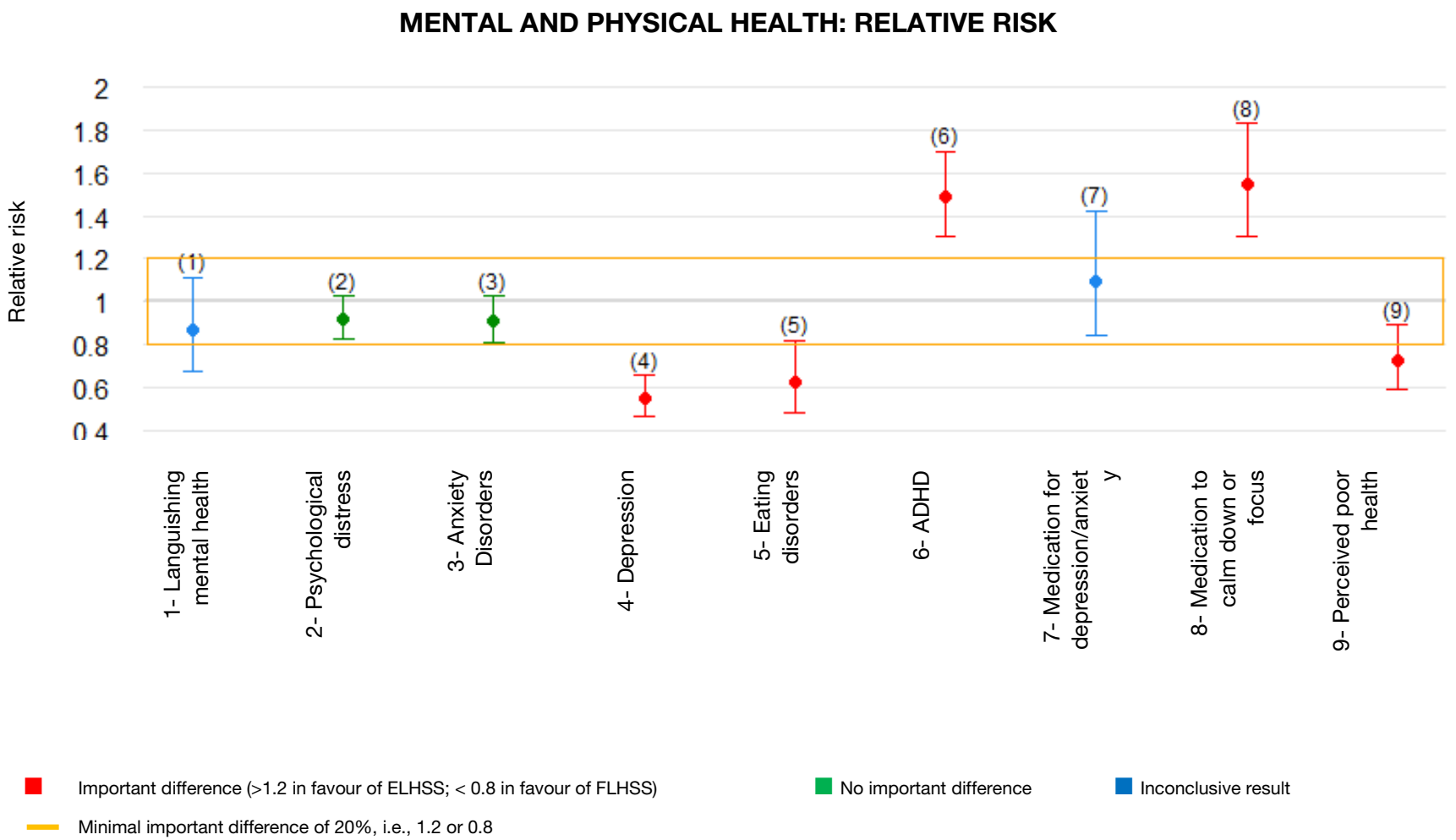
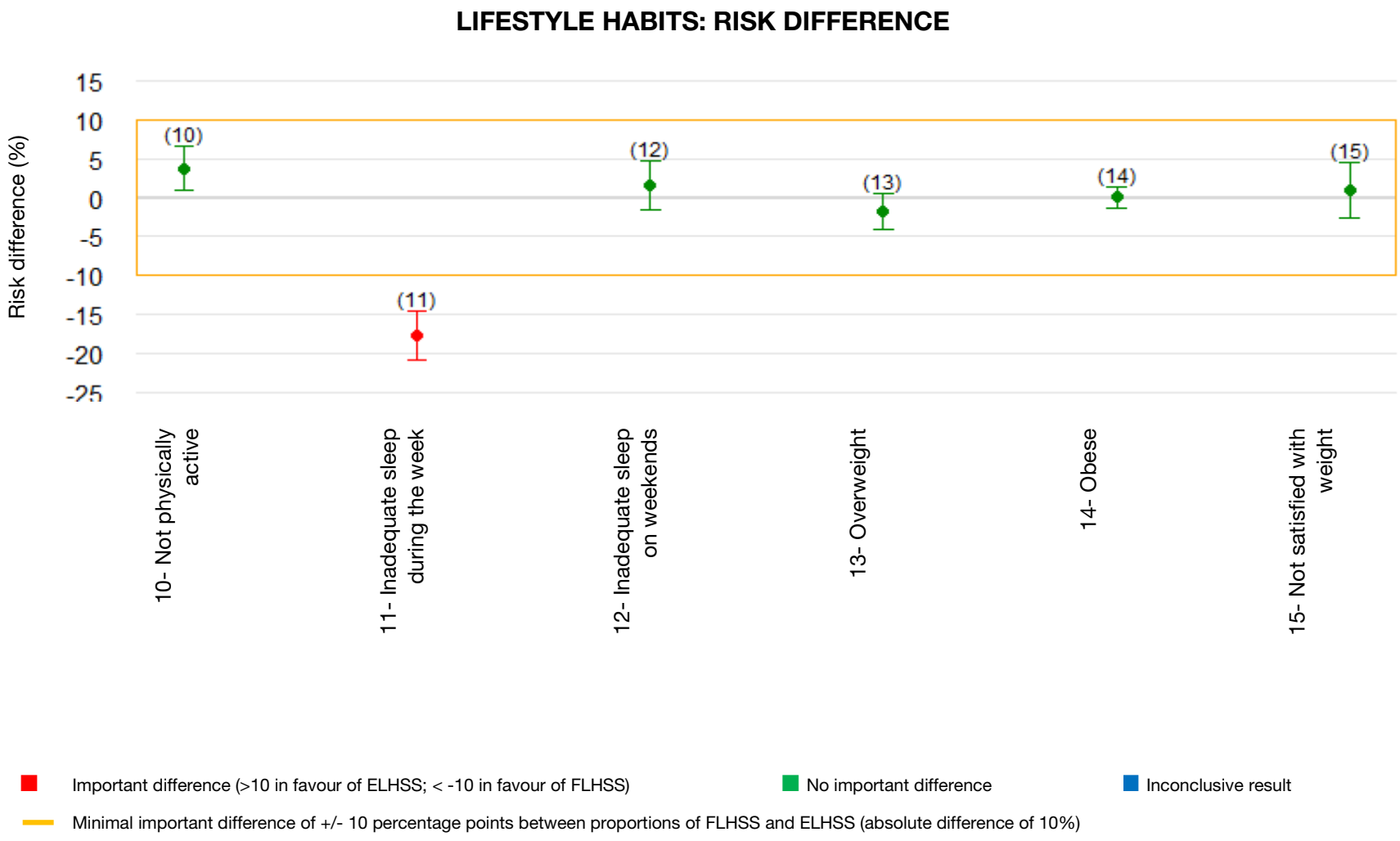


Figure 2 **Lifestyle habits**

A) Statistical inferences using the risk difference estimation method (FLHSS - ELHSS) with 95% confidence interval



B) Statistical inferences using the relative risk estimation method (FLHSS - ELHSS) with 95% confidence interval

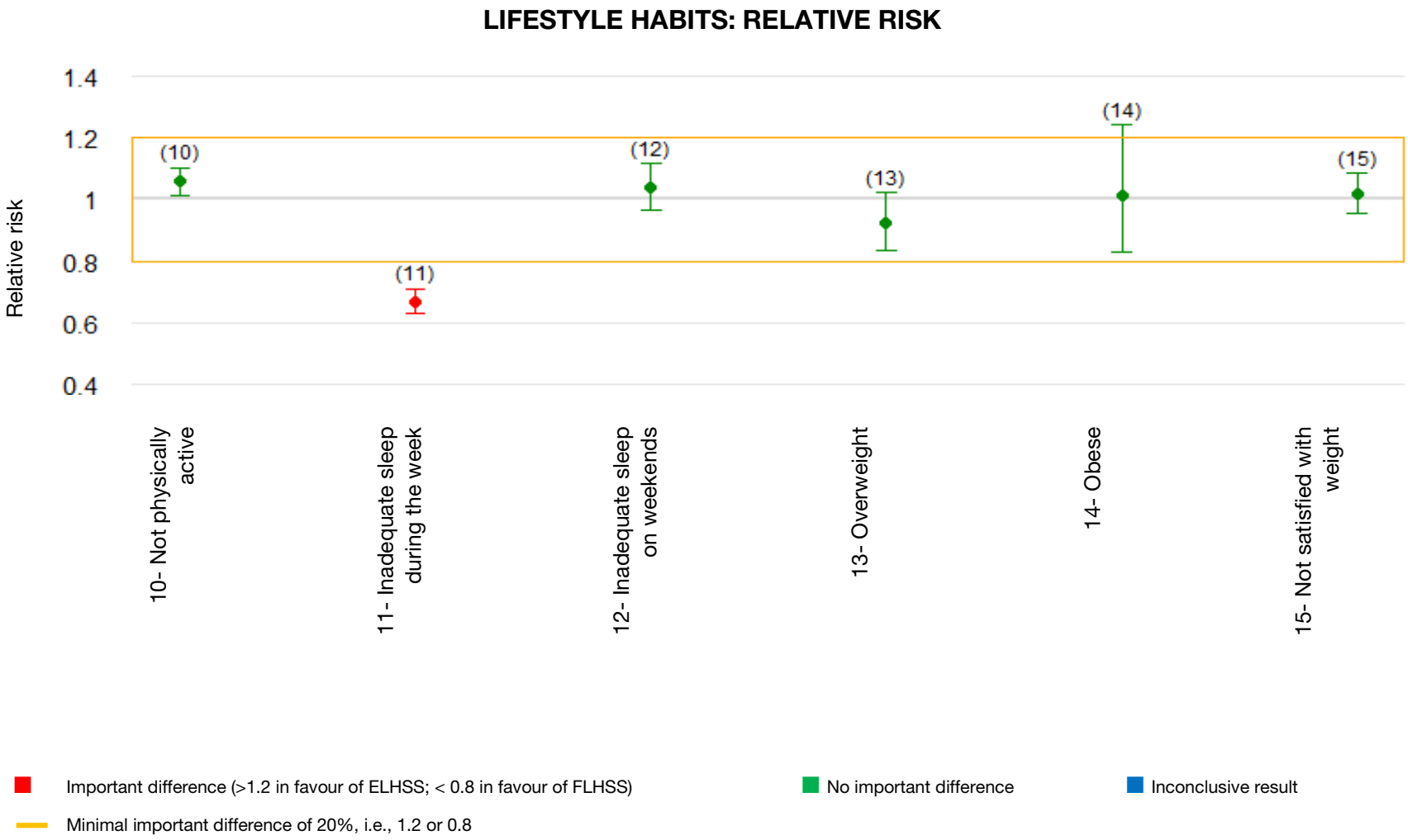
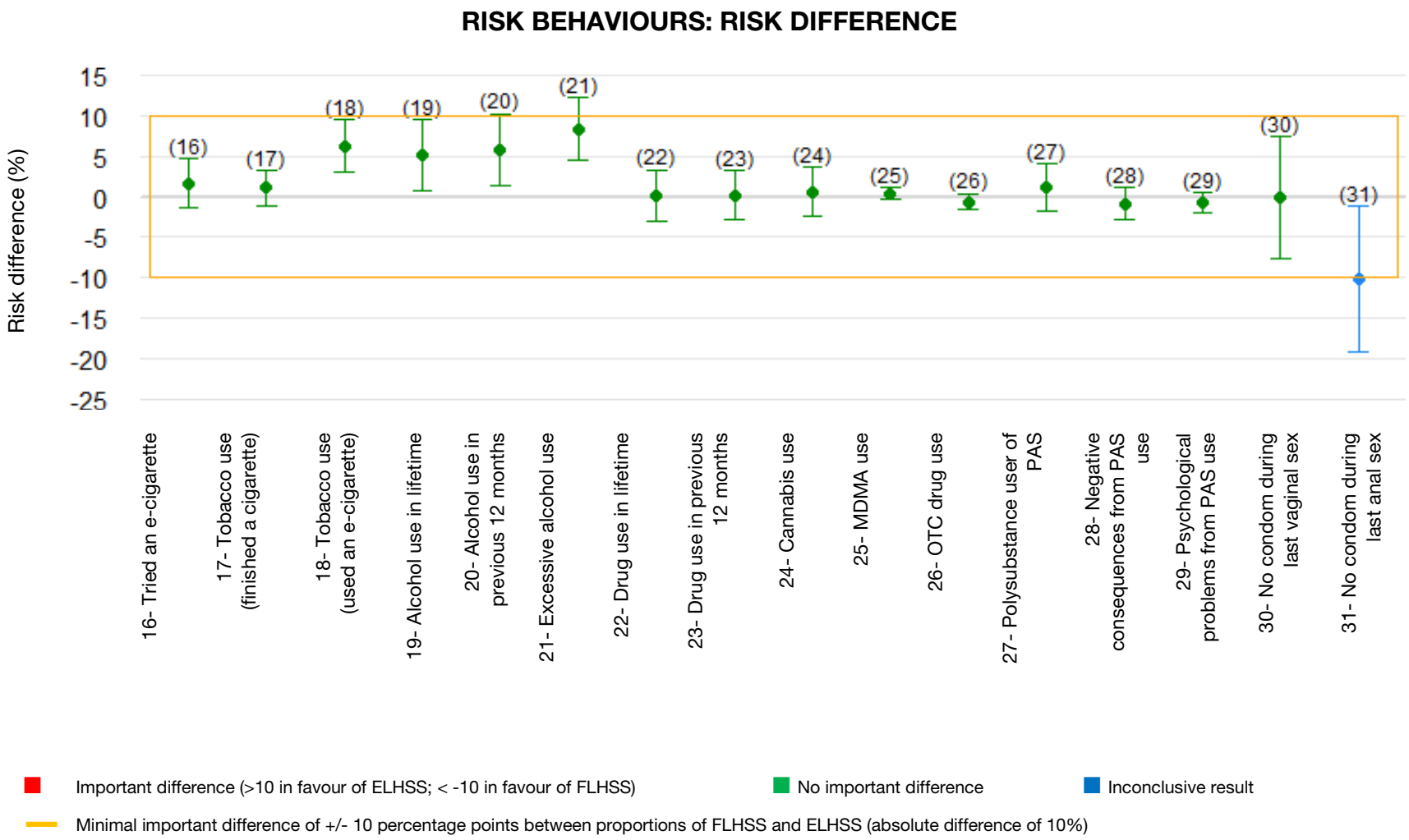


Figure 3 Risk behaviours

A) Statistical inferences using the risk difference estimation method (FLHSS - ELHSS) with 95% confidence interval



B) Statistical inferences using the relative risk estimation method (FLHSS - ELHSS) with 95% confidence interval

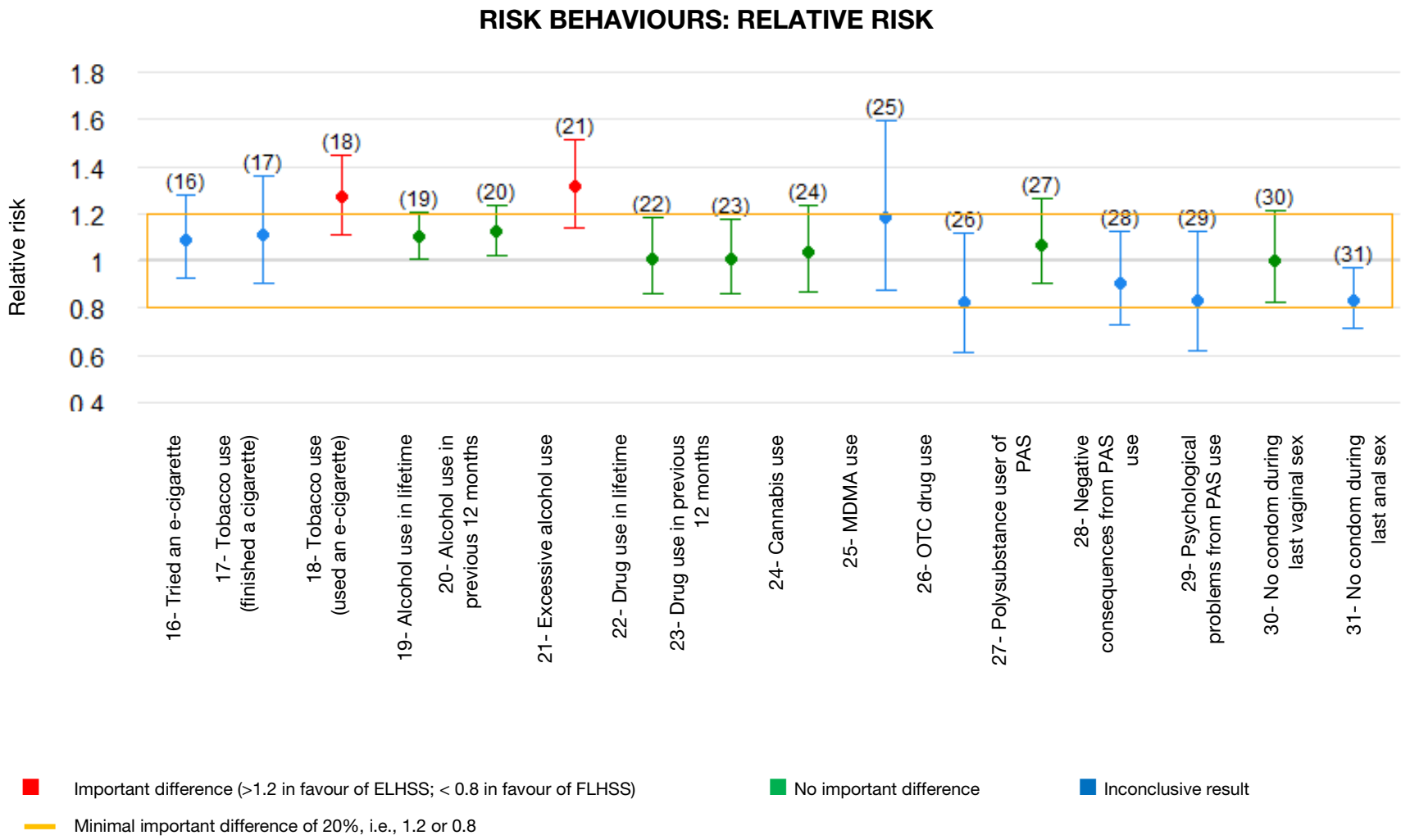
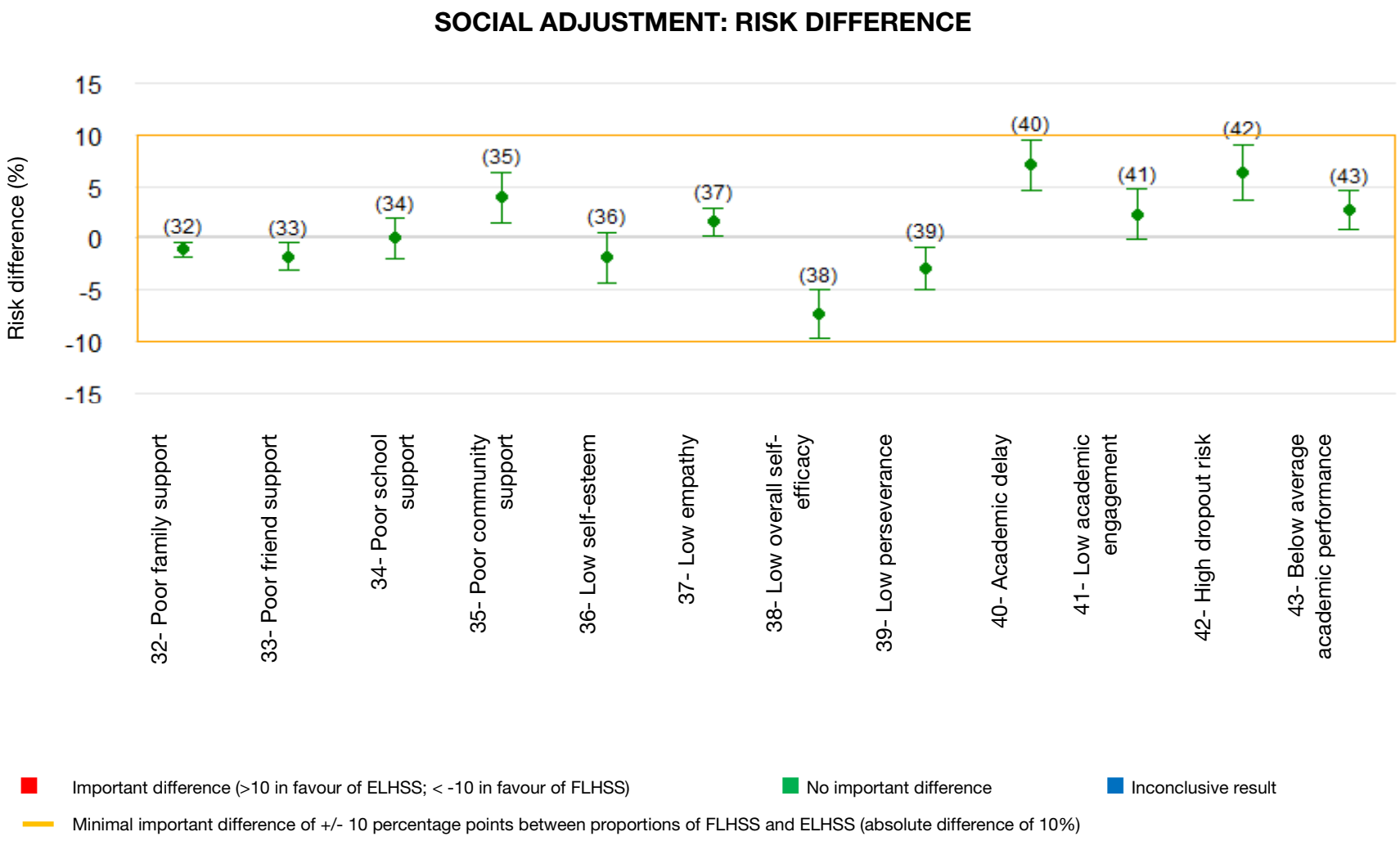


Figure 4 **Social adjustment: social support, self-esteem and social skills, and dropout risk**

A) Statistical inferences using the risk difference estimation method (FLHSS - ELHSS) with 95% confidence interval



B) Statistical inferences using the relative risk estimation method (FLHSS - ELHSS) with 95% confidence interval

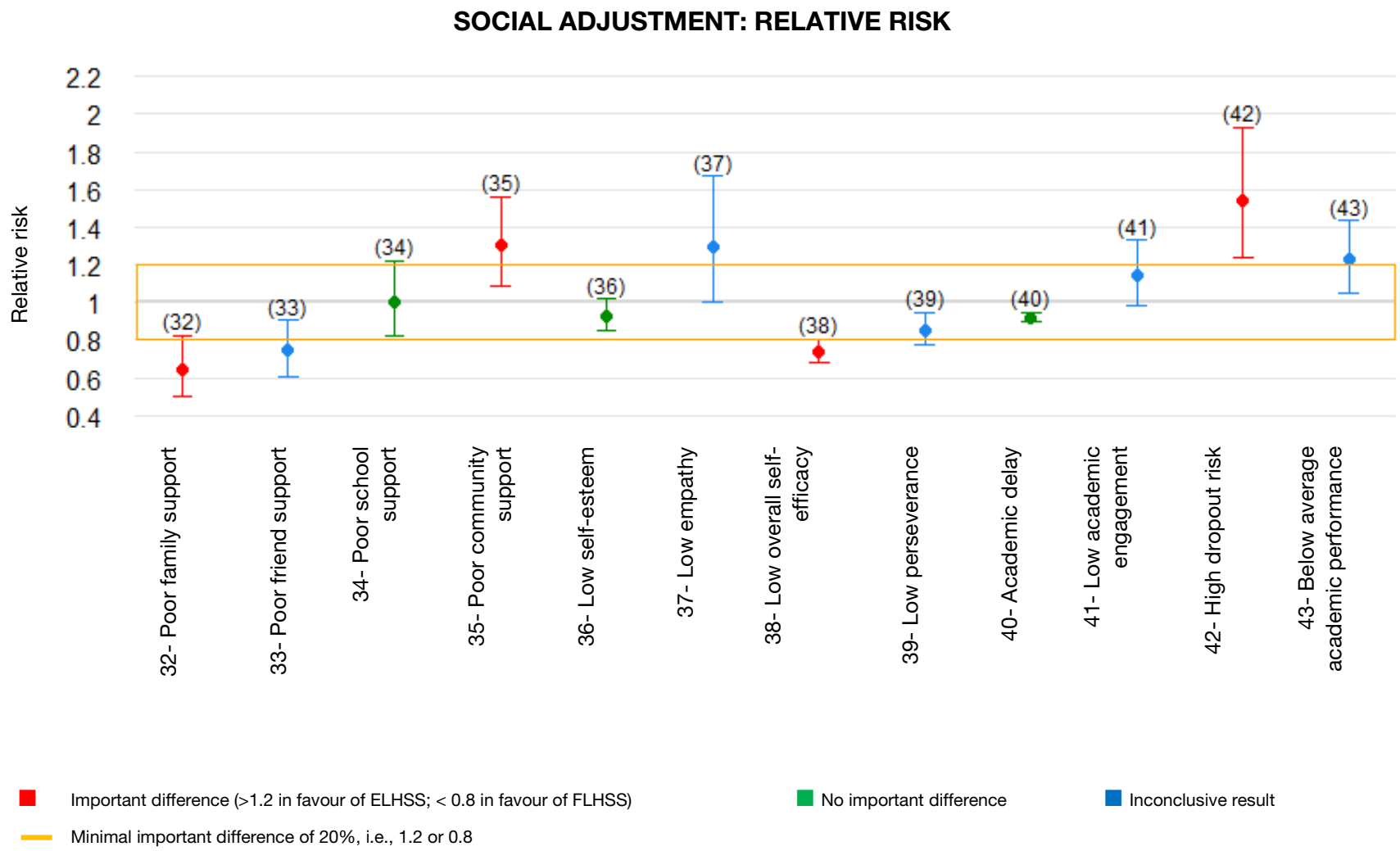
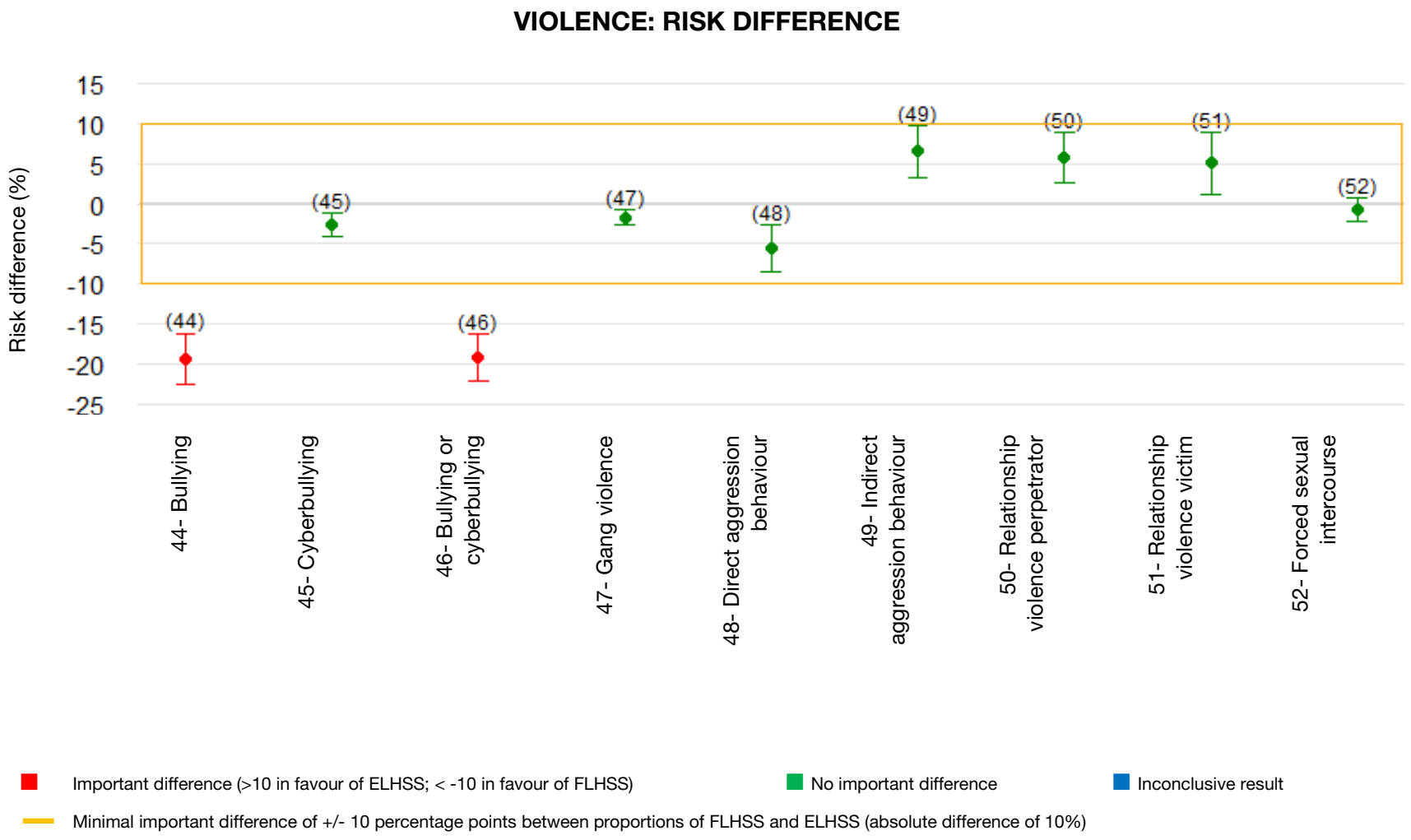
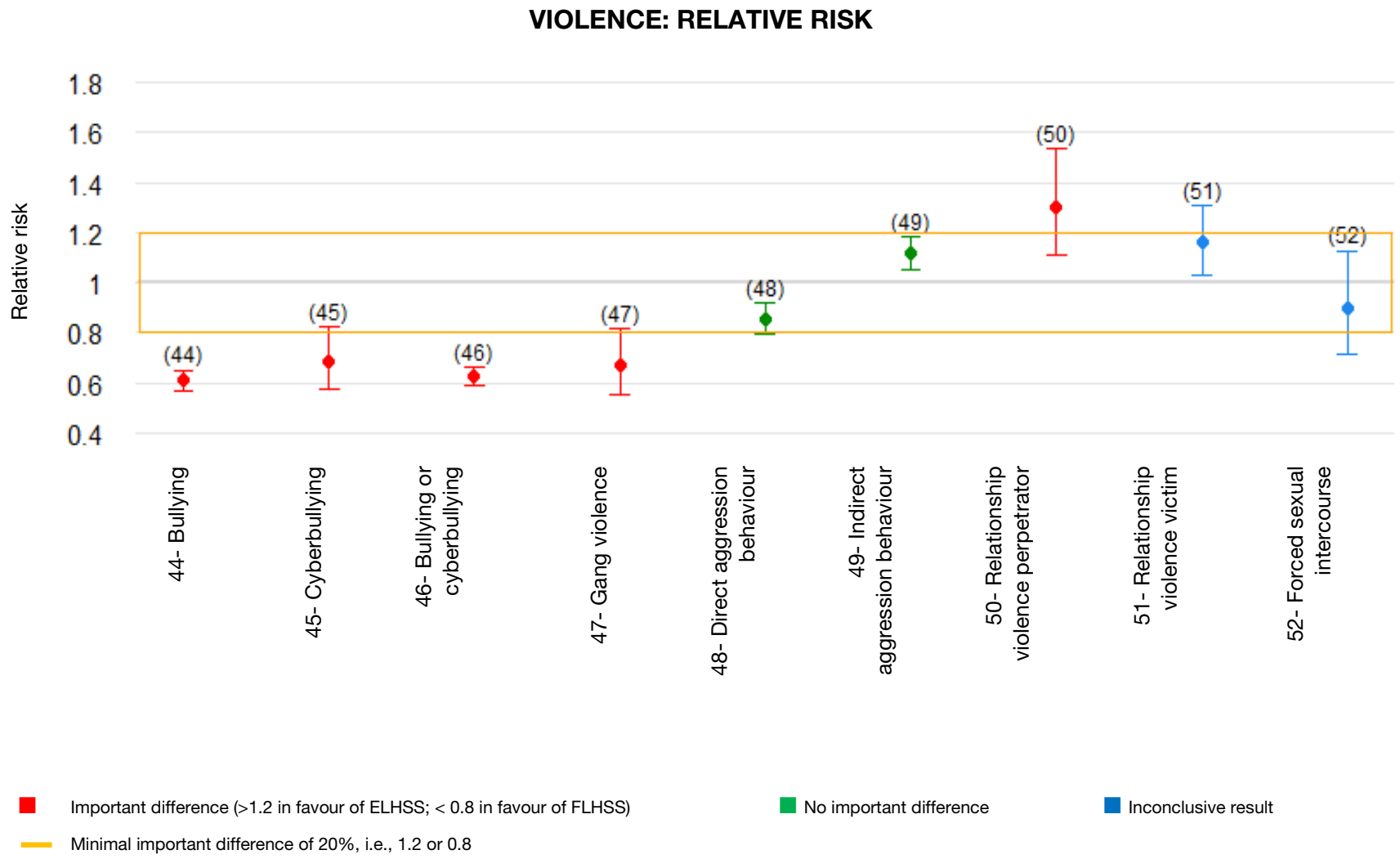


Figure 5 Violence

A) Statistical inferences using the risk difference estimation method (FLHSS - ELHSS) with 95% confidence interval



B) Statistical inferences using the relative risk estimation method (FLHSS - ELHSS) with 95% confidence interval



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