



Gender-inclusive ergonomics for sustainable cancer prevention: insights from self-reflection interviews with vulnerable young workers

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ABSTRACT

This article examines exposure to carcinogens in workplaces among vulnerable youth in a Co-op training program for adolescent and young adult trainees with low educational attainment. It explores how socio-environmental factors increase these risks. An ergonomic approach was used to understand real-world work situations, going beyond measuring exposure to understanding the mechanisms involved. The methodology includes self-reflection interviews (SRI) with eleven trainees, using video of their work situations to stimulate reflection. The analysis examines how gender, communication difficulties, and the gendered nature of trades influence the perception of risks, the understanding of exposure mechanisms, and knowledge of prevention measures. Key findings reveal that trainees often underestimate cancer-related risks, associating the absence of immediate discomfort with the absence of danger. Their understanding of exposure pathways is limited, with ingestion being the most recognized route. Trainees often recognize immediate effects over long-term health consequences. Gender plays a significant role, with young women in caregiving roles prioritizing the safety of others over their own. Trainees in masculine-typical jobs are more likely to receive support and guidance from colleagues. Communication skills impact risk awareness, with trainees who struggle to articulate their thoughts having more difficulty in identifying and explaining hazards in interviews. The study highlights significant gaps in trainees' comprehension and application of occupational health and safety measures. This research advances efforts toward a sustainable and equitable approach to occupational cancer prevention.

1. Introduction

Nearly half of the Canadian population will develop cancer at some point in their lives, and nearly a quarter will die from it. Between 4 % and 8 % of cancers are estimated to have an occupational origin (Canadian Cancer Statistics Advisory Committee, 2023). However, several scientific studies suggest that these figures may be significantly higher for certain groups that have been largely overlooked in existing research. These groups include, among others, adolescents and young adults (AYA), women, racialized individuals, people with disabilities,

and those with limited formal education (Labrèche et al., 2019; Peckham and Stephan-Recaido, 2023). A systematic review by Grant-Alfieri et al. (2022) highlighted the importance of developing multidimensional teaching methods that consider both personal and structural factors and that specifically target under-researched groups.

AYA aged 15 to 24 face a higher risk of occupational injury compared to their older colleagues (Breslin, 2008; Breslin and Pole, 2009; Breslin and Smith, 2010; Belin et al., 2011; Laberge, 2011; Laberge et al., 2014; Smith et al., 2015; Turner et al., 2022). AYA workers are nearly twice as likely to be exposed to carcinogens, mutagens, or reproductive toxins in the workplace compared to older workers (Havet et al., 2017; Labrèche

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Glossary

AYA	Adolescents and young adults
CFER	<i>Centers de Formation en Entreprise et Récupération</i> which means Company-school in the recycling sector
ILO	International Labour Organisation
OHS	Occupational Health and Safety
PTE	Preparatory Training for Employment (a 3-year vocational training program for students with moderate to significant school delays)
SRI	self-reflection interviews
SSO	Training Leading to Semi-Skilled Occupation (a 1-year vocational training program for students with slight school delays)
WOTP	Work-oriented training path
WHMIS	Workplace Hazardous Materials Information System

et al., 2017). Early exposures increase the chance of a change in genes (somatic mutation), in the functioning or use of genes (epigenetics), or in tissue interactions (tissue organisation) (Soto and Sonnenschein, 2010; Martincorena and Campbell, 2015; La Merrill et al., 2020). Research consistently shows that AYA workers are often placed in roles that come with inherently higher risks. (Julià et al., 2017; Mitchell and Murray, 2017; Descloux et al., 2025). In adolescence, brain development continues until approximately age 25, and several organs, including the gonads and mammary glands, continue to develop into adulthood and are particularly sensitive to toxic exposures (Johnson et al., 2009; Soto and Sonnenschein, 2010; Biro et Deardorff, 2013; La Merrill et al., 2020). In addition to biological differences, socially constructed gender roles shape the risks that young workers face. Occupational roles are often gendered, with men and women being assigned to different tasks based on societal norms and expectations. These gendered work cultures influence the actual risks and how risks are perceived and managed, with male workers who are men often receiving more support and exposure to higher-risk tasks, while workers who are women are frequently assigned roles that are perceived to be less hazardous and therefore receive less support and training in occupational health and safety (OHS) (Messing, 2021; Rollin and Tadeo Granda, 2025).

Few studies have examined the risk of developing occupational cancers when the initial exposure to carcinogens occurs early in one's career, although strong evidence has been gathered on risks associated with non-occupational exposures to radiation, tobacco smoke and other carcinogens (Carpenter and Bushkin-Bedient, 2013). The available occupational studies associate increased risk of mesothelioma with exposure to asbestos (Harding and Darnton, 2010), exposure to lung carcinogens and the risk of lung cancer (Kreuzer et al., 1999), exposure to vinyl chloride and liver cancer (Wong et al., 2002), as well as exposure to wood dust (Alonso-Sardón et al., 2015) or formaldehyde and nasopharyngeal carcinoma (Hildesheim et al., 2001) among young workers. Further, adolescent workers are particularly vulnerable at this stage of their life due to rapid physical, psychological, and emotional development, coupled with limited work experience (Breslin, 2008; Breslin and Smith, 2010; Breslin et al., 2018; ILO, 2018; Santelli et al., 2013; Soto and Sonnenschein, 2010). For instance, studies suggest that at this stage of development, adolescents are less able to anticipate the consequences of their actions and tend to underestimate risks, leading to riskier behaviors (Vladutiu et al., 2010; ILO, 2018; Santelli et al., 2013). Proactively integrating prevention into the initial stages of working life can mitigate some of these risks and yield significant benefits over time.

Low levels of education and academic challenges also contribute to workplace exposure to carcinogens, driven by social mechanisms such as the types of jobs occupied (manual labor positions are more likely to involve handling hazardous substances) (Jetha et al., 2020; Shahidi

et al., 2023; Bérubé et al., 2025a,b) and reluctance within workplaces to meet the diverse needs of people with learning difficulties (Jetha et al., 2021).

Significant differences in many parameters are observed between young men and women during puberty and the transition to adulthood. Historically, occupational cancers among women have been significantly under-covered in the scientific literature (Messing, 2002; Zahm and Blair, 2003; Lippel and Thébaud-Mony, 2020; Hohenadel et al., 2015), contributing to a cycle of invisibility (Messing, 2020; Lippel, 2020). More recently, several studies have specifically focused on occupational cancers in women, revealing certain risks associated with differentiated exposures, distinct metabolic mechanisms in cancer development (Brophy et al., 2012), and the unique nature of cancers (e.g., reproductive cancers, breast cancer) (Brophy et al., 2020).

For all these reasons, considering sex, gender, and other factors that may explain disadvantage is crucial in ergonomics. This ensures the fair and inclusive design of tools and methods for preventing workplace injuries and occupational diseases (Messing et al., 2003; Messing and Mager Stellman, 2006; Messing, 2021; Laberge et al., 2022). In this article, we pay particular attention to gender though the use of gender-sensitive analysis, along with other intersecting factors such as disability.

Unsurprisingly, the gaps in scientific knowledge about the causes of occupational cancers that disadvantage AYA, women, and individuals with disabilities or low education levels also extend to effective prevention measures. Cancer prevention interventions for AYA largely target non-occupational carcinogens and solely individual factors (knowledge and behavior towards prevention) (Pastor-Bédard et al., submitted). However, in OHS prevention, it is well known that interventions based on individual behavior change are less effective than those targeting organisational change (elimination or substitution of substances, engineering measures) (National Institute for Occupational Safety and Health, 2023)

In Quebec, Canada, there is a school-to-work Co-op program tailored for high school students who face multiple learning challenges, and as outlined above, may be at greater risk of occupational cancer: the Work-Oriented Training Path (WOTP). It targets students aged 15 to 21 with low levels of educational achievement to help them transition from school to work through traineeships in semi-skilled trades.

Given their age, the nature of the semi-skilled trades, limited work experience, learning difficulties, and, in some cases, immigration status, it is suspected that WOTP trainees are more likely to be exposed to carcinogens in their traineeship environments and future workplaces than the general population. Further, these students may lack access to preventive measures adapted to their specific circumstances (Breslin and Pole, 2009; Lay et al., 2016; Katende et al., 2024; Jetha et al., 2021). For instance, recently arrived students who do not yet speak the language may face an additional barrier when health and safety training materials or workplace instructions are only available in a language they do not understand well (Johnson et al., 2021).

This article presents part of the findings from a pilot study that gathered field data to investigate possible socioenvironmental mechanisms explaining heightened occupational cancer risks among AYA, low-skilled workers entering the workforce. The overall project includes data collected from the trainees, but also the teachers and the employers. These findings are and will be published elsewhere. The study uses the French ergonomics framework described by Daniellou in 2005. This approach moves beyond exposure assessments and examines actual work situations to clarify processes underlying vulnerability (Daniellou, 2005; Theberge and Neumann, 2010; Valdez et al., 2017). It seeks to understand how work environments and socio-environmental factors contribute to health risks, including gender roles that influence occupational risks. This perspective aligns with broader critiques in occupational and industrial research showing that many studies continue to prioritize operational efficiency over social sustainability and worker well-being (Basak and Verma, 2026). The French ergonomics model

integrates the concept of sustainable prevention, focusing on creating empowering work environments that enhance workers' capabilities while mitigating risks. By examining how gendered work roles, along with biological and social factors, intersect in real work situations, we aim to identify mechanisms that explain workers' vulnerability. This approach not only informs our data collection and analysis but also aligns with the goal of implementing lasting, equitable solutions that improve occupational health and safety outcomes for diverse, vulnerable groups, particularly those with limited educational backgrounds, women, and people with disabilities.

The main data collection methods involve observing actual work practices, combined with verbal accounts of work, gathered in various ways from different groups of participants (Theberge and Neumann, 2010; Valdez et al., 2017; Guérin et al., 2021). The analytical process was guided by an ecosystem perspective, recognizing health within a complex web of biological, psychological, environmental, and socio-economic factors (Bronfenbrenner, 1977; Webb et al., 2010). This approach supports occupational disease prevention by addressing individual factors, working conditions, and broader ecological influences, while also incorporating equity and inclusion (Webb et al., 2010).

In this article, we seek to understand how trainees perceive occupational cancer risk factors during their traineeships, and to identify areas of vulnerability in prevention approaches. We used an analytical lens that is mindful of gender and disability (Breslin and Pole, 2009; Bertin et al., 2018; Jetha et al., 2021). The specific objectives of this article are to describe the gendered perspectives of WOTP trainees regarding: (1) their perception of toxic substance risks encountered in their traineeship environments, (2) their understanding of the mechanisms of exposure and the development of diseases such as cancer, and (3) their knowledge and use of preventive measures.

2. Methods

2.1. Context of the study

The findings presented here come from an ergonomic pilot study aimed at exploring the potential risks of occupational cancers in real-world, pre-employment traineeship settings, as well as the factors that increase vulnerability in this population. The project gathered insights from a variety of stakeholders, including schoolteachers, workplace supervisors, and the trainees themselves. The data set included both qualitative and quantitative data from collection methods: questionnaires, in situ observations, and qualitative interviews with trainees, employers, and teachers/trainers in both school and traineeship settings. The self-reflection interview (SRI) was used to gain insights from trainees who may have difficulty expressing their thoughts abstractly or in traditional formats (such as surveys or standard qualitative interviews) on complex topics, such as workplace carcinogen exposure and protective strategies (Laberge et al., 2022).¹ The advantage of the SRI is that trainees are prompted to verbalize their experiences based on a video recording of themselves in action (Laberge et al., 2022). The results presented here primarily focus on these interviews.

2.2. Population and participants

The WOTP is divided into two training programs, in which students are sorted based on the extent of their academic delays. Those who have an academic level below 6th grade (primary school in Canada) follow a three-year program, while those with an academic level equivalent to a

completed 6th grade or slightly above participate in a one-year program. The one-year program trains students in a specific semi-skilled trade of their choice. They graduate with certification in this trade. The three-year program aims to provide general workplace training to the students. Therefore, even if they do choose a semi-skilled trade based on their interests, they do not graduate with a certification in a specific trade, but rather with certification for certain skills. Despite this, both programs share the same general structure and operation. As co-op programs, they alternate 2–3 days of classroom learning and 2–3 days of traineeship per week. Contrary to vocational training, the groups are organized by cohort, and not by trade, meaning that for the classroom learning, the groups assemble trainees that are learning different trades. Furthermore, their teachers are trained as regular high school teachers or as special education teachers, which means they do not have any institutionalized training on teaching OHS. These factors make it particularly challenging to offer adequate OHS training to the WOTP trainees in the school setting. Even in the hypothetical case of being able to offer excellent OHS training at school, there needs to be continuity with the workplace, since the retention of this type of training usually only lasts about 6 months (Sanli and Carnahan, 2018). Among schools offering WOTP, some provide a traineeship setting within the school, which functions as an actual recycling plant, handling different products or materials (electronic devices, wood, textile, etc.). These centers, hereafter called CFER, provide hands-on training in real-world work environments, emphasizing both skill-building and personal development. Trainees from these schools can carry out their traineeship inside the CFER facilities or in an external workplace. Each year, approximately 10,000 trainees enroll in the WOTP across all Quebec school boards. Students' academic delays stem from a variety of factors such as a range of learning difficulties, adaptation disorders, socioeconomically disadvantaged backgrounds, immigrant status, or living in remote areas far from major urban centers, which can make it harder to access specialized services in case of academic difficulties. In addition, many face gaps in educational attainment due to their understanding of the language of instruction, which in Quebec is predominantly French. Two-thirds of the WOTP trainee population are teenage boys and young men. The trades chosen by the trainees often correspond to either mixed gender roles or those traditionally associated with their gender, and rarely the opposite (Laberge, 2011).

For this study, five school boards across administrative regions of Quebec (Canada) were invited to participate, representing a variety of work and school practices. Six schools offering the WOTP expressed interest (two in a CFER setting), and nine teachers responsible for supervising pre-employment traineeships agreed to be involved (four in a CFER setting). All other participant categories were connected to these nine core teachers (trainees, employers).

The teachers' trainees were invited to participate in the project during in-class presentations. Of the 106 trainees in the nine groups, 72 agreed to participate. Each of them was met for a brief interview during which they were questioned about their traineeship environment, their trade, and certain identity-related factors (self-declared gender, country of birth, language spoken at home, etc.).

For the segment focusing on SRI, 33 of the 72 initially recruited trainees were selected for observation during their traineeships (21 in CFER facilities). Selection criteria included the likelihood of encountering carcinogen exposure during their traineeship, diversity in trainee profiles (in terms of disability, school service center, gender, and ethnocultural factors), and employer consent. Following these observations, 13 trainees were invited to participate in SRI. This selection was based on the diversity of trainee profiles, the observed relevance of their work situations for discussing workplace carcinogens, and the trainees' anticipated communication abilities. Of them, two young men were excluded because the research team was unable to interpret and analyse responses offered due to unforeseen communication difficulties. Finally, the 11 trainees whose interviews were analyzed come from the classes of six out of nine teachers (five women and six men) from four out of six

¹ In this article, the term "self-reflection interview" is used (Laberge et al., 2022) to designate a video-based interview method aimed at eliciting participants' own work activity through the analysis of recordings of themselves in action. In the English-language literature, this method has also commonly been translated from French as "self-confrontation interview".

participating schools. Eight of the trainees were doing external traineeships, while three were in internal placements within school-based CFER facilities.

Fig. 1 illustrates the process of recruitment from the first interviews to the analysis of the SRI. Table 1 presents a summary of age, gender, and program level of the 72 WOTP apprentices. While provincial-level statistics for this specific population are not publicly available, this sample offers a representative portrait of the demographic distribution typically observed in the WOTP across Quebec.

2.3. Data collection: self-reflection interviews (SRI)

Qualitative studies allow for exploration of deep, nuanced, and contextually rich insights to capture the depth of human perspectives. In this kind of design, meaning emerges from in-depth contextual descriptions (Tracy, 2024). The SRI is a qualitative method developed in ergonomics to tap into the reflective potential of learners and workers. Originally, this method was created for training future professionals in education and clinical sciences, under the name of stimulated recall (Kagan et al., 1963; Calderhead, 1981, referencing several studies that used this technique). Over time, this technique has been applied in various contexts, mostly in professional training at the college or university level, or in specialized fields (e.g., chess players, professional dancers) (Calderhead, 1981, citing de Groot's work, 1965). In ergonomics, this method was renamed the "self-confrontation interview" and involves showing workers video clips or photos of themselves performing work tasks as a starting point for reflection and explanation (Mollo and Falzon, 2004). In our previous research, we demonstrated the effectiveness of this method in helping under-educated, young trainees verbalize their work activities (Laberge et al., 2022). The method combines video prompts with techniques to explain and reflect on gestures and actions, making it particularly useful for people who may lack the vocabulary to describe their work or articulate their experiences during training.

Prior to the interviews, the 33 pre-selected trainees were observed doing their normal individual work in their traineeship workplaces. The in-situ observations involved filming them at work for several hours, often a full workday. The observation videos were then carefully watched and analyzed, with relevant sequences coded, including presence of potential carcinogen; work techniques exposing trainees to dust,

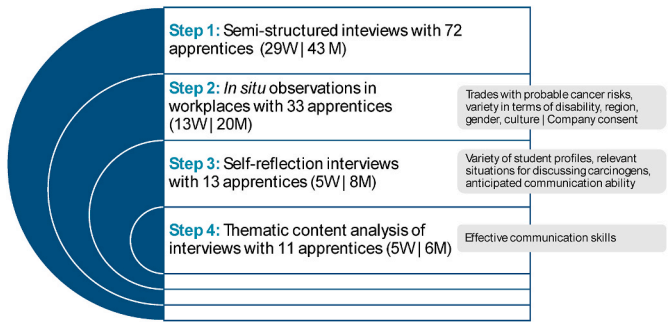


Fig. 1. Recruitment process

Caption: This diagram illustrates the four-step research process. Step 1 involves semi-structured interviews with 72 apprentices, 29 women and 43 men. Step 2 includes in-situ observations in workplaces with 33 apprentices (13 women and 20 men). Step 3 details self-reflection interviews with 13 apprentices (5 women and 8 men). Step 4 is thematic content analysis of the interviews with 11 apprentices (5 women and 6 men). The figure also illustrates selection criteria for each step: Step 2 selects apprentices working in trades with potential cancer risks and a variety of profiles, including factors like disability, region, gender, and culture, as well as company consent. Step 3 focuses on apprentices with relevant situations for discussing carcinogens and their anticipated communication abilities. Step 4 identifies apprentices with effective communication skills for the final analysis.

Table 1
Composition of the initial group of trainees.

Age group			Gender		Program	
15–16	17–18	19 to 21	Men	Women	FMS	FPT
33 (46 %)	28 (39 %)	11 (15 %)	43 (60 %)	29 (40 %)	22 (31 %)	50 (69 %)

[Caption: This table presents the composition of the group of trainees who completed the initial interview. It details their age group (15–16, 17–18, 19 to 21), their gender and their program (FMS – one year or FPT – 3 years)].

substances, or carcinogenic agents; practices related to protective equipment; and other scenarios linked to the presence or absence of safety measures or training.

From this analysis, individualized videos were edited for the 13 trainees selected and served as visual prompts during the interviews to encourage trainees to express their understanding and perceptions of the tasks performed, the hazards involved, the strategies used or demonstrated, and other aspects related to the research objectives. While a few guiding questions were pre-prepared, most of the interviews were driven by follow-up questions based on the trainees' answers and discourses. The SRI with each trainee were conducted by a research team member, recorded, filmed, and transcribed. The language used with the trainees was French, but the level was adapted to each individual. Table 2 provides a synthesis of the fieldwork data collected for each participant. The first column lists all tasks observed and filmed during the workday; the second identifies the specific tasks selected to create the video used during the SRI; and the third outlines the types of carcinogenic risks illustrated in the sequences, which served as a basis for discussion during the interviews.

2.4. Data analysis

The methodology of this study is grounded in the French ergonomics model, which emphasizes the importance of understanding the work context and the influence of socio-environmental factors, including gender roles, on workers' health. This perspective informs both the data collection process and the analysis, ensuring that the study remains attuned to the diverse needs of vulnerable groups, with a specific focus on gender-inclusive ergonomics.

The interviews were transcribed into verbatim and coded using QDA miner. The thematic content analysis technique was conducted on the material with a mixed inductive/deductive approach (Paillé and Mucchieli, 2016). This method involves identifying overarching themes and subthemes within the dataset and grouping relevant excerpts based on a discursive analysis. The process began with an initial naive reading of the corpus, during which notes on potential themes were taken. Subsequently, the interviews were coded to identify units of meaning, then regrouping them into overarching themes using analytical techniques such as constant comparison, inductive interpretation, searching for points of convergence and divergence, establishing relationships, constructing meaning, and considering specific contexts (e.g., typically masculine vs. feminine trades, trainees with varying levels of communication difficulties). One interview was fully coded by two research team members (LL and JW), and discrepancies were discussed until a consensus was reached. The remaining interviews were coded by one person (LL), using the thematic tree previously elaborated. Throughout the process, regular meetings were held within the research team to validate codes, relationships, and meaning construction. A cross-cutting goal was also to explore the influence of gender and the intersection with other vulnerabilities, such as learning disabilities or language barriers. Accordingly, the analysis classified the same information through different lenses: the gender of participants, socially constructed gender roles and their interplay within trades that are typically masculine, typically feminine or not strongly associated to a gender, and the trainees' level of comfort in understanding and responding to interview

Table 2

Overview of field observations and video excerpts used for SRI.

	Observed tasks	Selected Tasks for Video Excerpt	Illustrated Hazards
1-1W	Food prep, cleaning kitchen/toys/furniture	Vegetable prep, dishwashing, toy disinfecting	Disinfectant contact (skin, eyes, inhalation)
2-1W	Dog and horse care, cleaning enclosures, feeding, mucking stalls	Dog enclosure cleaning, disinfectant prep, horse feeding and stall cleaning	Chemical exposure, inhaling hay/dust/manure
3-1M	Battery boosting, tire install, sweeping, observing colleagues	Sweeping, boosting car, tire change, car prep	Oil/product contact, CO2 accumulation indoors
4-2W	Tire and oil changes, cleaning, trash handling	Oil reservoir handling, tire change, garbage disposal	Oil/product handling, inhalation risks
5-2M	Product retrieval and stocking	Product stocking and display checks	Spills, chemical contact, odor inhalation
6-2M	Pallet prep, forklift use, electronics sorting	Plastic bagging electronics, forklift operation, compactor use	Dust/gas inhalation from electronics
7-2W	Laundry, shoe sorting, locker room cleaning	Laundry handling (PPE), cleaning locker room, shoe sorting	Dust contact from uniforms and PPE
8-3M	Metal cutting, piercing, trimming, cleaning	Using hydraulic and manual tools, metal cleaning, PPE use	Chemical exposure, metal dust inhalation
9-4W	Rag sorting, flower preparation	Flower cutting, fertilizing, vase prep	Fertilizer/insecticide exposure
10-4M	Car refueling, cashier tasks, display cleaning	Refueling, cashier duties, vending machine refill	Fume inhalation (exhaust, gas), ink contact
11-4M	Using saws, sealing bags, shredding paper	Wood cutting, bag filling/sealing, paper shredding	Sawdust and plastic fumes, ink exposure

[Caption: This table presents a synthesis for each of the 11 apprentices included in the study. For each participant, it lists (1) the full range of tasks observed during their work-based learning placements; (2) the subset of tasks selected to create personalized 10–12-min video clips used during self-confrontation interviews; and (3) the occupational hazards these clips were intended to evoke, such as chemical exposures, inhalation risks, or skin contact with potentially toxic substances.].

questions. This latter factor is referred to as the “level of communication” throughout the article.

- **Advanced:** The trainee understood the interview questions with no difficulty, was able to elaborate on their work, and asked questions. The conversation was fluid, with no communication breakdowns.
- **Intermediate:** The trainee understood most questions and generally responded accordingly, though they did not elaborate as much as those in the advanced group. The conversation was relatively fluid despite some confusion and occasional clarifications needed from the interviewer.
- **Difficult:** The trainee struggled to understand the questions, requiring significant repetition and clarification to provide answers. Responses were generally brief, sometimes not fully addressing the questions, and included little to no explanation.

The gender classification was based on trainees' self-declaration. Classification of trades by gender-type was based on Employment Canada's statistical data, which provides the gender distribution for each occupation. (Government of Canada, Web site *Guichet emploi*). A trade was considered predominantly feminine if over 60 % of workers in that field were women, and vice versa. Two trades—florist assistant and stock handler—were classified as mixed. However, in this study, these trades were in highly gendered workplaces. For instance, only men worked in the auto parts warehouse where the young man training as a stock handler was placed, and only women worked in the flower shop, where the young woman training as a florist assistant was placed. For the purposes of analysis in this study, these trades were considered gender-typical. For the three trainees doing traineeships within CFER facilities, they were classified based on whether the tasks assigned to them were what would be considered typically feminine (cleaning and laundry) or masculine (operating a saw or driving a forklift), as they were not assigned a specific semi-skilled trade.

The research project was approved by the CHU Sainte-Justine Research Ethics Board affiliated with the University of Montreal (#2022–4117).

3. Results

Of the 11 interviews analyzed, three concerned trainees who were born outside the country or who spoke a language other than - or in addition to - French at home. In terms of communication skills, three trainees were categorized as advanced, five as intermediate, and three as having difficulty with communication. The four typically feminine

trades were indeed chosen by young women; however, one woman was learning a typically masculine trade (tier installer). The trades pursued in external traineeships included the following: one childcare assistant (W), one pet grooming assistant (W), two tire installers (1 W, 1 M), one stock clerk in an auto parts store (M), one metal fabrication labourer (M), one floral assistant (W), and one gas station attendant (M). For trainees in internal placements at CFERs, the roles were: material handling and forklift operations (M), general laborer in the recycling plant (she was asked to wash work clothes the day we visited) (W), and material sorter/packaging (cardboard, paper, wood) (M). [Table 3](#) presents sociodemographic information for the 11 participants, detailing their school, trade, gender, language spoken at home, communication level, program, traineeship facility, and whether they were born in Canada.

3.1. Knowledge and perception of occupational risk factors and exposures leading to cancer

Trainees' perception of cancer-related hazards varied widely, but most tended to underestimate these hazards. These perceptions were also shaped by gender roles and workplace norms, which may have influenced how risks are interpreted, tolerated, or dismissed by trainees across different job types. This underestimation took different forms in the discourse of the trainees. Some associated the absence of discomfort, such as a burning sensation or strong odor, with the absence of danger. For example, when discussing a lubricant, one participant explained: “If you get some on your hands or something, it doesn't matter. [...] You know, I could wash my hands, I'd just have greasy hands.” (8-3M, metal fabrication labourer). Yet, this statement was made just after the trainee had been asked about four WHMIS² symbols on the product's label seen in the video sequence, including the one indicating that the product poses severe long-term health risks (possibly a carcinogen).

Similarly, some trainees described habituation to a substance as being potentially protective. One participant (2-1W, assistant groomer), referring to the disinfectant she used daily during her traineeship, said:

Interviewer: *Does it ever sting your nose or make you sneeze?*

Trainee: *It used to, yeah, all the time, during the first week. But now, uh, not anymore.*

Interviewer: *Not anymore, it doesn't do that?*

² WHMIS is a classification system with generic pictograms for workplace hazardous materials information.

Table 3
Sociodemographic data.

Part.	School	Trade (gender-type)	Student gender	Home language	Comm level	Program	Trship facility	Born in Canada
1-1W	1	Childcare assistant (F)	W	Creole French	Int	PTE3	Ext	Yes
2-1W	1	Pet grooming assistant (F)	W	French	Adv	PTE3	Ext	Yes
3-1M	1	Tire installer (M)	M	Spanish & English	Dif	SSO	Ext	No
4-2W	2	Tire installer (M)	W	French	Adv	PTE3	Ext	Yes
5-2M	2	Auto parts stock handler (M)	M	Swahili	Int	PTE3	Ext	No
6-2M	2	Stock handler, forklift operator (M)	M	French	Adv	PTE2	CFER	Yes
7-2W	2	General laborer in a recycling plant (F)	W	French	Dif	PTE2	CFER	No
8-3M	3	Metal fabrication labourer (M)	M	French	Adv	SSO	Ext	Yes
9-4W	4	Floral assistant (F)	W	French	Int	PTE3	Ext	Yes
10-4M	4	Gas station attendant (M)	M	French	Int	PTE3	Ext	Yes
11-4M	4	Sorter, wood and paper (M)	M	French	Dif	PTE2	CFER	Yes

Legend: Part: each participant (1–11) is described by the school descriptor and gender | Trade (gender-type): F: typically feminine job | M: Typically masculine job. | Student gender: W: declared as a women | M: declared as a men | Comm level: Communication level | Adv: Advanced | Int: Intermediate | Dif: Difficult | Programme: PTE2 & PTE3: Preparatory Training for Employment, 2nd or 3rd year | SSO: Training Leading to Semi-Skilled Occupation | Trship facility: location of the traineeship, either inside a CFER facility (CFER) or an external workplaces (Ext).

Note: Schools 1 and 2 are in urban administrative area, Schools 3 and 4 are in rural administrative area, far from urban centers. School 2 and 4 offer CFER facilities. [Caption: This table presents sociodemographic information for 11 participants, detailing their school, trade, gender, home language, communication level, program, traineeship facility, and whether they were born in Canada. The trades are categorized as either typically masculine or feminine, and participants' communication abilities range from "difficult" to "advanced." Each participant is assigned to a specific school, with some schools located in urban areas and others in rural locations. Two of the schools offer a CFER (Centre de formation en entreprise et récupération) facility, which provides in-house training. The table provides a comprehensive view of participants' backgrounds in terms of education, language, work placement, and personal characteristics.].

Trainee: *Yeah. Because I work with it, so it doesn't affect me anymore.*

Interviewer: *Do you think you've gotten used to it?*

Apprentice: *Yes.*

Likewise, when exposure to a product or potentially harmful agent is perceived as minimal, whether in duration or quantity, the danger is often underestimated or ignored. For instance, a trainee in a CFER facility (11-4M, sorter) said:

Interviewer: *Is this oil toxic?*

Trainee: *No.*

Interviewer: *No?*

Trainee: *I think it is, but yeah, in the sense that, when it's in a big bottle, you can smell it, but when it's in a small bottle, it doesn't smell at all.*

At times, more than one of these ways of underestimating risk may combine, and they can also be shaped or reinforced by workplace culture. The metal fabrication labourer trainee (8-3M) explained this when asked about the risks of a toxic cleaning product:

"Oh, it's not dangerous, but, you know, sometimes if, for example, we use it to clean before painting parts, we wash all the parts with that product, we wear a mask because the odors can be harmful over time. Often, it's just that you end up with a headache; that's what my boss told me. He said, 'Yeah, you just get a headache sometimes,' but he said, 'If you're just using it to clean a small object, there's no point in wearing the mask.'"

In this quote, the trainee referred to his boss to justify the safety of the product while acknowledging that it can be harmful and may even cause symptoms with prolonged exposure. Ultimately, he believes that brief exposure does not cause discomfort and is therefore safe—an idea shared by his boss, an authority figure.

Another way in which risks are underestimated related to the perceived "naturalness" of certain products. Some trainees equated the natural origin of a substance or product with its safety. The assistant groomer (2-1W) said: "*well, hay is natural, so it's not toxic for us,*" when asked whether getting hay in her face posed any danger. Similarly, the assistant florist responded when questioned about precautions used to handle a fertilizer mixed into water:

"Not really, it's not dangerous. If you spill some on your hands, it's no problem. It's a completely natural product."

She made this statement even after the Health Hazard WHMIS sign was pointed out to her on the product bottle.

3.2. Understanding the pathways of exposure and health impacts

Toxic substances in the environment can be absorbed through several pathways and cause harm to health. However, participants' accounts suggested that their understanding of these underlying processes was fragmented. Of the exposure pathways, ingestion of liquids or products is the most recognized. This route was deemed far more worrisome than other forms of exposure, such as inhalation or skin contact. For instance, a young woman working as a tire installer (4-2W) said, while discussing the white grease she used to install tires on rims: "*You just shouldn't eat it,*" but added that it is not a problem if it is on her hands, since it does not burn the skin. A young man working as a gas station attendant (10-4M) also commented:

"Well, yeah, if you drink gasoline, that's definitely dangerous, but as for the fumes, I don't think they're dangerous."

In addition to the fear about ingesting products, shared by many of the trainees interviewed, some believed it is best to avoid getting products on the face. For example, a metal fabrication labourer trainee (8-3M) said: "*You know, you shouldn't put it on your face,*" referring to the same lubricating product mentioned earlier.

When discussing the link between exposure to chemicals and potential health risks, they focused on immediate effects, such as coughing caused by an overuse of cleaning products or dry skin from repeated washing.

Participants rarely discussed the relationship between exposure and disease or its causation (etiology). Only two trainees mention "cancer" or "carcinogenic." One trainee made a clear connection between a potentially harmful agent and its role in causing a disease (6-2M; stock handler):

Trainee: "*No, no, no, we don't use a broom at the company because the dust can fly around. Just a little bit of the cathodic product getting into the nostrils is enough.*"

Interviewer: "*And that's not good.*"

Trainee: "*It's really not good.*"

Interviewer: "*Okay, did they explain what it does?*"

Trainee: "*I was told it's comparable to asbestos.*"

Interviewer: "Oh, okay."

Trainee: "Yeah, well, not asbestos, but it can have the same effects as asbestos. It can get into the lungs and cause cancer later."

In other words, WOTP trainees most often identified the short-term, unpleasant impacts of exposure to a substance (e.g. coughing), but not the related exposure route (e.g. inhaling). When they did mention the exposure route, it was most often related to a conscious act, like ingesting (drinking) a substance, rather than an invisible, passive or involuntary exposure. Differences in understanding exposure pathways may also intersect with gendered expectations around bodily care or cleanliness, particularly in service jobs where appearance, sociability and hygiene are emphasized.

3.3. Perception and understanding of prevention measures

Prevention measures include a range of actions designed to protect workers, from general strategies to more specific practices. Personal protective equipment (PPE) and the training received both at school and during traineeships were the most frequently mentioned preventive measures during student interviews.

A significant portion of the interviews focused on PPE, with questions about its use and availability in work environments, as well as the responsibilities associated with allocating, storing, maintaining, and cleaning it. This topic sparked considerable interest among the trainees, with numerous questions and responses shedding light on their understanding of PPE's importance and how it should be used.

While the interviews were largely centered on chemical hazards, trainees were more inclined to discuss PPE in relation to other risks that seemed more tangible to them, such as wearing glasses to protect their eyes from debris or gloves to prevent cuts or punctures (3-1M, tire installer).

Interviewer: "Do you need to wear glasses for that?"

Trainee: "Yeah, yeah, to avoid small bits in your eye."

Interviewer: "Metal shards?"

Trainee: "Yeah, that's it."

Interviewer: "But do you need glasses to protect from oil or other products in your eyes?"

Trainee: "No."

Regardless of PPE usage, many participants believe that simply "being careful" is as effective a safety measure as wearing protective equipment. Both the pet grooming assistant (2-1W) and the childcare assistant (1-1W), notably both feminine-typical trades, mentioned taking care to step back when spraying cleaning products, but neither felt the need to wear PPE (mask or safety glasses). The grooming assistant explained that she would feel safer with glasses after having gotten cleaning product in her eyes, whereas the childcare assistant, lacking access to safety glasses, had never considered their necessity.

Along similar lines, two other trainees who regularly handle heavy and hazardous products were asked about safety measures or procedures to follow in the event of an accidental spill or the dropping of a hazardous product. Both stock handlers, a mixed-gender trade, one in a CFER (6-2M) and the other in an auto parts store (5-2M) emphasized the importance of "being careful" to avoid spills. However, the one in the CFER knew the protocols to follow in case of a spill (taking the example of battery acid in his explanation), while the other had received no clear instructions. The latter recounted an incident where he accidentally spilled a liquid (something like oil or engine liquid sold in the store), but was left without guidance on how to handle the situation, its associated dangers, or the proper precautions.

On the availability of PPE, opinions varied significantly across trainees depending on their work environments. The metal fabrication

labourer (8-3M) confirmed that his company provided a variety of PPE, such as gloves for different tasks and masks tailored to his specific needs. In contrast, the young gas station attendant (10-4M), who worked at a service station that also operated as a mechanical garage, was unaware that he could use the PPE available to the mechanics or that doing so would be better for his health.

Even when PPE is available, trainees did not always understand its purpose. The young woman responsible for laundering PPE at the CFER (7-2W) explained that she could not do this task with gloves because they would get wet, so she handles contaminated PPE with her bare hands instead. Although waterproof gloves were provided, she mentioned they were mainly intended for other tasks.

Regarding the fit of PPE, participants noted issues like poor sizing, loss of sensory perception, and reduced physical strength. The pet grooming assistant (2-1W) shared that she prefers not to wear gloves as they make it difficult to judge when to change or wring out her cleaning cloth when soaked in detergent. Two other trainees mentioned that their safety glasses did not fit properly, impairing their vision. The tire installer (4-2W) explained why she avoids wearing gloves:

Interviewer: "Do you ever wear gloves for this task?"

Trainee: "Not for this task, but one of my colleagues does. I don't because I sweat a lot."

Interviewer: "Okay."

Trainee: "It's like my hand is wet, like I've just gotten out of the bath."

Interviewer: "And that's uncomfortable?"

Trainee: "Yeah, and gloves get in the way. You can't really exert maximum force. Gloves provide a little grip, but rubber ones are hard, and they tear more easily. It's tougher. I used to wear them, but they bothered me too much, so I stopped."

Regarding the OHS training received at work, opinions also varied significantly among the trainees. Many participants agreed that their training was practical, often focused on specific tasks. It sometimes included safety instructions but offered little information beyond the immediate scope of their work. The young metal fabrication labourer (8-3M) mentioned that he was not always sure of the purpose of the parts he was working with unless he asked his supervisor. The stock handler trainee in an auto parts store (5-2M) admitted he had no idea about the hazards of the products he was handling, and no one at his traineeship had addressed this with him. Similarly, the young florist assistant (9-4W) stated that no one had explained the hazards of the fertilizers she used for flowers.

As for the OHS training received at school, very few mentioned it. Two trainees mentioned learning about WHMIS symbols in class. Generally, trainees in CFER facilities reported receiving more safety training during both their traineeships and at school, as their school and traineeship contexts were the same.

3.4. Gender and vulnerability factors

In this study, although responses shared by participants were to a large degree very similar, some differences emerged based on gender, the types of jobs held, and communication abilities. This section highlights how some of these social identities or roles could shape OHS parameters.

When discussing hazards, the two young women in typically feminine jobs involving caregiving were more likely to spontaneously mention dangers affecting others (children or animals) than those that could impact their own health. The childcare assistant (1-1W) frequently talked about risks to the children and the protective measures needed to keep them safe. Similarly, the pet grooming assistant (2-1W) emphasized the hazards posed by cleaning products and their impact on dogs.

Interviewer: *Does the product smell strong?*

Trainee: A little. It's hard for the dogs because their noses are so close to the wall of the dog pen.

By contrast, trainees in typically masculine jobs, regardless of gender, tended to normalize environmental and personal dirtiness. This is observed among the three garage trainees: the two tire installers (3-1M, 4-2W), and the gas station attendant (10-4M). For instance, the gas station attendant (10-4M), when asked about gasoline on his shoes, answered: *"What do I do about it? I just leave it there."* A similar question was asked to one of the tire installers (3-1M):

Interviewer: For you [mechanics], is it a problem to get dirty?

Trainee: No, it's normal.

Interviewer: Normal?

Trainee: Very normal

He added that the dirt does not bother him. The young woman working as a tire installer (4-2W) gave a comparable response when asked about having dirty hands. She mentioned that her hands always end up dirty and that it did not bother her; she normalized this eventuality as part of the trade's culture. However, a notable difference emerged in the accounts of these two trainees. The young man consistently wore his gloves, while the young woman never did. During the self-reflection interview, she shared that when she does wear gloves, she has to exert more force to manipulate tools and parts.

Another distinction between typically masculine and feminine jobs concerns supervision and support. Trainees in traditionally masculine jobs often described their work as collaborative, emphasizing the help and guidance they received from colleagues. The tire installer who was a woman (4-2W) spoke highly of her coworkers, saying: *"I'm not trained in this field, but I learned mechanics from my colleagues."* This reflects a sense of being well-supported in her workplace.

In contrast, participants in traditionally feminine jobs, such as the childcare assistant (1-1W), often work alone. This participant followed a task list prepared by her schoolteacher, with limited interaction with the staff on-site. She explained that the list contained tasks her coworkers did not have time to complete because they were overloaded, which justified the teacher's intervention. The young women in typically feminine roles were the ones who reported having developed strategies on their own.

Beyond gender, communication ability was another factor influencing how carcinogenic hazards were understood. Many WOTP trainees have experienced learning difficulties, which often manifest as challenges in communication. Language barriers can further limit their ability to articulate their understanding of workplace safety rules. Indeed, among participants in this study, those with the most significant communication difficulties tended to struggle the most in identifying hazards, their long-term effects, and protective measures.

For instance, one of the tire installers (3-1M) mentioned always wearing gloves but, due to communication difficulties, he could not explain why, illustrated in the following quote:

Interviewer: *"Do you prefer to wear gloves?"*

Trainee: "Yeah."

Interviewer: "Why?"

Trainee: "I don't know."

Interviewer: "Is it because they keep your hands cleaner?"

Trainee: "I don't know."

Case illustration: Intersectionality in vulnerability

Two trainees (6-2M and 7-2W) from the same school, are interesting to present in contrast to one another. They were each engaged in

traineeships at the same CFER, but they demonstrated significantly differing perceptions of risk, despite being in the same class. The first (6-2M), assigned to a manual handling task, provided detailed descriptions of workplace hazards and the instructions he received to mitigate them. The second (7-2W), responsible for laundering soiled work clothing, conveyed a sense of security and displayed minimal awareness of potential hazards.

6-2M, explaining a safety procedure: *"We were trained on what to do if there's a hydraulic oil leak. If it gets on your glove, you take it off quickly, wash your hands, and call poison control. It can corrode the skin, even a small amount can cause a wound."*

Interviewer to 7-2W: *If you need to remove your glove quickly, do you know how to do it?*

Trainee: Yes, with the other glove, the one that's not contaminated, let's say.

Interviewer: Does it get your hands dirty?

Trainee: Yes. [...] It's dirty, so we wash it.

Interviewer: Okay. What's on the gloves, actually?

Trainee: I don't know, they just get dirty. It's dust.

Interviewer: Okay, so you don't know what's on them?

Trainee: *Yeah, I don't know. But they're dirty.*

Participant 6-2M, who has good communication skills, described a protocol for handling a rare hydraulic oil leak and underscored the importance of workplace safety as explained to us through a personal story - his father suffered a severe workplace accident that left him unable to return to work. In contrast, 7-2W, who struggles with communication challenges, failed to make connections between the PPE she handled, possible contaminants, and potential health risks.

Both trainees worked at a school-run recycling company where trainees rotate through various job tasks based on their strengths and challenges. The first student performed all production tasks and was promoted to team leader, with certification to operate a forklift. The second rotated through only a few positions, as most tasks were too complex for her. She was frequently assigned support roles, such as laundering and cleaning. It was observed that these support roles, often associated with typically feminine tasks, received less attention from educators and supervisors, as well as less training on potential hazards. These hazards, being less visible, were likely perceived as less critical.

4. Discussion

The ergonomic approach used in this study, rooted in a sustainable prevention framework, elucidated the risk awareness and preventive measures manifest in cancer prevention (Garrigou et al., 2017; Galey et al., 2019; Pastor-Bédard et al., submitted), a topic rarely explored in studies on AYA's occupational health and safety. This framework emphasizes the importance of analyzing real work situations to uncover how social and organizational dynamics—including gender roles—shape perceptions, exposure and vulnerability, in view of building sustainable and inclusive prevention strategies. The value of this method lies in its ability to observe actual work situations, capturing the interaction between the individual, their tasks, the environment, and the tools available, providing a deeper understanding of the actual challenges these AYA trainees face in their first steps toward their professional life. It enables the development of prevention strategies that are likely to be more effective and grounded in the reality of the workplace. This approach enhances the sustainability of prevention efforts, as it encourages the integration of safety principles into broader organizational factors that shape risk exposure.

4.1. Occupational cancer prevention among WOPT trainees: challenges and insights

This study highlights substantial disparities in how trainees perceive and understand risks, the mechanisms by which risks impact health, and the protective measures they, as individuals, should adopt. Overall, trainees demonstrate low cancer risk awareness, with rudimentary, sometimes allegorical, interpretations of health hazards. The intangible nature of carcinogenic risks and the abstract, delayed, and uncertain onset of disease (Marchand, 2022; Fineberg, 2013; Mohammed-Brahim, 2018) contribute to students' difficulty in grasping the import of hazards in the workplace. Ingestion is the most identified pathway by participants, whereas it is known to be the least frequent exposure route in occupational settings. Inhalation or skin contact are less frequently recognized as dangerous by trainees, even though they are in fact the most frequent exposure routes (Centre canadien d'hygiène et de sécurité au travail, 2024).

Risk awareness is associated with the occurrence of symptoms or discomfort. Without these signals, danger remains invisible and trivialized. Even when discomfort occurs, trainees merely perceive it as a sign of potential danger, and not directly as a sign of real-time exposure (e.g. they might say the product is strong and dangerous but doesn't have a long-term effect). They also fail to link symptoms, exposure to substances, and exposure routes. Exposure perceived to be low in intensity is similarly minimized or ignored. Breslin et al. (2007) found that AYA workers often downplay occupational injury risks, viewing them as part of the job. Even exposures causing discomfort are normalized.

4.2. Risk awareness and protective measures among WOTP trainees

Findings reveal that WOTP trainees' awareness of carcinogenic risks and their understanding of protective measures are incomplete. Recognizing latent, invisible risks proves particularly challenging for trainees with learning difficulties, with significant implications for prevention strategies (Meyskens et al., 2016). Complex exposures are difficult to understand, and effective protective measures are similarly challenging to identify and validate (Penny and Wallace, 2015).

Research among primary school students shows a disproportionate focus on individual determinants (e.g., physical activity, bad habits) when considering cancer causes and prevention (Deyra et al., 2022). Given that many WOTP trainees, particularly those in the three-year Preparatory Training for Employment Program, often perform at a primary school learning level (Ministère de l'Éducation et de l'Enseignement supérieur, 2013); their risk perceptions may mirror those of younger students.

Interestingly, some trainees, like the young floral assistant, seemed to perceive certain products as 'natural,' possibly due to preconceived notions about working with plants. A product that appears natural, in their view, may be considered 'harmless' to health. Could so-called 'greenwashing' practices mislead vulnerable young people, particularly those with limited literacy, regarding the long-term dangers associated with these products? This raises important questions about marketing practices, particularly in the realm of cancer prevention (Williams, 2024). For instance, what are we to make of 'pinkwashing'—a marketing tactic where companies promote breast cancer awareness by selling pink-ribboned products while continuing to manufacture cosmetic or beauty items that, over time, could be linked to an increased risk of cancer? There were no hair stylist assistants among the trainees interviewed here, but it is a popular trade choice among young women in the WOTP. Such practices can be misleading, especially for vulnerable young people with low literacy levels, who may not fully understand the long-term dangers associated with these products.

Most occupational health interventions targeting young workers still rely heavily on individualized and age-based explanations of risk, often emphasizing dramatic messaging while neglecting the contextual, social, and organizational dimensions of young workers'

experiences—particularly those of apprentices (Descloix et al., 2025). Unsurprisingly, in our study, personal protective equipment (PPE) is the primary protective measure identified by trainees. However, despite recognizing PPE as a key safeguard, trainees admit they do not always use it, and do not really know how to use it properly. This may stem from the lower effectiveness of PPE (often not provided or properly used) compared to other measures like substance elimination, process substitution, and collective protective equipment (CPE) (Garrigou et al., 2020; Dyreborg et al., 2022; National Institute for Occupational Safety and Health, 2023; Rollin and Tadeo Granda, 2025). While PPE can act as a physical barrier, it also impairs sensory perception, such as sight, smell, hearing, and touch, which are critical for information processing (Zare et al., 2021). For instance, protective eyewear may obstruct visibility if not clean or properly fitted, while gloves can hinder tactile sensitivity necessary for discriminating product properties, useful information in quality control tasks. Furthermore, PPE can also impact communication (Leung et al., 2024), which could be particularly challenging for young trainees who are learning the job, especially considering a significant portion of them already have communication challenges.

Improperly fitted PPE can also cause discomfort, leading to constant adjustments and even health issues like musculoskeletal disorders, or, ironically, touching the face *more* often with sullied hands while fiddling with masks or glasses. PPE has been shown to be particularly ill-suited for women's body dimensions (Schlünssen and Jones, 2023), a fact corroborated by the young women in this study who reported discomfort. Maladapted PPE leading to open wounds, such as the constantly damp conditions within gloves noted by the young woman working in tire installation, could increase the likelihood of dermal exposure to toxic substances. Studies reveal additional barriers to PPE use, such as availability, conflicts with operational logic, and cultural perceptions. For example, Rollin (2024, 2025) found that in typically masculine jobs like auto body repair, PPE is often perceived as a sign of weakness, whereas in typically feminine industries like the beauty industry, it may undermine trust and client relations by suggesting the presence of hazardous substances. These factors contribute to inconsistent PPE use among workers, including WOTP trainees.

4.3. Gender and vulnerability in occupational risk perception

It is well established that the gendered division of labor has implications for occupational health and safety (OHS), as men and women may be exposed to different risks and respond differently to these exposures (e.g., developing different types of cancer at different stages of life) (Messing, 2021; Rollin and Tadeo Granda, 2025). Quinn et al. (2020) demonstrate that occupational gender segregation has persisted over time, despite policies promoting greater gender equity. The authors suggest several explanations for these persistent trends, including essentialist beliefs that assign tasks based on what is perceived as "natural" for men or women, organizational structures and environmental settings (tools, equipment, schedule, etc.) historically designed by and for men that continue to favor them, and gender-dominated cultures that actively or passively exclude non dominant genders. Related to this gendered division of labour, gender differences in perceptions related to health and safety have been observed in a similar population in France (Rollin and Tadeo Granda, 2025).

In the present study, young women in traditionally feminine roles mentioned receiving less support than their masculine counterparts and had narrower workplace social networks. In earlier studies conducted by our team (Laberge et al., 2012), it was observed that young men received job orientations more conducive to OHS on their first day of traineeship compared to young women. These findings were drawn from a qualitative study involving individual interviews with 31 trainees (18 men and 13 women). The results revealed that mentoring was more consistent for young men, who were exposed more quickly and directly to the core tasks of their trade. In contrast, young women were often assigned peripheral tasks and left on their own more frequently during their first

day. Nearly all the young men (16) spent their entire first day under the continuous supervision of a mentor, whereas most of the young women (10) spent less than half of their first day with a mentor. Considering the importance of mentoring and the transfer of safety knowledge in OHS, gender equity in supervision and prevention is an important question to raise. Many other studies have showed that effective OHS training combines safety awareness with job-specific knowledge, best transmitted by experienced workers (Chatigny, 2001; Laberge et al., 2012; Rollin, 2024). That said, as mentioned in the results section, the presence of a mentorship and supervision culture does not necessarily ensure the transmission of safety practices. On the contrary, job culture can sometimes obscure this transmission through hegemonic mechanisms that reinforce power and masculine strength (Rollin and Tadeo Granda, 2025).

Another finding related to gender is that only the young women in the study reported being more concerned about the health and safety of others, including the animals they cared for, often even more than their own well-being. Care-related professions, predominantly occupied by women, often prioritize client well-being over personal safety (Alexander and Klein, 2001; Rollin and Tadeo Granda, 2025). This was obvious among the young women working in caregiving roles, whether for people, animals, or plants. This may also reflect how occupational health and safety (OHS) concepts and language—originally developed around industrial, male-dominated trades—do not always translate meaningfully into care-oriented roles, potentially leading to lower recognition of personal exposure or risk in these contexts (Laberge et al., 2022). When OHS frameworks fail to account for the nature of relational or emotional labor, prevention may appear less relevant or visible to workers in feminized occupations.

4.4. Comparative cases: gender and intersecting vulnerabilities

To deepen our understanding of how gender and other social dimensions shape trainees' experiences of risk, we draw on the two illustrative dyads presented at the end of the results section, which highlight both sex- and gender-based differentiations. These comparative cases offer a lens into how gendered expectations intersect with physical capacity, communication ability, and workplace task assignments in shaping exposure to occupational hazards.

In the first dyad, two trainees—a young man and a young woman—were both assigned to the same typically masculine trade as tire installers in a garage. While both internalized the cultural norm that being “tough” and indifferent to grime is part of the job, the interview with the young woman revealed a more physically taxing experience. For example, she described that wearing protective gloves required much more effort, possibly because she was already operating near her physical limit. This suggests that gendered expectations and sex-linked differences can both shape how tasks are experienced, and how occupational risks are internalized and navigated, even in identical roles.

The second dyad highlights intersecting vulnerabilities through the comparison of two trainees in the same classroom, both working in the same context: a young immigrant woman with communication difficulties and a young white man born in Quebec with strong verbal abilities. The young woman was assigned to auxiliary cleaning and laundry tasks—roles often feminized and under-recognized in occupational health—and reported little supervision or support, despite clear exposure risks (e.g., handling contaminated uniforms without PPE). In contrast, the young man was given production-related tasks and demonstrated a stronger grasp of safety protocols. These discrepancies prompt critical reflection: Would a man with similar communication challenges have been assigned to the same auxiliary tasks? Would those tasks have been seen as hazardous and thus more effectively mitigated?

These examples reinforce longstanding concerns in gender and work research: that risks associated with typically feminine tasks are often rendered invisible, while masculine-associated tasks are more readily

acknowledged and supported in prevention systems (Messing, 2004; Paiva, 2014). They also illustrate how gender intersects with ability, language, and social positioning to shape vulnerability, underscoring the importance of inclusive, context-sensitive ergonomic approaches for sustainable and equitable occupational health strategies.

4.5. Broader implications and future directions

AYA workers, particularly young men, are often stereotyped as risk-takers (Stergiou-Kita et al., 2015). However, Laberge (2011) observed that many young trainees were quite shy and hesitant to call attention to themselves, as they sought acceptance within the group—far from being reckless. This observation raises an important question: even though the law provides the right to refuse work when a danger is perceived, do young trainees, especially those without job security, truly exercise this right? The literature suggests that asserting one's rights as a young worker is challenging (Tucker et al., 2013), and this challenge is experienced differently for men and women (Breslin et al., 2007). Difficulty in asserting rights is closely tied to the ways in which young workers perceive risks and their understanding of prevention measures. If young workers are hesitant to assert their rights due to fear of exclusion or job loss, this highlights a crucial gap in both the prevention and enforcement of safety measures. These factors—risk perception, the right to refuse, and job insecurity—will be carefully considered in the ongoing action-research development project.

4.6. Scope and limitations

The communication abilities of the AYA involved in the study posed challenges in conducting interviews and interpreting data. While the SRI method was carefully chosen to include as many trainees as possible, two participants who were interviewed had to be excluded from our analysis because it was not possible to extract meaningful information from their interviews. In this case, other elements, such as real-life observation videos and interviews with teachers, were used to identify the hazards these trainees faced and how they protected themselves. Their situation was therefore included in the overall project (not presented here) and will be considered in the development of tailored prevention methods. While this study is a first step, it raises questions about whether certain responses might reflect typical answers or if they are unique to the population studied—something we were unable to ascertain in many cases.

Furthermore, the gender-based analysis is undoubtedly incomplete. While the gendered nature of the jobs was explored, it was not possible to investigate how this intersects with the trainees' gender identity. This was primarily because the number of participants was small. Additionally, the trainees' gender identities were not discussed, preventing the identification of meaningful patterns on this issue. Finally, since all but one of the participants were engaged in occupations typically associated with their gender, it was difficult to define the extent to which differences could be attributed to the trainees' gender versus the gendered nature of the job itself. This observation, however, suggests that part of the gender influence occurs in the process of choosing the traineeship placements, which lies outside the scope of this study.

This study has contributed to understanding how AYA in the WOTP perceive cancer-related risks in their work environment, better identifying the mechanisms through which these risks are underestimated or ignored and recognizing gaps in the prevention measures in use. It has also helped determine how certain vulnerability factors influence aspects of the situation. This information will be useful for the development of the early occupational cancer prevention program, which is the ultimate goal of this project.

5. Conclusion

This study among young people in the WOTP has allowed for a more

detailed exploration of certain aspects of their perception of potentially carcinogenic exposures that may be present in their traineeship environments. Several common mechanisms of underestimating cancer-related risks were identified. Our study shows that prevention measures are not always being explained or made available to trainees, and are, therefore, not always well understood.

Environments and attitudes differ significantly between typically masculine and feminine occupations. Communication skills appear to be an important factor in understanding hazards, potentially increasing vulnerability. Our study suggests that gender is an influencing factor in the perception of risks and preventive measures, but this requires further investigation.

The development of tailored tools for WOTP trainees is crucial so that they can actively participate in the risk prevention efforts in their current and future work environments. Creating environmental changes (e.g. substitution, elimination, engineering modifications) and involving them in the process would be a more efficient prevention measure than focusing on behaviour change. However, even with all the necessary knowledge, systemic barriers remain. The requirements set by the ministerial WOTP program (i.e. the number of hours required to obtain a diploma) and the precarious work situations in which these young people often find themselves after completing the program limit the power they have to change their working conditions. It is important to reflect on the laws and regulations that can truly protect AYA in precarious jobs, so that they can effectively assert their rights without the fear of losing their job. Protecting one's health at the cost of losing employment or failing to receive a diploma will never be a valid solution.

CRediT authorship contribution statement

Marie Laberge: Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Liam Lett:** Writing – review & editing, Writing – original draft, Validation, Methodology, Formal analysis. **Sami Fettaïh:** Writing – review & editing, Visualization, Validation, Methodology, Investigation, Data curation, Conceptualization. **Jena Webb:** Writing – review & editing, Visualization, Validation, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Nadielda Pastor-Bédard:** Writing – review & editing, Investigation. **France Labrèche:** Writing – review & editing, Methodology, Funding acquisition. **Sabrina Gravel:** Writing – review & editing, Funding acquisition, Conceptualization. **Sylvain Letscher:** Writing – review & editing, Funding acquisition.

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Data availability

The data that has been used is confidential.

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