

Title: Preventive behaviour at work of vocational students

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Authors :

Lecours, Alexandra ^{a,b} *, erg, Ph. D. ; Therriault, Pierre-Yves, erg., Ph. D. ^{a,b}

^a Département d'ergothérapie, Université du Québec à Trois-Rivières, Canada; ^b Laboratoire de recherche en ergologie, Université du Québec à Trois-Rivières, Canada.

Address of authors :

Département d'ergothérapie
Université du Québec à Trois-Rivières
3351, boul. des Forges, C.P. 500,
Trois-Rivières (Québec)
G9A 5H7
(819)376-5011 #3726

*Corresponding author : Alexandra Lecours (ORCID : [0000-0002-4485-7829](https://orcid.org/0000-0002-4485-7829))

Email : Alexandra.Lecours@uqtr.ca

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Abstract :

Background. Statistics suggest young workers are a group at high risk of sustaining injury. Vocational students are frequently included in the ‘young workers’ group, with all other different types of workers aged 24 or less. However, the literature exposes vocational students as having specific descriptive characteristics, suggesting that this subgroup might differ from other ‘young workers’. The literature offers little description of this population toward prevention at work. The aim of the study was to explore factors associated with vocational students’ preventive behaviour at work. **Methods.** The study was conducted with 129 participants following a predictive correlational design. Preventive behaviour and some personal, occupational and environmental factors were recorded by validated questionnaires. Multiple regression analyses were used to identify factors associated with vocational students’ preventive behaviour at work. **Results.** Findings showed the majority of vocational students had a moderate level of preventive behaviour at work. Most relevant factors associated with preventive behaviour at work for this specific population were: 1) type of prevention training, 2) autonomous motivation, 3) study program and 4) type of school. **Conclusion.** Vocational students are a specific population and it is important to work on relevant factors during their studies to help them become involved toward prevention.

Key words : Occupational health and safety; Vocational training, Young workers

1. Background

Statistics show that young workers are a group at high risk of sustaining injury. In fact, youth aged 15 to 24 are proportionally more often victims of an injury at work than their older colleagues (Breslin et al. 2003, Ledoux and Laberge 2006, Salminen 2004). In America, it is estimated that the frequency rate of occupational injuries among workers aged 15 to 24 is 5.8%, while it is of 3.7% among older workers (Hébert et al. 2003). In Europe, the risk of work accidents among young workers is 25% to 40% higher in comparison with other age groups (Schneider 2007). Several studies have highlighted the factors related to young workers' relationship to prevention. Among others, authors suggest that positive perception and interest toward prevention seem weaker among younger workers compared to older workers (Moscato et al. 2011, Schooley 2012, European agency for safety and health at work 2006). Also, it appears the higher risk to have a work injury among youth could be related to the fact that these workers often have several organizational (e.g. irregular hours, low pay) or physical (e.g. repetitive work, heavy lifting) constraints in their job (Gervais, Massicotte, and Champoux 2006, Ledoux and Laberge 2006, Zierold and Anderson 2006). Besides biological age (Salminen 2004, Laflamme and Menckel 1995, Hale and Hale 1986, Breslin and Smith 2005) and lack of work experience (Breslin et al. 2003, Laberge 2008, Passmore et al. 1991, Tétreault 1994), lack of training in terms of prevention is also reported as a factor associated with the risk of work-related injuries or illnesses among youth (Laberge, Maceachen, and Calvet 2014, Ledoux et al. 2008, Moreau, Angora, and Michel 2013, Moscato et al. 2011). In this sense, training related to prevention provided by employers to young workers is often scarce (Ledoux, Laberge, and Thuilier 2015), low, or at least uneven between organizations (Smith and Mustard 2007). Moreover, the quality of such training is not reported in the literature (Breslin et al. 2011, Zierold and Anderson 2006). It also appears that training related to prevention offered in vocational training centres has mixed effects on young workers behaviours and attitudes toward prevention (Chatigny and Desmarais 2015, Frigul and Thébaud-Mony 2010, Moreau, Angora, and Michel 2013).

Most studies conducted to increase understanding of young workers' experiences related to prevention have focussed on age as the main inclusive criteria (Laberge and Ledoux 2011, Breslin et al. 2003, Breslin and

Smith 2005, Salminen 2004, Turner, Tucker, and Kelloway 2015). Students attending vocational training or entering labour market after vocational training are frequently included in the ‘young workers’ group (Laberge and Ledoux 2011, Breslin et al. 2003), with all other different types of workers aged generally 24 or less (i.e. high schools or college part-time workers, full-time workers without a diploma, school dropouts, etc.). However, literature exposes vocational students as having specific descriptive characteristics, suggesting this subgroup might differ from other ‘young workers’. In fact, clientele attending vocational training centres in the Canadian province of Quebec has specific student profiles. These students are composed of minors coming from general high schools, but also from adults who have experienced periods of employment, studies, inactivity or immigration (Berbaoui 2015, Chatigny and Desmarais 2015, Chatigny et al. 2012). Pupils aged 24 and under represent 55% of the population, while those aged 30 and over account for 30% of the clientele in vocational training centres (Gouvernement du Québec 2010). Very young students (less than 20 years old) would represent only 17% of the clientele (MELS & MESRST 2012). Over 60% of young students (24 years old or younger) have a high school diploma upon entering vocational training, while only 40% of older students (25 years and older) have earned this diploma. The majority of vocational students (60 %) live with their parents and most of them (70%) work part-time (Berbaoui 2015). Vocational training centres’ pupils are men at 56% (Gouvernement du Québec 2010). Although most of vocational students are aged 24 and under, some are older. So, age should not be the only criteria to define them toward prevention. In fact, using age as the main criteria implies some students are not taken into account into the portrait and this could imply a bias.

With these specific characteristics of the population of students learning a trade in vocational training centres, it is possible to ask if factors related to prevention among young workers are necessarily the same for the specific population of vocational students? Little information is available in the scientific literature to describe this population toward prevention at work. As vocational students present a large variability in terms of age, work experience and study background, it is relevant to understand their relationship to prevention when they enter vocational training to ensure a prevention training that is appropriate to fit their needs and realities. As studies report a high risk of work-related injuries or illnesses despite the completion

of a vocational training (Ledoux and Laberge 2006, Girard et al. 2006, Thivierge 2002, Turner, Tucker, and Kelloway 2015), it is important to describe vocational students regarding prevention. An exploration of the main factors associated with higher preventive behaviour will facilitate a better organization of prevention education in vocational training and, ultimately, help these students to become involved workers toward prevention.

1.2 Context of vocational training

In the Canadian province of Quebec, training for a skilled or semi-skilled occupation is primarily offered in near of 200 vocational training centres. For the 2013–2014 academic year, 129 348 students were registered in one of the programs offered (Gouvernement du Québec 2015). These programs are offered on a full-time basis and the duration of study is relatively short, ranging from 600 to 1,800 hours. These courses are offered to students from the age of 15. The education in vocational training is entirely oriented toward learning the trade. There is no general education. In addition, the curriculum is divided into multiple training modules developing specific skills. The duration of these modules varies between 15 and 135 hours of training. Many of the programs, but not all, include a module dedicated to education about prevention of work-related injuries or illnesses. However, this module is, for most study programs, generic and not specific to the occupation taught (Chatigny and Desmarais 2015). This module, when present, is usually given very early in the curriculum and has between 15 and 30 hours of instruction. Notions regarding legislative framework for health and safety are addressed, as well as risks to health or safety related to the occupation (Girard et al. 2006). Less frequently, working methods and skills to prevent these risks can be addressed (Girard et al. 2006).

2. Theoretical background: Preventive behaviour at work

Recognized as a determinant of success in prevention of work-related injuries or illnesses (Roy et al. 2008), preventive behaviour at work is a predominant concept to measure to understand vocational students' relationship to prevention. Preventive behaviour at work consists of observable and measurable actions that

a worker, or a vocational student, can do to protect his/her own health and safety and those of his colleagues, contributing to the overall health of the organization. A recent study (Lecours and Therriault 2017a) highlighted these actions are grouped in five attributes defining the concept of preventive behaviour at work, which are: 1) compliance with safety rules and procedures; 2) proactivity, participation, engagement and initiatives related to prevention; 3) maintenance of the physical environment; 4) concern for the social environment and; 5) reflexivity and analytical skills of work situations.

Moreover, the concept analysis identified several antecedents that must be in place in the daily life of a worker, or a vocational student, prior to the development of preventive behaviour (Lecours and Therriault 2017a). Authors mentioned that personal, occupational and environmental factors may be considered as antecedents or determinants of preventive behaviour at work. Among personal factors, it is suggested that prevention training, knowledge, skills, self-efficacy and motivation toward prevention are antecedents of preventive behaviour at work. Among occupational factors, the occupation itself with its requirements, characteristics and risks would affect preventive behaviour. Finally, among environmental factors, attitudes and influences of colleagues and supervisors (or teachers) toward prevention are of crucial importance in the development of preventive behaviour among workers or students learning a trade, as well as safety climate and management style.

The aim of the study was to explore factors associated with vocational students' preventive behaviour at work. The specific objectives were: 1) to describe preventive behaviour at work of students at the beginning of their vocational training, and 2) to identify some personal, occupational and environmental factors associated with vocational students' preventive behaviour at work.

3. Material and Methods

3.1 Design

The study was conducted following a predictive correlational design (Fortin 2010).

3.2 Participants

Participants were students from five vocational training programs, namely automated system electromechanics, cooking, hairstyling, landscaping and secretarial. These programs were offered in three vocational training centres in the province of Quebec, Canada. All participants had at least one work experience in the last 12 months. Study programs were selected based on their different realities (e.g.: number of hours allocated to the prevention teaching, available resources) and on the different risks to health or safety related to the trade (e.g. musculoskeletal disorders or work accidents). These criteria allowed the research team to obtain a wide diversity in the sampling. Participants were all French speaking. All participants who were asked to take part in the study agreed.

3.3 Variables

Dependent variable

Preventive behaviour at work was measured with the *Échelle du comportement préventif au travail* (ECPT) (Lecours and Therriault 2016). It is a self-administered questionnaire of nine items that has been validated with French young workers. The measure is based on three factors related to attributes of the concept of preventive behaviour at work, which are 1) compliance with safety rules and procedures, 2) participation and initiatives related to prevention, and 3) concern for social and physical environment. The questionnaire asks the worker, or the vocational student, to rate frequency of performance of different behaviours on a 5-point Likert scale (never, rarely, sometimes, often, always). After recoding items that have a negative form, total score range from 9 to 45, a higher score reflecting a higher level of preventive behaviour at work. Results of the validation study of this tool conducted with 195 young workers showed a stable factorial structure and high internal consistency and test-retest fidelity (Lecours and Therriault 2016).

Independent variables

Personal factors : Data on **age**, **gender**, possession of a **high school diploma** and **background** (high school vs labour market) have been collected with a sociodemographical questionnaire. Information on the type of

prevention training received (none, generic or specific to trade) was gathered as well. Finally, information about **motivation toward prevention** was collected with the *Échelle d'autodétermination de la motivation à adopter des comportements sécuritaires* (Lecours and Therriault submitted), a validated French version of the *Self-Determination Theory Safety Motivation Scale* (Scott, Fleming, and Kelloway 2014). The tool measures 4 types of motivation (intrinsic, identified, introjected, external) according to the level of internalization of the value of prevention. Level of agreement on items of each of these subscales is scored on a 7-point Likert scale. The validation study conducted with 225 young workers found a stable structure. Internal consistency was highly satisfactory and test-retest reliability was high for the majority of statements. For the purpose of the present study, we collapsed intrinsic and identified motivation (becoming autonomous motivation) and introjected and external motivation (becoming controlled motivation). This simpler classification of motivation's levels was used in previous studies (Gagné et al. 2010). Total scores range from 6 to 42 for each of the two scales, a higher score reflecting a higher level of motivation. In order to conduct further analysis, participants' scores were dichotomized at the median. High and low levels of each scale of motivation were then obtained.

Occupational factors: Information on the **study program** (automated system electromechanics, cooking, hairstyling, landscaping and secretarial) was gathered.

Environmental factors: The sociodemographical questionnaire allowed to get information about **part-time job** students may have. The **type of vocational training centre** (general, construction, agriculture/horticulture) was also used as a variable that may influence the level of preventive behaviour at work.

3.4 Procedure

All variables were collected by written forms completed in the classroom in the first month of the vocational training. It was decided to take measures at the beginning of studies in order to identify factors to address during the curriculum. The three forms (sociodemographical questionnaire, preventive behaviour measure and motivation toward prevention measure) took 30 to 40 minutes to complete.

3.5 Ethics

Participants took part freely and voluntarily in the study. No financial incentive was offered. This project received the approval of the Research Ethics Committee with humans of the Université du Québec à Trois-Rivières (CER-14-208-07.02).

3.6 Analyses

As our dependent variable is measured with a Likert scale, parametric analyses may be an issue. In fact, no well accepted statistical approach is actually recognized in literature as the right procedure to use (Grace-Martin 2008). In order to make a rigorous scientific work and to choose the statistical procedure that will suit the data the best, normality tests were first conducted on the ECPT total score. First, the different graphics (shape of the distribution, Q-Q plots, box plots) allowed to observe that the distribution of the variable tended to be normal with no outliers. We also made sure that skewness (-0.17, SE : 0.21) and kurtosis (0.05, SE : 0.42) respect the properties of normal distribution. Finally, normality tests (K-S (129) = 0.72; p : 0,99 ; S-W (129) = 0,99; p = 0.17) allowed to be confident the variable distribution was not different from normal distribution. All these indices ensured the dependent variable is normally distributed. Moreover, literature suggests that with a Likert scale of numerous items scored on at least 5 points, it is possible to consider the variable as being continuous and to perform parametric statistics with integrity (Grace-Martin 2008). Then, the choice of using parametric statistical tests to keep as much information as possible was made.

For the objective 1, univariate and bivariate descriptive statistics were conducted.

For the objective 2, multiple regression analyses were conducted. The assumptions of multiple regression analyses were verified (e.g. multicollinearity, homoscedasticity, independence of errors, normal distribution of errors). Multiple regression analyses were then carried out using a direct approach (i.e. all variables were entered in the equation simultaneously) because there was no specific hypothesis about the order of importance of the different factors. This method provides an estimation of the contribution of each factor

over and above the others (Tabachnick and Fidell 2013). The best model retained, with all factors significant at $p < 0.05$, was selected according to the following criteria : 1) high amount of variance explained and 2) low number of factors included (parsimony).

3.7 Statistical power

In terms of correlation analyses, statistical power reaches 80% for an effect size (r) of 0.24 or more when considering a sample size (n) of 129 and a significance level (p) of 0.05 (Faul et al. 2009). The reference values established by Cohen (1988) suggest that an effect size (r) of 0.1 is small, 0.3 is moderate, 0.5 is large and 0.7 is extra-large. According to the study parameters, it is possible to detect small-moderate to extra-large effects (Cohen 1988).

4. Results

4.1 Description of participants according to personal, occupational and environmental factors

The mean age of the 129 participants was 23.8 years old (SD : 7.7, range 15-54) and 67.4% were female. Participants mostly came from labour market (76.0%) prior to the beginning of their vocational studies. The majority of participants had a high school diploma (67.4%). Prevention training received by participants was mostly generic (78.3%). Half of participants (51.2%) had a high level of autonomous motivation toward prevention, as 57.4% of participants had a low level of controlled motivation. Table 1 describes participants' preventive behaviour according to personal factors.

Insert Table 1 here

Participants were enrolled in five different study programs with a higher proportion (41.9%) coming from the hairstyling program. Table 2 describes participants' preventive behaviour according to the occupational factor

Insert Table 2 here

Among environmental factors related to preventive behaviour at work, the majority (57.4%) of participants had a part-time job during their vocational studies. The majority of participants (80.6%) came from a general vocational centre, compared to a school specialized in the construction sector or in agriculture/horticulture. Table 3 describes participants' preventive behaviour according to environmental factors.

Insert Table 3 here

4.2 Description of preventive behaviour at work of participants

The average score of participants on the ECPT was 35.5/45 (SD : 4.8, range 21-45). The weighted average score on the compliance with safety rules and procedures subscale was 3.83 (SD : 0.67, range 1.75 - 5), corresponding to a frequency score of 'sometimes' to 'often'. On the participation and initiatives related to prevention subscale, the weighted average score was 3.81 (SD : 0.87, range 1-5), also corresponding to a frequency score of 'sometimes' to 'often'. Finally, on the concern for social and physical environment, the weighted average score was 4.2 (SD : 0.57, range 2.33-5), corresponding to a frequency score of 'often' to 'always'. Figures 1 to 3 show the frequency of realization reported on each behaviour of the ECPT.

Insert figure 1 here

Figure 1. Number of participants according to the frequency of behaviours included in the compliance with rules and procedures subscale¹

Insert figure 2 here

¹ Items 1 and 4 have been recoded before analyses because of negative form

Figure 2. Number of participants according to the frequency of behaviours included in the participation and initiatives related to prevention subscale

Insert figure 3 here

Figure 3. Number of participants according to the frequency of behaviours included in the concern for social and physical environment subscale

4.3 Factors associated with preventive behaviour

The strongest and most consistent correlates with higher preventive behaviour were autonomous motivation ($r = 0.56$, $p < 0.001$), controlled motivation ($r = 0.29$, $p = 0.001$), age ($r = 0.26$, $p = 0.003$) and part-time job ($r = 0.26$, $p = 0.004$). Studying in the vocational training centre specialized in agriculture/horticulture was, for its part, significantly associated with a lower preventive behaviour ($r = -0.34$, $p < 0.001$).

Table 4 shows the final multiple regression model for the ECPT score. Studying in the cooking program, not being in the vocational training centre specialized in agriculture/horticulture, receiving a specific prevention training and having a higher level of autonomous motivation accounted for 44 % of the adjusted variance.

Insert Table 4 here

5. Discussion

This study sought to describe preventive behaviour at work of vocational students and to explore the influence of some personal, occupational and environmental factors. As measured with the ECPT, level of vocational students' preventive behaviour at work is moderate (35.5/45). As shown in figures 1 to 3, participants reported to adopt behaviours related to prevention mainly « frequently » in their daily work. Results also suggest participants report a higher frequency of adoption of behaviours related to the concern

for physical and social environment in comparison with behaviours related to compliance with rules and procedures and with participation and initiatives related to prevention. These results are consistent with a prior study that found that vocational students consider prevention mostly as personal concrete actions related to working equipment (Andersson et al. 2014) and with another study suggesting that social relations have an important effect on behaviours and attitudes toward prevention among young workers (Breslin et al. 2007).

5.1 The influence of personal factors on preventive behaviour at work

Results revealed no difference on ECPT total score according to gender. Gender difference toward prevention at work is still misunderstood in scientific literature, specifically among young workers. In fact, results of a large critical review concluded that gender-related differences toward the risk of work-related injuries or illnesses are related to the fact that working conditions and types of employment differ between men and women (Laberge and Ledoux 2011). Indeed, the examination of scientific writings allow to understand that traditional male occupations are characterized by risks linked to efforts to be deployed as well as to loads lifting, while traditional female occupations involve more static postures and repetitive gestures (Chatigny et al. 2012). Because of these occupational and contextual factors, it is difficult to isolate the effect of the biological gender on preventive behaviour at work of vocational students.

According to age, results suggest that older participants have a higher level of preventive behaviour compared to younger ($p < 0.05$). In fact, age seems to have a moderate effect ($r = 0.28$) on preventive behaviour of vocational students. This difference of age toward prevention is also related in other studies. Large systematic reviews based on population-based studies suggest that adolescents (15-19 years) and young adults (20-24 years) would be at higher risk of workplace injuries compared to older workers (Hale and Hale 1986, Laflamme and Menckel 1995, Salminen 2004). Some authors suggest that developmental factors (e.g., cognitive or affective maturation) may increase the vulnerability to injury of younger workers, but these explanations remain hypothetical (Breslin and Smith 2005, Laberge and Ledoux 2011). Further

studies need to be conducted before isolating the effect of age from other influencing factors such as lack of experience.

Even if participants who came from the labour market reported a higher level of preventive behaviour than participants who came directly from high school, the difference did not reach statistical significance ($p > 0.05$). Also, results suggest that having work experience or entering to vocational training right after high school has only a small effect ($r = 0.12$) on vocational students' preventive behaviour. This was surprising because research about young workers suggested that work experience is a protective factor regarding occupational injuries, since it allows the worker to develop strategies to cope with the various constraints he/she encounters in his/her work (Breslin et al. 2003). Moreover, other authors suggest that inexperience related to work would lead to a propensity among young workers to take risks and adopt unsafe behaviours (Tétreault 1994).

No difference on ECPT total score was found according to the possession of a high school diploma, as well as for the type of prevention training received ($p > 0.05$). In fact, results show a higher level of preventive behaviour at work among students who received a specific prevention training, compared to a generic and to no training, but the difference between groups did not achieve statistical significance ($p > 0.05$). Our results suggest a small-moderate effect ($r = 0.18$) of the type of training on preventive behaviour at work. The uneven number of participants in the three groups may have affected the statistical power required to detect the difference between groups. Also, data collection has been done during the first month of vocational studies and the prevention training was in progress. Scientific literature suggests consistently that lack of training would be an important factor related to the high frequency of work-related injuries or illnesses among young workers (Ledoux et al. 2008, Laberge, Maceachen, and Calvet 2014, Moreau, Angora, and Michel 2013, Moscato et al. 2011). Moreover, it is suggested that a prevention training specialized for the trade to be learned is an important antecedent of preventive behaviour at work (Lecours and Therriault 2017a) and has significant positive effect on students' relationship to prevention (Lecours

and Therriault in press). It is then possible to hypothesize that results may have been different if data collection has been done later in the curriculum.

Finally, participants who reported a high level of autonomous and controlled motivation presented a higher level of preventive behaviour ($p < 0.05$), compared to participants who had low levels of motivation. Our results suggest moderate ($r = 0.26$) to strong ($r = 0.45$) effect the level of motivation on preventive behaviour at work of vocational students. This is consistent with literature on preventive behaviour which shows that motivation is a significant antecedent (Lecours and Therriault 2017a). The relatively high level of autonomous motivation toward prevention reported by participants may be in relation with results of a study involving 800 vocational students revealing that 87% of them found prevention as a very important or an important subject (Moreau, Angora, and Michel 2013). Similarly, results of collective interviews with pupils in vocational training suggested that they consider themselves to be aware of the importance of prevention (Chatigny et al., 2012). These results differ greatly from results conducted on general youth that suggest they have a low concern toward prevention (European agency for safety and health at work 2006, Moscato et al. 2011, Schooley 2012).

5.2 The influence of occupational factors on preventive behaviour at work

The only occupational factor that has been included was the study program, or the trade to be learned. Results suggest significant differences on preventive behaviour levels of participants according to their study program ($p < 0.05$) and a moderate effect ($r = 0.37$). This variable has never been studied in vocational training literature, but preventive behaviour literature suggests the importance of occupational requirements, tasks and risk as an antecedent of preventive behaviour (Lecours and Therriault 2017a). Differences found between groups may also be related to the large variability of resources allocated to prevention training across vocational programs, to the different teaching methods used and to the several course contents offered (Chatigny and Desmarais 2015, Pisaniello et al. 2013).

5.3 The influence of environmental factors on preventive behaviour at work

Among environmental factors, having a part-time job and type of vocational training centre seemed both to have an influence on students' preventive behaviour at work. In fact, participants who have a part-time job reported lower levels of preventive behaviour ($p < 0.05$) compared to participants who do not have a part-time job. Having a part-time job or not has a small to moderate effect ($r = 0.22$) on vocational students' preventive behaviour. This factor has never been formally studied in relation with preventive behaviour at work, but a prior qualitative study conducted with vocational teachers may provide a first draft explanation (Lecours and Therriault 2017b). In fact, several teachers have denounced the less than rewarding message about prevention that is conveyed in the workplaces of their students. As the influence of supervisors or colleagues is an important antecedent of preventive behaviour at work (Lecours and Therriault 2017a), this may have negative repercussions on how students internalize the value of prevention.

Finally, results suggest a significant ($p < 0.05$) moderate ($r = 0.35$) effect of the type of vocational training centre on students' preventive behaviour at work. In fact, results revealed that students coming from the school specialized in agriculture/horticulture have lower levels of preventive behaviour at work than students coming from the general school. Participants coming from the school specialized in the construction industry reported the highest level of preventive behaviour at work. This may be in relation with the culture of prevention that is present in some occupational domains. In fact, in Quebec, national efforts have been made in the last ten to fifteen years to improve prevention in vocational training centres of high priority occupational sectors, such as construction (Chatigny and Riel 2014). On the other hand, prevention culture is less developed in agriculture/horticulture schools, which may impact on preventive behaviour levels of students.

5.4 Factors associated with preventive behaviour

Results of multiple regression analyses show that four factors were, together, significantly found to be associated with a higher preventive behaviour: 1) being in the cooking program (as compared with

hairstyling), 2) not studying in the agriculture/horticulture vocational training centre, 3) receiving a specific prevention training and 4) having a high autonomous motivation.

First, results suggest an influence of the study program or of the trade to be learned on the level of preventive behaviour. In fact, it appears that studying in cooking increases by over 2 points ($b = 2.20$) the score on the ECPT, as compared to studying in hairstyling.

The influence of the environment of the school setting also seems to be an important factor explaining preventive behaviour among vocational students. Results show that studying in the vocational training centre specialized in agriculture/horticulture decreases by over 3 points ($b = -3.50$) the score on the ECPT, as compared to studying in a general vocational training centre.

Results also suggest the type of prevention training received may have a significant effect on preventive behaviour at work. In fact, having a specific prevention training increases by near 3 points ($b = 2.94$) the score on ECPT, as compared with receiving no prevention training.

Finally, autonomous motivation matters in the understanding of preventive behaviour at work of vocational students as the total score on ECPT increases by 0.46 points with each point of increase on the autonomous motivation subscale of the *Échelle d'autodétermination de la motivation à adopter des comportements sécuritaires*.

Results of multiple regression analyses are consistent with the influence of personal, occupational and environmental factors on preventive behaviour at work, as discussed above.

5.5 Practical implications

Results of this study allowed to draw up a portrait of the factors associated with vocational students' preventive behaviour at work. A main strength of this study is the fact that a variety of personal, occupational and environmental factors have been studied together. This is likely to have contributed to the high amount of variance explained. In fact, most of the previous studies conducted to describe young workers relationship to prevention focussed on personal factors (Laberge and Ledoux 2011). Also, study included factors that have never been formally studied among the vocational students population, such as the influence of study

program, part-time job and type of prevention training. Finally, as this study focussed exclusively on the population of vocational students, it was possible to identify factors to work on during vocational training in order to improve pupils preventive behaviour at work. Interestingly, all factors retained in the final multiple regression model are modifiable. None of the non-modifiable factors (e.g. age, gender) figured in the final model. It is then important to work to improve uniformity across the different vocational programs in terms of resources allocated to prevention training, to improve the culture of prevention of schools regardless of their specialization, to develop specific prevention training for the different programs and to improve autonomous motivation of students. These four factors seemed to be those with the most effect on preventive behaviour of vocational students and should be included in reflections regarding the future of vocational training.

5.6 Limitations

Several limitations of the present study must be noted. First, two of the three vocational training centres included in the study had participants of only one study program each. This led to a difficulty to isolate the effects of school from those of the study program on preventive behaviour. Moreover, some antecedents of preventive behaviour, such as self-efficacy, have not been studied. Also, even if the ECPT has been found to be the most appropriate tool to measure preventive behaviour of French young workers (Lecours and Therriault 2017a, 2016), it presents some shortcomings such as the inability to evaluate the attribute of reflectivity and analytical skills of work situations or the inability to measure separately the attributes of maintenance of physical environment and of concern for social environment. This may have led to a lack of information. Finally, the uneven number of participants in each group is an element that may have affected the statistical results and must be taken into account in the interpretation of results.

6. Conclusion

In conclusion, findings of this study showed the majority of vocational students has a moderate level of preventive behaviour at work. We found some relevant factors influencing preventive behaviour at work for

this specific population. In fact, personal factors (type of prevention training, autonomous motivation), occupational factors (study program) and environmental factors (type of school) have been found to be associated with preventive behaviour. As young workers, even if they completed a vocational training, are still a population at high risk of sustaining injury or illness, it is important to improve those factors during their studies to help them to become involved workers toward prevention.

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References

- Andersson, I.-M., K. Gunnarsson, G. Rosèn, and M. Moström Åberg. 2014. "Knowledge and experiences of risks among pupils in vocational education." *Saf Health Work* 5 (3):140-146. doi: 10.1016/j.shaw.2014.06.002.
- Berbaoui, A. 2015. "Les jeunes de 16-24 ans inscrits en formation professionnelle et les obstacles à leur participation à la formation." Faculté d'éducation, Université de Sherbrooke.
- Breslin, C., M. Koehoorn, P. Smith, and M. Manno. 2003. "Age related differences in work injuries and permanent impairment: a comparison of workers' compensation claims among adolescents, young adults, and adults." *J Occup Env Med* 60 (9):E10.
- Breslin, C.F., J. Polzer, E. MacEachen, B. Morrongiello, and H. Shannon. 2007. "Workplace injury or "part of the job"?: Towards a gendered understanding of injuries and complaints among young workers." *Soc Sci Med* 64 (4):782-793. doi: <http://dx.doi.org/10.1016/j.socscimed.2006.10.024>.
- Breslin, F.C., S. Morassaei, M. Wood, and C.A. Mustard. 2011. "Assessing occupational health and safety of young workers who use youth employment centers." *Am J Ind Med* 54 (4):325. doi: 10.1002/ajim.20937.
- Breslin, F.C., and P. Smith. 2005. "Age-related differences in work injuries: A multivariate, population-based study." *Am J Ind Med* 48 (1):50-56. doi: 10.1002/ajim.20185.
- Chatigny, L. Nadon-Vézina, J. Riel, V. Couture, and P. Hastey. 2012. *Analyse ergonomique de la santé et de la sécurité en centre de formation professionnelle*. Montréal: IRSST.
- Chatigny, C., and L. Desmarais. 2015. *L'intégration de la santé et de la sécurité dans la formation des élèves et des enseignants de la formation professionnelle*. Montréal: CSST-MEESR.
- Chatigny, C., and J. Riel. 2014. "La santé et la sécurité des élèves en centre de formation professionnelle: approche, représentations, et genre." *PISTES* 16 (4):On line. doi: 10.4000/pistes.4402.
- Cohen, J. 1988. *Statistical power analysis for the behavioral sciences*. 2e ed. Hillsdale, New Jersey: Lawrence Erlbaum Associates.
- European agency for safety and health at work. 2006. *Intégration de la sécurité et de la santé au travail dans l'éducation : bonnes pratiques à l'école et dans l'enseignement professionnel*. Office des publications officielles des Communautés européennes. Luxembourg.
- Faul, F., E. Erdfelder, A. Buchner, and A.-G. Lang. 2009. "Statistical power analyses using G*Power 3.1: Tests for correlation and regression analyses." *Behav Res Methods* 41 (4):1149-1160. doi: 10.3758/BRM.41.4.1149.
- Fortin, M.-F. 2010. *Fondements et étapes du processus de recherche*. Montréal: Chenelière Éducation.
- Frigul, N., and A. Thébaud-Mony. 2010. *Où mène le Bac pro ? Enseignement professionnel et santé au travail des jeunes*. Paris: L'Harmattan.
- Gagné, M., J. Forest, M.-H. Gilbert, C. Aubé, E. Morin, and A. Malorni. 2010. "The Motivation at Work Scale: Validation evidence in two languages." *Educational and Psychological Measurement* 70 (4):628-646. doi: 10.1177/0013164409355698.
- Gervais, M., P. Massicotte, and D. Champoux. 2006. *Conditions de travail, de santé et de sécurité des travailleurs du Québec*. Montréal: IRSST.
- Girard, S.A., P. Doyon, L. Gilbert, M. Legris, and D. Laliberté. 2006. "Santé et sécurité du travail et formation professionnelle : Prochaine cible d'intérêt." *Pistes* 8 (2): On line.
- Gouvernement du Québec. 2010. *La formation professionnelle et technique au Québec : un aperçu*. Ministère de l'éducation du loisir et du sport. Québec.
- Gouvernement du Québec. 2015. *Nombre d'inscriptions par programme de formation professionnelle, selon le type de diplôme recherché, le secteur de formation, le sexe, le type de fréquentation scolaire, la langue d'enseignement, la strate d'âge et le statut d'élève débutant, année scolaire 2013-2014*. Ministère de l'éducation de l'enseignement supérieur et de la recherche. Québec.
- Grace-Martin, K. 2008. "Can Likert scale data ever be continuous?" *Article Alley*:On line.

- Hale, M., and A. Hale. 1986. A review of literature relating to the accident experience of young workers, and the relation between accidents and age. Health and Safety Technology and Management (HASTAM) Ltd. Birmingham.
- Hébert, F., M. Gervais, P. Duguay, D. Champoux, and P. Massicotte. 2003. "Les jeunes: contraintes du travail et risques." 2ième congrès national de l'Association canadienne de recherche en santé au travail ACRST/CARWH, Montréal.
- Laberge, M. 2008. Les TMS et les jeunes: enjeux et perspectives de recherche pour une prévention durable
- Laberge, M., and E. Ledoux. 2011. "Occupational health and safety issues affecting young workers: A literature review." *Work* 39 (3):215-232.
- Laberge, M., E. Maceachen, and B. Calvet. 2014. "Why are occupational health and safety training approaches not effective? Understanding young worker learning processes using an ergonomic lens." *Safety Sci* 68:250-257. doi: 10.1016/j.ssci.2014.04.012.
- Laflamme, L., and E. Menckel. 1995. "Aging and occupational accidents a review of the literature of the last three decades." *Safety Sci* 21 (2):145-161. doi: 10.1016/0925-7535(95)00059-3.
- Lecours, A., and P.-Y. Therriault. 2016. "French transcultural validation of the Compliance with Safety Behavior Scale." *Work* 55 (4):805-815. doi: 10.3233/WOR-162445.
- Lecours, A., and P.-Y. Therriault. 2017a. "Preventive behavior at work - A concept analysis." *Scand J Occup Ther* 24 (4):1-10. doi: 10.1080/11038128.2016.1242649.
- Lecours, A., and P.-Y. Therriault. 2017b. "Supporting vocational students' development of preventive behaviour at work: a phenomenological analysis of teachers' experiences " *IJRJET* 4 (1):20-46. doi: 10.13152/IJRJET.4.1.2.
- Lecours, A., and P.-Y. Therriault. In press. "Evaluation of occupational therapy workshops to prevent work-related injuries or illnesses among vocational students." *Journal of Occupational Therapy, Schools and Early Intervention*.
- Lecours, A., and P.-Y. Therriault. Submitted. "Motivation to adopt safe work behaviour: French validation of the Self-Determined Safety Motivation Scale." *Can J Behav Sci*.
- Ledoux, É., L. Laberge, and C. Thuilier. 2015. Portrait de l'accueil et de la formation à l'embauche des étudiants occupant un emploi pendant l'année scolaire. Montréal: IRSST.
- Ledoux, É., L. Laberge, C. Thuilier, P. Prud'homme, S. Veillette, M. Gaudreault, and M. Perron. 2008. Étudier et travailler en région à 18 ans quels sont les risques de SST : une étude exploratoire. *Contexte de travail et SST*. Montréal: IRSST.
- Ledoux, É., and M. Laberge. 2006. *Bilan et perspectives de recherche sur la SST des jeunes travailleurs*. Montréal: IRSST.
- MELS & MESRST. 2012. Indicateurs de l'éducation. Québec.
- Moreau, J.P., C. Angora, and X. Michel. 2013. Gestion des enjeux de santé au travail dans l'enseignement professionnel. Nantes: Académie de Nantes.
- Moscato, G., G. Pala, M.A. Boillat, I. Folletti, R. Gerth Van Wijk, D. Olgiati-des Gouttes, L. Perfetti, S. Quirce, A. Siracusa, J. Walusiak-skorupa, and S.M. Tarlo. 2011. "EAACI position paper: prevention of work-related respiratory allergies among pre-apprentices or apprentices and young workers." *Allergy* 66 (9):1164-1173. doi: 10.1111/j.1398-9995.2011.02615.x.
- Passmore, D.L., M. Odnoda, R. Paine, and D.A. Mohamed. 1991. "Epidemiology of work injuries among former participants in vocational education." 14th annual congress of the Northeast educational research association, Ellenville.
- Pisaniello, D.L., S.K. Stewart, N. Jahan, S.L. Pisaniello, H. Winefield, and A. Braunack-Mayer. 2013. "The role of high schools in introductory occupational safety education – Teacher perspectives on effectiveness." *Safety Sci* 55 (2013):53-61. doi: <http://dx.doi.org/10.1016/j.ssci.2012.12.011>.
- Roy, M., J. Cadieux, L. Forter, and L. Leclerc. 2008. Validation d'un outil d'autodiagnostic et d'un modèle de progression de la mesure en santé et sécurité du travail. Montréal: IRSST.
- Salminen, S. 2004. "Have young workers more injuries than older ones? An international literature review." *J Safety Res* 35 (5):513-521. doi: 10.1016/j.jsr.2004.08.005.

- Schneider, E. 2007. "Young worker - facts and figures." European agency for safety and health at work, accessed August 31. <https://osha.europa.eu/en/tools-and-publications/publications/reports/7606507>.
- Schooley. 2012. "High school teacher drives home the safety message." *Worksafe magazine* January/February:18-21.
- Scott, N., M. Fleming, and K. Kelloway. 2014. "Understanding why employees behave safely from a self-determination theory perspective." In *The Oxford handbook of work engagement, motivation, and self-determination theory*, edited by Marylène Gagné, 276-294. Oxford University Press.
- Smith, P.M., and C.A. Mustard. 2007. "How many employees receive safety training during their first year of a new job?" *Inj Prev* 13 (1):37. doi: 10.1136/ip.2006.013839.
- Tabachnick, B.G., and L.S. Fidell. 2013. *Using multivariate statistics*. 6th ed. Boston: Pearson Education.
- Tétreault, P. 1994. *Les jeunes au travail et la problématique de la santé et de la sécurité du travail*. CSST. Montréal.
- Thivierge, C. 2002. "Jeunes et prévention. De l'école au boulot." *Prévention au travail* 15 (4):7-14.
- Turner, N., S. Tucker, and E.K. Kelloway. 2015. "Prevalence and demographic differences in microaccidents and safety behaviors among young workers in Canada." *J Safety Res* 53 (0):39-43. doi: <http://dx.doi.org/10.1016/j.jsr.2015.03.004>.
- Zierold, K.M., and H.A. Anderson. 2006. "Severe injury and the need for improved safety training among working teens." *Am J Health Behav* 30 (5):525.

Tables

Table 1. Description of preventive behaviour of vocational students according to personal factors

	n (%)	Total score on ECPT ¹ Mean (SD)	Test	p value	Effect size r
Gender			t (127) =	0.50	0.06
Male	42 (32.6%)	35.1 (5.1)	-0.683		
Female	87 (67.4%)	35.7 (4.6)			
Age			F (3, 122) =	0.02	0.28
15-24	86 (66.7%)	35.3 (4.6)	3,536		
25-34	27 (20.9%)	34.4 (5.5)			
35-44	10 (7.8%)	38.4 (3.3)			
45-54	3 (2.3%)	41.7 (4.9)			
Background			t (124) =	0.14	0.12
High school	28 (21.7%)	34.3 (5.3)	-1.373		
Labor market	98 (76.0%)	35.8 (4.7)			
High school diploma			t (118) =	0.46	0.07
Yes	87 (67.4%)	35.3 (4.8)	-0.741		
No	33 (25.6%)	36.1 (6.3)			
Prevention training			F (2,126) =	0.14	0.18
No	13 (10.1%)	34.8 (5.0)	2.02		
Generic	101 (78.3%)	35.3 (4.9)			
Specific	15 (11.6%)	37.8 (3.9)			
Autonomous motivation			t (120) =	0.000	0.45
High (32-42)	66 (51.2%)	37.7 (4.5)	-5.5		
Low (6-31)	62 (48.1%)	33.5 (4.2)			
Controlled motivation			t (126) =	0.004	0.26
High (22-42)	54 (41.9%)	36.7 (4.7)	-2.961		
Low (6-21)	74 (57.4%)	34.5 (4.7)			

¹ *Échelle du comportement préventif au travail*

Table 2. Description of preventive behaviour of vocational students according to the occupational factor

	n (%)	Total score on ECPT ¹ Mean (SD)	Test	p value	Effect size r
Study program			F (4, 124) =	0.001	0.37
Hairstyling	54 (41.9%)	35.4 (4.5)	4.86		
Cooking	37 (28.7%)	36.4 (5.0)			
Secretarial	13 (10.1%)	34.8 (5.0)			
ESA	15 (11.6%)	37.8 (3.9)			
Landscaping	10 (7.8%)	30.2 (2.9)			

¹ *Échelle du comportement préventif au travail*

Table 3. Description of preventive behaviour of vocational students according to environmental factors

	n (%)	Total score on ECPT ¹ Mean (SD)	Test	p value	Effect size r
Part-time job					
Yes	74 (57.4%)	34.6 (4.6)	t (124) = 2.456	0.02	0.22
No	52 (40.3%)	37.8 (5.0)			
School					
General school	104 (80.6%)	35.7 (4.7)	F (2,126) = 8.869	0.000	0.35
Construction school	15 (11.6%)	37.8 (3.9)			
Agricultural school	10 (7.8%)	30.2 (2.9)			

¹ *Échelle du comportement préventif au travail*

Table 4. Final multiple regression model on total ECPT¹ (n= 128)

Independent variables	Raw coefficient	Standard error	Standardized coefficient	p value	Confidence interval (95%)
Intercept	20.52	1.77		0.000	17.00 – 24.04
Cooking program	2.20	0.75	0.21	0.004	0.719-3.687
Agricultural school	-3.50	1.24	-0.20	0.005	-5.94—1.05
Specific prevention training	2.94	1.03	0.20	0.005	0.897-4.977
Autonomous motivation	0.46	0.05	0.58	0.000	0.355-0.567

Adjusted R²= 0.442

¹ *Échelle du comportement préventif au travail*