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Examining the health and functioning status of medical laboratory professionals in Ontario, Canada: an exploratory study during the COVID-19 pandemic

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ABSTRACT

Objectives This study aims to explore the overall and specific aspects of the functioning of medical laboratory professionals (MLPs) in Ontario, Canada during the COVID-19 pandemic.

Design A cross-sectional analysis where a questionnaire was used to assess the mental status of MLPs.

Setting An online questionnaire administered in Ontario, Canada.

Participants 632 MLPs (medical laboratory technologists, technicians and assistants) were included.

Main outcome measures We employed the WHO Disability Assessment Schedule V.2.0 (WHODAS V.2.0) Questionnaire to assess functioning/disability and Copenhagen Psychosocial Questionnaire, third edition for psychosocial workplace factors. Multiple regression analysis examined the relationship between overall and specific domain functioning scores and psychosocial workplace factors.

Results Of the total 632 participants, the majority were female gender and Caucasian. It was found that health (β=2.25, p<0.001, CI: 1.77 to 2.73), management of environmental conditions (β=0.65, p<0.001, CI: 0.33 to 0.98), fear of unemployment (β=−0.72, p<0.001, CI: −1.09 to −0.35) and frequency of stress (β=−1.86, p<0.001, CI: −2.33 to −1.40), in addition to bullying exposure (β=0.56, p<0.01, CI: 0.15 to 0.98) and threats of violence exposure (β=0.90, p<0.01, CI: 0.25 to 1.54), significantly decreased functioning overall and within the specific WHODAS V.2.0 functioning domains.

Conclusion This study provides preliminary evidence of the overall and specific aspects of functioning among the MLPs during the COVID-19 pandemic. Besides, these findings can support and guide the improvement of workplace practices and policies among MLPs in the future.

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ The WHO Disability Assessment Schedule V.2.0 and Copenhagen Psychosocial Questionnaire, third edition are both validated measures on an international scale.
⇒ We cannot conclude any causal relationships as this is a cross-sectional study; thus, the results cannot be generalised to different population groups.
⇒ The medical laboratory technologist sample had similar demographic statistics to the overall population at the provincial level.
⇒ The sample did not include all of the medical laboratory professionals in the province, as data was only collected from professionals within the Medical Laboratory Professionals' Association of Ontario.

INTRODUCTION

Medical laboratory professionals (MLPs) are a vital part of the healthcare sector worldwide. In Ontario, this group includes medical laboratory technologists (MLTs) and technicians/assistants (MLT/As). MLTs are a regulated group of healthcare professionals[1] who analyses laboratory specimens and interpret laboratory results to assist in disease prevention,[2] while MLT/As are a non-regulated group of healthcare professionals[1] who collect and process specimens (eg, blood samples) and prepare chemical reagents for testing.[3]

There has been significantly less research on the mental health and functioning of MLPs' during the pandemic compared with other healthcare groups despite their occupational contribution during the pandemic. The current state of the literature reveals an abundance of studies conducted on mental health challenges of various healthcare workers such as nurses,[4 5] doctors[6] and rehabilitation professionals (eg, occupational and physical therapists).[7] The functioning of these healthcare workers has been explored to a greater extent than MLPs, which has provided insight into the importance of examining functioning. For example, among nurses[8–11] and physicians,[12 13] it has been reported that decreased functioning can result in decreased work performance, hence an increased threat to patient safety. Melnyk *et al*[11] reported that approximately 50% of nurses experienced

poor physical and mental health, which was associated with an increased probability of medical errors.[11] Additionally, Tawfik *et al*[12] reported that factors such as low safety grades, burnout, suicidal ideation and fatigue led to an increase in medical errors in physicians posing a threat to patient safety.[12]

The significant challenges faced by MLPs in Ontario, Canada, during the COVID-19 pandemic have been reported by the Medical Laboratory Professionals' Association of Ontario (MLPAO).[14] Notably, there has been a shortage of MLT staff during this time, which was exacerbated by the increased demand for MLTs to perform essential laboratory analyses on patient specimens. Both of these variables increased the workload for the few MLTs employed during the pandemic, decreasing their mental health due to increased occupational stress, exhaustion and burnout.[14]

The literature has highlighted how the COVID-19 pandemic has led to decreased mental health of MLPs due to increased occupational stress,[15] anxiety and depression.[16] An increased focus on COVID-19-related tasks demonstrated employees experiencing higher levels of psychological distress, including occupational stress, anxiety and depression.[17] A qualitative study examined the stressors of MLPs during the pandemic in Ontario, Canada. The results revealed that staff shortages worsened during the pandemic. Participants noted that they have been feeling 'forgotten' within the healthcare system despite all their efforts during the pandemic. Additionally, participants experience poor working conditions that have been exacerbated by the pandemic.[18] An Ethiopian study reported that MLPs were 4.69 times more likely to experience depression than pharmacy workers and 3 times more likely to experience anxiety.[19] They further reinforced these MLPs' increased likelihood of depression, stress and anxiety. Another study by the same team on psychological distress demonstrated that 71.4% of MLPs in their sample experienced moderate-to-severe levels of psychological distress due to COVID-19. Furthermore, the study found that 25.5% of participants suffered moderate-to-severe depression and 37.7% reported moderate-to-severe anxiety symptoms.[16]

Further research has been conducted to examine how the COVID-19 pandemic decreased the well-being, mental health and work participation of MLPs in Ontario, Canada.[20] The results highlighted that particular psychosocial work conditions decreased the mental health status and functioning of MLPs. While the functioning of MLPs was not the main outcome of this study, this research still provides preliminary evidence demonstrating how the COVID-19 pandemic has decreased functioning/increased disability of MLPs. It was reported that the mean disability scores of this population were 92% higher than the general population. This result indicates very high disability/low functioning within this population compared with the general population.[20] Thus, the health and disability status of MLPs can be defined as the level of functioning experienced in the face of mental health challenges.

The current literature only provides a preliminary investigation of the mental health/functioning of MLPs during the COVID-19 pandemic. The overall and specific domains of functioning in this population are still poorly understood and have yet to be studied. Therefore, our research study aims to further the exploration of the functioning of MLPs in Ontario, Canada, in the context of the COVID-19 pandemic. Moreover, this study will delve deeper into the health and disability status of MLPs by looking at domain-specific aspects of functioning.

METHODS

Design

This study employed a cross-sectional research design where a questionnaire was used to assess the mental status of MLPs in Ontario, Canada. The questionnaire included questions regarding the demographic characteristics and the extent of disability of MLPs. As a part of a larger initiative, this study included a sample representing approximately 50% of the MLPs in Ontario, Canada, with 929 MLTs and 1866 MLT/As. All data were securely collected and stored on REDCap[21 22] servers at the University of Toronto to ensure privacy and confidentiality.

Sample

The MLPAO is a non-profit organisation that represents the interests of MLPs with healthcare professions, government, educational institutions and regulatory bodies.[23] The MLPAO electronically invited MLTs and MLT/As with a cover letter outlining the description and objectives of the study, in addition to a questionnaire and the rights of respondents as participants. This organisation also sent electronic reminders to the MLTs and MLT/As that had not yet responded to the survey.

To participate in the current study, MLTs and MLT/As were required to meet the following eligibility criteria: (1) their clinical practice is located in the province of Ontario, (2) they must be registered with the College of MLT of Ontario (only for MLTs), (3) they must be a provider of direct or indirect clinical patient care and (4) they must be actively employed and working as of the start date of the COVID-19 pandemic (11 March 2020). Given a power level of 0.95 and a significance level of 0.05 and assuming a small effect size d=0.01 for the relationship between functioning of MLP's and psychosocial workplace factors, a sample size of 110 is required when seven independent variables from table 1 including (1) feeling of work importance, (2) fear of unemployment, (3) management of workplace environmental conditions, (4) health, (5) feelings of stress, (6) threats of violence exposure and (7) bullying exposure are included in the analysis.[24]

Table 1 Multiple regression results of psychosocial workplace factors (COPSOQ-III dimensions) and total WHODAS V.2.0 functioning scores

Variable	Slope (β)	SE	T value	P value	95% CI
Feeling of work importance	0.55	0.26	2.16	0.03*	0.05 to 1.05
Fear of unemployment	-0.72	0.19	-3.84	<0.001***	1.09 to −0.35
Management of workplace environmental conditions	0.65	0.17	3.97	<0.001***	0.33 to 0.98
Health	2.25	0.24	9.24	<0.001***	1.77 to 2.73
Frequency of stress	-1.86	0.24	-7.86	<0.001***	2.33 to −1.40
Threats of violence exposure	0.90	0.33	2.72	0.007**	0.25 to 1.54
Bullying exposure	0.56	0.21	2.67	0.008**	0.15 to 0.98

*P<0.05, **p<0.01, ***p<0.001.
COPSOQ-III, Copenhagen Psychosocial Questionnaire, third edition; WHODAS V.2.0, WHO Disability Assessment Schedule V.2.0.

Outcome measures

We used the 12-item, self-administered WHO Disability Assessment Schedule V.2.0 (WHODAS V.2.0—online supplemental table 1) to measure functioning/disability in MLTs and MLT/A's during the COVID-19 pandemic. The questionnaire asks participants about challenges they face due to health conditions, including short-term or long term, lasting illnesses/diseases, mental health conditions, drug/alcohol abuse and injuries. The questionnaire assesses functioning in six domains: (1) cognition—communicating and comprehending, (2) mobility—the ability to get around and move, (3) self-care—attending to one's eating, dressing, hygiene and ability to stay alone, (4) getting along—social interactions, (5) life activities—work/school, leisure activities and domestic responsibilities and (6) participation—societal/community participation. To provide clarity on the particular questions asked within the WHODAS V.2.0 measure, we have provided a couple of samples. One example question from the cognition domain is: 'In the last 30 days, how much difficulty did you have in: concentrating on doing something for ten minutes?'. Additionally, a sample question from the mobility domain is: 'In the last 30 days, how much difficulty did you have in: standing for long periods such as 30 min?'. Within these domains, each question response is scored on a Likert scale ranging from 1 (none) to 5 (extreme). These scores were used to calculate a total score for each participant using complex 'item response theory' (IRT) scoring, which allowed participants' functioning to be measured on a scale from 0 (high functioning) to 100 (little functioning). We have chosen this particular measure as it directly measures functional disability (what patients are able to do or not). We are able to explore functional disability and its relationship to psychosocial workplace factors. In addition, the psychometric properties of this measure have been assessed in multiple countries worldwide to reveal that WHODAS V.2.0 has good reliability and validity.[25] Using the Multi-Country Survey Study on Health and Responsiveness conducted in 61 countries with more than 140 000 responses, WHODAS V.2.0 was found to show the same psychometric properties in different population groups. Respondents had consistent orderings of over 90% for mobility, 85% for effect and 60% for self-care over various settings.[26]

Participants' functioning was assessed based on their relationship to psychosocial workplace factors from the English version of the Copenhagen Psychosocial Questionnaire, third edition (COPSOQ-III—online supplemental table 2).[27] This measure included 48 Likert scale questions assessing the following domains: demands at work, work organisation and job contents, interpersonal relations and leadership, work–individual interface, social capital, offensive behaviours, and health and well-being. Across these 7 domains, 27 dimensions were assessed, including burnout, work pace, job satisfaction and social support.[28] Each COPSOQ-III dimension had responses ranging from 0 to 100 on a Likert scale. In addition, the assessment of the psychometric properties of the dimensions, as mentioned earlier, has shown acceptable, good internal consistency, as measured through Cronbach's a, across a heterogeneous set of worker samples, from multiple countries.[27] Therefore, the measures used in this study can reliably and distinctly measure functioning and disability in participating MLPs.

Data analysis

All data collection occurred during the second wave of the COVID-19 pandemic, and statistical analyses were performed using R Studio software V.1.3.959 for macOS.[29] First, demographics were used to characterise that sample based on gender, age, employment, ethnicity, marital status, education, disability and safety. Descriptive statistics were performed by calculating the frequency and the percentage of responses for categorical variables and calculating means and SD for continuous variables. Next, inferential statistical analysis was performed using multiple regression to assess the functioning of MLPs as a function of the 567 psychosocial workplace factors (COPSOQ-III dimensions) during the global pandemic. The statistical significance was set to p<0.05 and 95% CI were calculated. In addition, χ^2 and fisher's exact tests were used to evaluate associations between the demographic variables and the subdomain scores before

building multiple regression models. Then an inferential regression analysis was used to build models to understand distinct types of WHODAS V.2.0 functioning in the context of demographic and COPSOQ-III variables.

Patient and public involvement

Patients were not involved in the design, or conduct, or reporting, or dissemination plans of our project. The findings from of our peer-reviewed publications will be made available to members through the MLPAO.

RESULTS

Demographics

The demographic characteristics of all three participant groups are shown in tables 2 and 3 and in the online supplemental table 3. A total of 553 MLTs and 401 MLT/As met the eligibility criteria of this study. The overall sample response rate was 66.2%. Additionally, the response rate of MLTs was 74.7% and the response rate of MLT/As was 54.6%. In table 2, the demographics of the MLTs are shown. The majority of the respondents self-identified as Caucasian women with a mean age of 45 years (SD=12.3). Additionally, around 65% of the total participants were classified as MLTs and over 70% reported working full time with a community college certification or bachelor's degree. Most respondents were married or committed, with roughly half caring for children. Approximately 90% of participants reported no need for work accommodation due to physical disability. Furthermore, the majority of the participants reported mostly trusting their employer to ensure their safety and always/mostly adhering to workplace COVID-19 guidelines.

The demographic characteristics of the medical laboratory technicians are shown in table 3. The majority of the respondents self-identified as women, and were Caucasian, with a mean age of 40 years (SD=10.5). Additionally, 27% of the participants were classified as medical laboratory technicians. Over 60% of participants reported working full time with a community college certification or bachelor's degree. Most respondents were married or committed, with roughly half caring for children. Approximately 90% of participants reported no need for work accommodation due to physical disability. Furthermore, the majority of the participants reported trusting their employer to ensure their safety and always/mostly taking COVID-19 guidelines seriously in the workplace.

The demographic characteristics of the medical laboratory assistants are shown in the online supplemental table 3. The majority of the respondents self-identified as Caucasian women, with a mean age of 41 years (SD=9.7). Additionally, around 8% of participants were classified as medical laboratory assistants and over 60% reported working full time with a community college certification or bachelor's degree. Most respondents were either married or in a committed relationship, with nearly half caring for children. Approximately 90% of participants reported no need for work accommodation due to physical disability. Furthermore,

Table 2 Demographics of medical laboratory technologists (n=413)

Variable	Frequency	Percentage
Gender (n=412)		
Female	373	90.54
Male	39	9.47
Age (n=388)		
21–31	71	18.30
32–42	104	26.80
43–53	94	24.23
54–64	106	27.32
65–76	13	3.35
Marital status (n=413)		
Single	52	12.59
Married/committed relationship	328	79.42
Other	33	7.99
Ethnicity (n=433)		
White/Caucasian	356	82.22
Other	77	17.78
Number of children (n=408)		
0	221	54.17
1–2	167	40.93
3–5	20	4.90
Work accommodation due to physical disability (n=412)		
Yes	18	4.37
No	383	92.96
Choose not to answer	11	2.67
Workplace COVID-19 guidelines taken seriously (n=413)		
Always	170	41.16
Most/half of the time	222	53.75
Sometimes/never	21	5.09
Employment status (n=434)		
Full time	337	77.65
Part-time	75	17.28
Other	22	5.07
Trust in employer to ensure safety (n=413)		
Always	72	17.43
Most/half of the time	294	71.19
Sometimes/never	47	11.38
Highest level of education (n=458)		
Trade certificate/diploma from vocational school	29	6.33
Community college graduate	188	41.05
University certificate below bachelors	23	5.02
University Bachelor's degree	175	38.21
Other	43	9.39

Table 3 Demographics of medical laboratory technicians (n=168)

Variable	Frequency	Percentage
Gender (n=168)		
Women	156	92.86
Men	11	6.55
Other	1	0.59
Age (n=159)		
21–31	43	27.04
32–42	51	32.08
43–53	48	30.19
54–64	17	10.69
Marital status (n=167)		
Single	39	23.35
Married/committed relationship	112	67.07
Other	16	9.58
Ethnicity (n=173)		
White/Caucasian	120	69.36
Other	53	30.64
Number of children (n=163)		
0	84	51.53
1–2	57	34.97
3–5	22	13.50
Work accommodation due to physical disability (n=168)		
Yes	5	2.98
No	157	93.45
Choose not to answer	6	3.57
Workplace COVID-19 guidelines taken seriously (n=168)		
Always	83	49.40
Most/half of the time	82	48.81
Sometimes/never	3	1.79
Employment status (n=183)		
Full time	112	61.20
Part-time	53	28.96
Other	18	9.84
Trust in employer to ensure safety (n=1 68)		
Always	47	27.98
Most/half of the time	102	60.71
Sometimes/never	19	11.31
Highest level of education (n=196)		
Trade certificate/diploma from vocational school	33	16.84
Community college graduate	109	55.61
University certificate below bachelors	7	3.57
University Bachelor's degree	28	14.29
Other	19	9.69

the majority of the participants reported mostly trusting their employer to ensure their safety and always/mostly taking COVID-19 guidelines seriously in the workplace.

Relationship between demographic variables and WHODAS V.2.0 functioning scores

The multiple regression models shown in table 4 demonstrate how demographic variables such as age, gender, disability and job classification predict the functioning scores of the six WHODAS V.2.0 domains. For the cognition domain, gender (β1=0.47, p<0.05), age (β2=−0.01, p<0.05) and disability (β3=−0.67, p<0.05) had significant correlations. Age was significantly associated with the getting along (β1=−0.03, p<0.001), life activities (β1=−0.02, p<0.001) and participation (β1=−0.02, p<0.001) domains. Disability showed significant relationships with the mobility (β1=−1.34, p<0.001), self-care (β1=−0.41, p<0.05) and participation (β2=−1.54, p<0.001) domains.

Relationship between psychosocial workplace factors (COPSOQ-III dimensions) and total WHODAS V.2.0 functioning scores

The multiple regression predicted the total WHODAS functioning score as a function of the psychosocial workplace factors (COPSOQ-III dimensions) as shown in table 1. The results revealed that 7 out of 48 psychosocial dimensions were significantly associated with the total WHODAS functioning score in MLTs and MLT/As. It was found that the COPSOQ predictors explained 41.25% of the variance, adjusted R^2=0.4125, $F(7,617)=63.58$, p<0.001. The following COPSOQ variables significantly predicted the total WHODAS functioning score: feeling of work importance (β=0.55, p<0.05, CI: 0.05 to 1.05), fear of unemployment (β=−0.72, p<0.001, CI: −1.09 to −0.35), management of workplace environmental conditions (β=0.65, p<0.001, CI: 0.33 to 0.98), health (β=2.25, p<0.001, CI: 1.77 to 2.73), frequency of stress (β=−1.86, p<0.001, CI: −2.33—1.40), threats of violence exposure (β=0.90, p<0.01, CI: 0.25 to 1.54) and bullying exposure (β=0.56, p<0.01, CI: 0.15 to 0.98). In other words, for example, participants who were exposed to threats of violence in the workplace experienced 0.9 times higher disability.

Additionally, the median of the total WHODAS functioning scores was 20 (0 indicates high functioning, 100 indicates low functioning). The median was chosen as the appropriate measure of central tendency, as there was a skewed distribution of total scores. Population norms have been developed for the 12-item WHODAS V.2.0 with total scores calculated using IRT scoring.[30] When comparing our sample to the population norms of the WHODAS V.2.0, our median of 20 falls between the 92.4 and 93.0 population percentile.

Relationship between psychosocial workplace factors (COPSOQ-III dimensions) and functioning scores of the WHODAS V.2.0 domains

The multiple regression models in table 5 demonstrate how psychosocial work factors (COPSOQ-III dimensions)

Table 4 Multiple Regression results of demographic variables and the functioning scores of the WHODAS V.2.0 domains

WHODAS domains	Demographic variables	Slope (β)	SE	T value	P value
Cognition	Gender	0.47	0.20	2.30	0.02*
	Age	-0.01	0.01	-2.37	0.01*
	Disability	-0.67	0.32	-2.08	0.03*
Mobility	Disability	-1.34	0.29	-4.60	<0.001***
	Job classification	0.26	0.09	2.97	0.003**
Self-care	Disability	-0.41	0.16	-2.49	0.01*
Getting along	Age	-0.03	0.01	-6.05	<0.001***
Life activities	Age	-0.02	0.01	-3.87	<0.001***
Participation	Age	-0.02	0.01	-3.41	<0.001***
	Disability	-1.54	0.46	-3.34	<0.001***

*P<0.05, **p<0.01, ***p<0.001.
WHODAS V.2.0, WHO Disability Assessment Schedule V.2.0.

predict the functioning scores of the six distinct WHODAS domains. The key findings indicate that health has a significant correlation with all six WHODAS domains: cognition (β1=0.21, p<0.001), mobility (β1=0.5, p<0.001), self-care (β1=0.11, p<0.001), getting along (β1=0.26, p<0.001), life activities (β1=0.48, p<0.001) and participation (β1=0.62, p<0.001). Self-care (β2=0.08, p<0.001), getting along (β2=0.13, p<0.01), life activities (β2=0.17, p<0.001) and participation (β2=0.21, p<0.001) domains showed a significant relationship with the management of workplace environmental conditions. Fear of unemployment had a significant relationship with cognition (β3=−0.11, p<0.05) and mobility (β3=−0.15, p<0.01). The cognition (β4=−0.22, p<0.01) and participation (β4=0.4, p<0.001) domains demonstrated a statistically significant relationship with the frequency of stress. Bullying exposure had a significant relationship with getting along (β5=0.16, p<0.01) and life activities (β5=0.15, p<0.01). Threats of violence exposure had a significant relationship with mobility (β6=0.39, p<0.001).

DISCUSSION

This research aimed to explore the overall and more specific aspects of functioning in MLTs and MLT/As in Ontario, Canada, due to the COVID-19 pandemic. Our main findings to be discussed are the psychosocial workplace factors that were significant in relationship to both the total functioning model and domain-specific functioning model. This is the first study to examine total functioning and specific domain functioning and their relationship to the psychosocial workplace factors in the COPSOQ-III for the MLP population. Thus, WHODAS V.2.0 as a measure of functioning in MLPs or other healthcare professionals has not been extensively studied. However, different measures of functioning have been used to examine healthcare professionals (nurses,[31 32] doctors,[33–35] first responders,[36] etc).

Compared with the WHODAS V.2.0 population norms, our sample's total functioning scores were between the 92.4th and 93rd population percentile, indicating high disability/low functioning. The overall low functioning of our sample highlights low functioning within the specific WHODAS V.2.0 domains as well. It should be noted that this current study measured functioning during the COVID-19 pandemic when people were not in an optimal state. This result supports the connection between poor mental health and functional abilities in this sample. Another study examining anxiety, depression and functioning in healthcare workers (clinical and non-clinical employees) reported that the mean of their total functioning scores was 19.47, which falls closer to the 92.4th percentile.[37] This study indicates similar levels of disability/functioning as our current sample.

In the current study, MLPs who received accommodation due to a physical or psychological disability demonstrated higher functioning in the cognition, self-care and participation domains. These findings can be corroborated by a study conducted by Dong *et al*,[38] which revealed that individuals who received accommodations in the workplace reported higher employer and coworker supportiveness and higher levels of job satisfaction. This can significantly mediate how people with disabilities manage workplace barriers and stressors, influencing all domains of functioning.[38]

Contrary to early research, which believed that social relationships become impaired and less satisfying with age, this study demonstrated that functioning in getting along, life activities and participation in society improve as age increases. As older adults shift their focus towards emotional goals, they report investing more time in their social networks and maintaining them. Similarly, in the context of the pandemic, a Canadian study revealed that increased age was associated with maintaining friendships as per the WHODAS V.2.0.[39] Thus, our findings are supported by recent research, which reveals that,

Table 5 Multiple regression results of the psychosocial workplace factors and the functioning scores of the WHODAS V.2.0 domains

WHODAS domains	Psychosocial workplace factors	Slope (β)	SE	T value	P value
Cognition	Need to be at work and home	-0.11	0.04	-2.32	0.02*
	Health	0.21	0.06	3.65	<0.001***
	Frequency of irritability	-0.23	0.07	-3.28	0.001**
	Fear of unemployment	-0.11	0.04	-2.39	0.01*
	Frequency of stress	-0.22	0.07	-2.9	0.003**
Mobility	Health	0.5	0.06	8.29	<0.001***
	Threats of violence exposure	0.39	0.08	3.8	<0.001***
	Receiving adequate information	-0.2	0.06	-3.29	0.001**
	Fear of unemployment	-0.15	0.04	-3.06	0.002**
	Frequency of feeling worn out	-0.13	0.06	-2.15	0.03*
Self-care	Frequency of insufficient time	0.07	0.02	2.47	0.01*
	Recognition of work	0.1	0.03	-3.3	0.001**
	Fair treatment at workplace	0.08	0.03	2.35	0.02**
	Management of workplace environmental conditions	0.08	0.02	3.51	<0.001***
	Health	0.11	0.03	3.43	<0.001***
	Frequency of irritability	-0.1	0.03	-2.97	0.003**
Getting along	Frequency of irritability	-0.29	0.06	-4.6	<0.001***
	Bullying exposure	0.16	0.05	3.06	0.002**
	Management of workplace environmental conditions	0.13	0.04	2.9	0.003**
	Need to be at work and home	-0.12	0.05	-2.28	0.02*
	Health	0.26	0.07	3.95	<0.001***
Life activities	Behind in work	-0.1	0.05	-2.08	0.04*
	Management of workplace environmental conditions	0.17	0.04	4.03	<0.001***
	Satisfaction with job overall	0.14	0.05	2.7	0.007**
	Negative influence of work on private life	-0.41	0.06	-6.43	<0.001***
	Need to be at work and home	-0.14	0.05	-2.55	0.02*
	Health	0.48	0.06	8.11	<0.001***
	Bullying exposure	0.15	0.05	2.94	0.003**
Participation	Supervisor conflict resolution	-0.25	0.07	-3.34	<0.001***
	Frequency of supervisor support	0.24	0.07	3.13	0.001**
	Fear of job transfer	-0.19	0.05	-3.43	<0.001***
	Management of workplace environmental conditions	0.21	0.05	3.77	<0.001***
	Negative influence of work on private life	-0.21	0.08	-2.49	0.01*
	Health	0.62	0.07	8.01	<0.001***
	Frequency of stress	0.4	0.09	-4.37	<0.001***

*P<0.05, **p<0.01, ***p<0.001.
WHODAS V.2.0, WHO Disability Assessment Schedule V.2.0.

generally, older adults have a more satisfying and positive experience with social relationships and encounter fewer interpersonal conflicts and stressors.[40]

Disability in the context of understanding and communication was influenced by gender and age, wherein male gender and younger adults were observed to have more disabilities in this domain. This contrasts with several studies which have observed a decline in cognitive abilities with age. However, some studies, for instance, one conducted by Theocharopoulou *et al*,[41] found that elderly individuals might rely more on speech as their dominant communication tool and the quality of their narratives is similar or better than that of younger adults.[41] Nevertheless, the differences in communication and understanding between men and women in the sample are trivial and most likely a result of situational conditions

based on previous studies conducted in different cultural contexts.

In the current study, participants who reported worse health experienced higher disability/lower functioning. More specifically, this lower functioning significantly decreased all six life domains: participants' ability to communicate and comprehend, move/get around, care for themselves, interact socially, attend to daily life activities and participate in society. These findings are supported by Souza *et al*,[42] who studied the influence of musculoskeletal symptoms on work functioning in nurses. Most of the nurses suffering from these physical health symptoms had a moderate disability which was found to interfere with organising and handling work activities, performing physical work responsibilities, concentrating and attending to cognitive tasks in the workplace, job satisfaction and work productivity.[42] These findings are further supported by Lindegård *et al*, who found that musculoskeletal pain and perceived stress together led to the largest risk of a decrease in workability and performance in Swedish healthcare workers. Furthermore, musculoskeletal pain separately also led to a significant risk of a decrease in these occupational outcomes.[43] Additionally, Ahmed *et al*[44] studied the influence of lower back pain on disability and the quality of life of healthcare workers. It was found that this common physical health ailment led to 70.8% of healthcare workers experiencing low functioning and 77.5% experiencing a low quality of life.[44] This result supports the current findings, which demonstrate that poor health can decrease functioning in this population.

In this study, participants who reported a lack of environmental conditions management in their workplace (including air quality, temperature, lighting, noise and work ergonomics) experienced higher disability/lower functioning. This lower functioning was also found to significantly decrease the participants' ability to care for themselves, interact socially, attend daily life activities and participate in society. In addition, a poor physical work environment has been found to decrease the mental health of healthcare employees.[45 46] For instance, Vieira *et al*[47] found that exposure to poor intensive care unit environmental conditions led to mental and physical health decline in their sample of healthcare professionals.[47]

Additionally, our current research found that participants that reported frequent exposure to bullying at work experienced higher levels of disability/lower functioning when interacting socially and attending daily life activities. Other healthcare professionals have studied the influence of workplace bullying and verbal harassment. For instance, Nwaneri *et al*[48] found that workplace bullying resulted in nurses experiencing negative mental health outcomes, including anxiety, anger/frustration, social difficulties at work, etc.[48] Furthermore, Ekici and Beder[49] found that over 70% of physicians and over 80% of nurses experience bullying in the workplace, which was associated with depression and decreased work performance, including decreased energy at work, interaction with supervisors and coworkers and workplace motivation.[49]

The current study found that participants that reported frequent exposure to threats of violence at work experienced higher levels of disability/lower functioning when moving/getting around. The influence of workplace violence on the physical health and mobility of healthcare professionals has been extensively studied.[50–53] For instance, Miranda *et al*[53] reported that nursing home workers who experienced physical assault reported musculoskeletal pain that continuously interfered with their work.[53] Furthermore, Rezaee and Ghasemi[52] report that physical workplace violence was associated with lower back pain symptoms (chronic and acute) in nurses.[52] The literature supports the findings that workplace violence leads to a lack of physical health and mobility in other healthcare professionals.

In this study, Rezaee *et al*[52] it was also reported that the occurrence rate of chronic lower back pain was approximately 30%, and the occurrence rate of acute lower back pain was approximately 50%. Therefore, it was concluded that nurses felt a fear of unemployment due to the prevalence of injury.[52] This finding is supported in the current study as participants that reported greater fear of becoming unemployed experienced higher disability/lower functioning. This finding was further reinforced as we found this lower functioning specifically decreased the participants' ability to communicate, comprehend and move/get around. To further support the current findings, Lahana *et al*[54] highlighted that approximately 30% of the participants' reasoning for working as a nurse was due to fear of unemployment. It was found that these participants had higher levels of burnout compared with the nurses whose primary aim was to help others.[54] Burnout is reported as an occupational hazard for healthcare professionals' physical and mental health; thus, increased levels of burnout in this population of nurses point to higher disability/lower functioning.[55 56]

Participants who did not report a high frequency of feeling stressed experienced less disability/increased functioning. More specifically, this higher functioning significantly increased participants' ability to understand and communicate (cognition). Farahat *et al*[57] showed high workplace stress and burnout levels were reported in their sample of healthcare workers during the COVID-19 pandemic. They found that stress led to a decline in cognitive functioning, resulting in increased workplace errors.[57] To further reinforce the findings, Toscano and Zappalà[58] found that social isolation and stress lead to decreased remote work satisfaction and employees' perceptions of workplace productivity during the COVID-19 pandemic.[58]

However, our current study found that participants who reported a low frequency of feeling stressed experienced higher levels of disability/low functioning when participating in society. A study by Shrestha *et al*[37] had similar findings for their overall WHODAS V.2.0 functioning score. They found that anxiety and depression

in healthcare workers led to a low impairment in functioning during the COVID-19 pandemic.[37]

This is the first study to examine the total functioning and specific domain functioning of the WHODAS V.2.0 and its relationship to the psychosocial workplace factors in the COPSOQ-III for the MLP population. One strength of this research study is that the WHODAS V.2.0 and COPSOQ-III are both validated measures on an international scale, providing well-referenced reasoning for including these measures. We additionally acknowledge the limitations of this research study. Due to the cross-sectional nature of this study, we cannot conclude any causal relationships. Thus, these results cannot be generalised to different population groups. In addition, there is a lack of research on MLPs; thus, our research cannot be reinforced by findings on this healthcare group. We further acknowledge that the overall response rate indicates that there may be a sample/non-response bias from the MLP population, leading to decreased sample representativeness. It is acknowledged that the participants heavily influenced by the second wave of COVID-19 pandemic were less likely to respond and be included in the study. This points to a response bias based on the decreased mental health status of these individuals. Next, the sample was recruited exclusively through the MLPAO, an association with voluntary membership; thus, our sample did not include all individuals in the province working in the profession, only the individuals associated with the MLPAO. This indicates potential sample/non-response bias and lack of sample representativeness from the missing individuals working in the profession outside of the MLPAO in the province. However, the demographics of the overall population of practicing MLTs in Ontario in 2021 had significant overlap with our sample. The average age of MLTs in Ontario was 46 years old, while the average age of our sample of MLTs was 45 years old.[59] In addition, the percentage of the overall population of MLTs in Ontario working full time in 2021 was 86% and the percentage of our MLT sample working full time was 77%. The percentage of the overall provincial population working part-time was 14% and the percentage of our MLT sample working part-time was 17%.[60] This indicates that our sample demographics are mostly representative of the overall provincial population.

CONCLUSION

This study provides preliminary evidence of the overall and more specific aspects of functioning in the MLT and MLT/A population in Ontario, Canada, due to the COVID-19 pandemic. Overall, it was found that health, management of environmental conditions, fear of unemployment, bullying exposure, threats of violence exposure and frequency of stress were the psychosocial workplace factors that significantly influenced functioning overall and within the specific WHODAS V.2.0 functioning domains. These findings can support future research and interventions to better understand the functioning of the MLP population. For instance, these findings can support the implementation of interventions aimed at improving the functioning of MLPs, including developing new workplace policies. The study emphasised that increased workload for the MLTs during the pandemic or any such crisis situations can decrease their mental health due to occupational stress, exhaustion and burnout. Further, the decreased functioning due to these factors can result in decreased work performance, hence an increased chance of making errors. There is a great need for prioritising the mental health of the MLPs to prevent depression and burnout, as this group of professionals are generally overlooked. Future studies could further examine the overall and specific functioning domains within the MLP population in other provinces or on a more international scale. Additionally, future research could examine more in-depth studies of the work environment of MLPs examining their workload, stressors and its relationship to their work performance.

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