

Title: The Profession of Neuropsychologist in Canada:
Findings of a National Survey

Sebastien Monette^{a,b}, Josie-Anne Bertrand^{c,d}, Elisabeth Perreau-Linck^e, Daniela Ramos-Usuga^{f,g}, Diego Rivera^h and Juan Carlos Arango-Lasprilla^{g,i,j}

^a Department of Psychology, Université du Québec à Montréal, Montréal, Canada;

^b Institut universitaire Jeunes en difficulté, CIUSSS Centre-Sud-de-l'île-de-Montréal, Montréal, Canada;

^c Douglas Mental Health University Institute, Montreal, Canada;

^d Institut universitaire de gériatrie de Montréal, Montreal, Canada;

^e Centre hospitalier universitaire Sainte-Justine, Montreal, Canada;

^f Biomedical Research Doctorate Program, University of the Basque Country, Leioa, Spain;

^g Biocruces Bizkaia Health Research Institute, Barakaldo, Spain;

^h Department of Health Sciences, Public University of Navarre, Pamplona, Spain;

ⁱ IKERBASQUE. Basque Foundation for Science, Bilbao, Spain;

^j Department of Cell Biology and Histology, University of the Basque Country, Leioa, Spain

CONTACT Sebastien Monette monette.sebastien@uqam.ca Département de Psychologie, Université du Québec à Montréal (UQAM), C.P. 8888, Succ. Centre-ville, Montréal, Canada QCH3C 3P8.

This is an accepted manuscript of an article published by Taylor & Francis in The Clinical Neuropsychologist on 18 Nov 2021, available online:

<https://doi.org/10.1080/13854046.2021.2002934>

Abstract

Objective: The purpose of this study was to investigate the demographic characteristics, academic training and types of professional activities of clinical neuropsychologists in Canada. **Method:** 282 participants completed the online-based survey. **Results:** Most respondents were women with a mean age of 43 years. They typically had doctoral-level training (85%) and about one-quarter had postdoctoral training (23%). Nearly half (47%) had a lifespan practice, over one-third (37%) had an adults-only practice, and about one-sixth (16%) had an exclusively pediatric practice. Most worked full-time (79%) almost evenly split three ways between the public sector the private sector or both sectors simultaneously. The most common professional activities related to assessment (95%), although clinical supervision (43%), and rehabilitation (42%) were also quite frequent, whereas research (27%) and teaching (18%) were less so. The most common reason for referral was to obtain a diagnosis (79%). Pediatric neuropsychologists worked primarily with individuals with neurodevelopmental disorders and neuropsychologists working with adult populations worked primarily with individuals with emotional disorders, acquired neuropsychological disorders (traumatic brain injury, stroke/vascular), and neurocognitive disorders (dementia). **Conclusions:** Canadian neuropsychologists seem to benefit from a fairly balanced situation considering that the level of training and the ratio of neuropsychologists per capita are both high. On the other hand, the level of training and the rate of neuropsychologist per capita vary widely between regions of Canada, which suggests a need to standardize training across the country.

Introduction

History and Pioneers of Neuropsychology in Canada

Canadian neuropsychology was born from the pioneering work of Donald Hebb in the 1940s and of Drs. Wilder Penfield and Brenda Milner of the Montreal Neurological Institute in the 1950s (Janzen & Guger, 2016). Milner's work is renowned the world over, particularly that with patient H.M. who developed severe anterograde amnesia following bilateral medial temporal lobectomy. It was groundbreaking in that it demonstrated the existence of multiple memory systems and the role of the medial temporal structures in long-term memory functioning. Beginning in the 1960s, neuropsychology training programs were established at the University of Victoria (British Columbia), the University of Windsor (Ontario), York University (Ontario), Simon Fraser University (British Columbia), Université de Montréal (Quebec), and later in many other Canadian universities. Since then, neuropsychology has continued to develop and the profession has continued to evolve across Canada. For a review of the history of neuropsychology in Canada, see Janzen and Guger (2016), Fuerst, and Rourke (1995), Hayman-Abello et al. (2003), and Rourke et al. (1981).

Canada and Its Diversity

Canada is the second-largest country in the world by landmass, and 39th by population. It is composed of ten provinces and three territories. About 60% of its estimated population of some 38 million people live in Ontario and Quebec (Statistics Canada, 2021a). About 75% of Canadians speak English and about 23% speak French. The latter are found mostly in the province of Quebec (Statistics Canada, 2021b). This diversity involves cultural differences that may have an impact on how neuropsychology evolved in each province.

Number of Neuropsychologists in Canada

There is no telling exactly how many neuropsychologists there are in Canada as these data are not available for all of the provinces and territories. According to the Canadian Institute for Health Information (CIHI, 2021), there were 19,103 psychologists in Canada in 2019 (see Table 1) or 51 per 100,000 inhabitants (1:1840). The province of Quebec alone had 7,728 psychologists, that is, 40.5% of the total, which far exceeds the province's demographic weight in the country (23%). Data provided by the Quebec Association of Neuropsychologists (QANP) in 2020 (personal communication) showed that exactly 956 psychologists in Quebec, that is, 12.4% of the total number in the province, had the certificate to conduct neuropsychological (NP) assessment and, therefore, were officially recognized as neuropsychologists (see below). In Ontario, according to the 2018-2019 annual report of the College of Psychologists of Ontario (2019), 404 psychologists in the province declared working in the field of clinical neuropsychology, that is, about 10% of the total. It is safe to say, then, that there are at least about 1,400 neuropsychologists in Canada. In a study of the profession of psychologist in Canada (Hunsley et al., 2013), of a representative sample of 540 psychologists, 8% reported that their highest academic degree to be in neuropsychology and 16.7% reported offering NP testing services. On this basis, the number of neuropsychologists could represent from 8% to 16% of Canadian psychologists, which is to say from 1,500 to 3,000 possibly. However, we are inclined to believe that the number of neuropsychologists in Canada is probably more in the vicinity of 1,670 (see Table 1 for details of this estimation), given that the proportion of psychologists who are neuropsychologists is 12% and 10%, respectively, in the most populated provinces (Quebec and Ontario) and based on the data that we were able to obtain from the online

directories of associations and provincial professional orders of psychologists and from discussions with colleagues from the less populated provinces. It should be noted, however, that some neuropsychologists in Canada have a master's degree and others have a doctorate.

Licensure and title

With exception of the province of Quebec (see below), the title of neuropsychologist is not regulated by law in Canada, although most if not all of the persons who identify as neuropsychologists are psychologists. The title of psychologist is normally governed by provincial law and licensure is normally granted by the professional order (regulatory body) of each province/territory. The requirements to be a licensed (or registered) psychologist vary by province/territory (see Table 1). A doctorate is required to obtain a license to practice as a psychologist in most provinces (representing around 80% of the Canadian population): Quebec, British Columbia, New Brunswick, Ontario, Manitoba, and Prince Edward Island. In these provinces, the training required for licensure is thus similar to those found in the United States, namely, 9 to 11 years of postsecondary education and training to obtain a professional doctorate in psychology (PsyD) or a professional-scientific doctorate in psychology (PhD), passing the Examination for Professional Practice in Psychology (EPPP) and a period of postgraduate supervised practice. Like in the US (Buckman et al., 2018), a master's degree can lead to the title of "psychological associate" (or other title) in some provinces, namely Ontario, Manitoba, and Prince Edward Island. Some provinces (Alberta, Saskatchewan, Nova Scotia, Newfoundland and Labrador) still accept master-level candidates for a psychologist's license, although the number of these provinces has been decreasing over the years (see Drapeau et al., 2016; Dobson, 2016, for a more in-depth description of the situation of

clinical psychology in Canada). Each provincial order defines other requirements for obtaining a license to practice psychology, for example, in terms of the number of hours of supervised practice during and after graduate training, number of hours of supervised practice after obtaining a master's or doctorate degree and completion of the EPPP.

Competence in neuropsychology is normally declared at that time. This seems to be self-declared in most provinces, except in Quebec (see below) and in Ontario, where the College of Psychologists of Ontario (CPO) determines whether the professional possesses that competence based on training received

(https://cpo.on.ca/cpo_resources/registration-guidelines-psychologist-i-guidelines-for-completing-the-declaration-of-competence/).

Board Certification Specific to Neuropsychology

There is no official Canadian board certification organization for clinical neuropsychology equivalent to the American Board of Clinical Neuropsychology (ABCN) or the American Board of Professional Neuropsychology (ABN). At the provincial level, however, Quebec stands alone in requiring a specific training certificate to practice clinical neuropsychology. To our knowledge, it is one of the few jurisdictions in the world to officially regulate the title of neuropsychologist, along with the state of Louisiana in the United States (see Grote & Novitski, 2016) and Switzerland (see Chartrand et al., 2019). Bill 28, An Act to amend the Professional Code and other legislative provisions in the field of mental health and human relations,¹ which was enacted in Quebec in 2009, reserves certain activities in the field of mental health, such as the assessment of NP disorders, to certain professionals, namely, physicians (all of

¹ Bill 28 reserves specific activities for certain professionals in the field of human relations, including, among other things, the evaluation of NP disorders, the evaluation of mental disorders, and psychotherapy.

them) and psychologists who hold a “training certificate” issued by the Ordre des psychologues du Québec (OPQ) attesting to this competence. The title of neuropsychologist is thus regulated “indirectly” by reserving the activity of assessing NP disorders to those psychologists. Bill 28 defines the reserved activity of assessing NP disorders as follows: “assessment of neuropsychological disorders is designed to find links between a clinical condition and a possible change in cerebral or higher mental functions, to identify any impairment of these functions, and, if necessary, to establish a brain/behaviour link – a link which cannot be reduced to determining where the identified dysfunctions are ‘geographically’ located in the brain.” The criteria for obtaining this certificate are primarily as follows: 1) hold a doctorate in psychology; 2) hold a psychologist license from the OPQ; 3) completed a certain number of graduate courses in neuropsychology (15 credits, typically five courses); and 4) completed a clinical neuropsychology internship of 1,500 hours supervised by a neuropsychologist (OPQ, 2020). Thus, most neuropsychologists from Quebec have a doctorate specializing in neuropsychology, which is a difference with the American model, which recommends a doctorate (most of the time in clinical psychology) and postdoctoral training specializing in neuropsychology.

Accreditation of University Programs and Internships

The Canadian Psychological Association (CPA) has accredited doctoral programs in psychology (e.g., clinical psychology, counselling psychology, school psychology, neuropsychology) and internships (e.g., clinical psychology, counselling psychology, school psychology, neuropsychology) since 1994 (Dobson, 2016) but does not grant board certification to individuals. This accreditation procedure grew in importance after the APA announced in 2008 that it would no longer accredit doctoral and internship

programs in Canada. The APA and the CPA in 2012 signed the *First Street Accord* recognizing that the principles and standards of accreditation of the CPA were equivalent to those of the APA. Psychologists with a doctorate accredited by the CPA can thus more easily obtain a license to practice in another province or the United States. The CPA has thus accredited doctoral programs in neuropsychology ($n = 3$, 1 in Quebec, 2 in Ontario) and internship programs in neuropsychology ($n = 2$, both in Ontario). The number of doctoral programs in neuropsychology and of internship programs in neuropsychology accredited by the CPA seems very low compared to the actual number of doctoral programs and internship programs offered in Canadian universities. For example, the CPA indicates only one doctoral program specializing in neuropsychology accredited in the province of Quebec, whereas there are to our knowledge seven universities in Quebec that offer a doctorate specializing in neuropsychology (PsyD or PhD), which lead to obtaining the title of psychologist and the training certificate for the assessment of NP disorders.

Neuropsychologists' Associations

Aside from professional orders, whose primary mandate it is to protect the public and which are responsible for issuing licenses to practice psychology, there are various professional psychology associations in Canada. However, there are very few associations specific to neuropsychologists in Canada. The CPA comprises a *Clinical Neuropsychology* section, the purpose of which is to “promote the development of Clinical Neuropsychology as a special interest area in psychology”. In 2020, there were 269 members in the clinical neuropsychology section of the CPA, so around 16% of Canadian neuropsychologists (CPA, personal communication). Created in 2013, the QANP is the only official association solely for neuropsychologists in Canada (Aubé et

al., 2017; Chartrand et al., 2019). Its mission is to defend the interests of neuropsychologists, promote best practices in neuropsychology, encourage continuing professional development, inform the general public about neuropsychology, and facilitate access to NP services. In March 2021, the QANP had 656 members (468 neuropsychologists, 188 doctoral-level students, personal communication), so around 49% of Quebec neuropsychologists. The QANP is a provincial association, which necessarily implies that it is physically closer to the professionals it represents, which could explain its high membership rate, compared to the neuropsychology section of the CPA. The QANP also offers many services to members (annual clinical neuropsychology congress, advanced workshops, advocacy, online forum, etc.).

In sum, Canada is a prominent country in the development of clinical neuropsychology in the world and, by our estimates, is among the countries with the highest ratio of neuropsychologists to population. Several studies had been carried out by the members of our team in the aim of describing the state of practice in different countries, such as France, Italy, Latin-America, South Africa, Nordic countries, United States, and Spain (Arango-Lasprilla et al., 2017; Branco-Lopes et al., 2019; Block et al., 2017; Norup et al., 2017; Onida et al., 2019; Olabarrieta-Landa et al., 2016) among others. Against this background, we undertook a study to investigate the sociodemographic characteristics, academic training, and professional activities of clinical neuropsychologists in Canada.

Method

Participants

Self-identified psychologists and other health professionals working in the field of clinical neuropsychology in Canada participated in the study. The inclusion/exclusion

criteria were the following: 1) must hold a bachelor's and master's degree; 2) must consider oneself a neuropsychologist and/or must have engaged in neuropsychology-related activities, such as assessment, rehabilitation, teaching, or research in the past year; 3) must be living in Canada at time of study; and 4) must have completed the sociodemographic questions and at least the first survey question related to professional training. Of the 304 individuals who started the survey, nine did not engage in neuropsychology-related activities in the past year, 12 did not complete the sociodemographic questions, and one answered inconsistently. These were excluded from the analyses. The final sample, then, consisted of 282 participants.

Measures

The survey was based on an original survey developed by a group of neuropsychology researchers at the University of Deusto in Spain. It comprised 76 questions divided into nine areas of interest: 1) sociodemographics; 2) professional training; 3) current work situation; 4) assessment and diagnosis; 5) rehabilitation; 6) teaching; 7) research, 8) ethics; and 9) views on different issues in the NP field. The majority of the survey questions in the instrument were developed by this group of researchers. A few questions were translated from existing surveys and some existing survey items were adapted for this instrument (Rabin, Barr, & Burton, 2005; Sweet & Moberg, 1990; Sweet, Moberg, & Westergaard, 1996; Sweet, Moberg, & Suchy, 2000a; 2000b; Sweet, Nelson, & Moberg, 2006; Sweet et al., 2011; Wade & Baker, 1977). The survey was translated by bilingual neuropsychologists from Spanish to English and French, Canada's two official languages. The questions were adapted to the professional and cultural context of neuropsychologists in Canada. Finally, two online surveys (in both languages) were created using the online platform www.SurveyMonkey.com.

Procedure

Upon receiving approval for the study from the Research Ethics Board of Université du Québec à Montréal (UQAM), we asked a dozen neuropsychologists to complete the survey to provide us with comments on the readability and clarity of the items. Then, the surveys were distributed by email invitation to neuropsychology professionals through several professional organizations in Canada (e.g., provincial orders of psychologists, provincial associations of psychologists, CPA clinical neuropsychology section, and QANP). The professionals were asked to share the survey with their colleagues. Participants were advised that the survey was anonymous and participation voluntary in an informed consent form that they had to click “agree” to before completing the questionnaire. The survey took approximately 20 minutes to complete. Data were collected from February 2019 to May 2020². Thus, over the 14 months that this data collection lasted, 2-3 months were during COVID-19 pandemic (state of health emergency declared in mid-March 2020 in all Canadian provinces), and 190 participants responded to the survey before this date and 90 after. There were no significant differences between the participants who completed the questionnaire before or after the start of the pandemic on the variables most likely to have been influenced by the pandemic period (e.g. income, number of patients assessed per month, number of patients in rehabilitation per month, number of hours per evaluation), thus we are reasonably convinced that the data of this survey reflect the clinical practices of neuropsychologists before COVID-19.

² The recruitment period was very long, because several associations or regulating bodies\professional orders were slow to respond to us or first refused to participate. Some regulatory bodies or associations had a policy stating that no e-mail distribution of any information or advertising by third parties was allowed and some decided to consult their members or board of directors before agreeing to distribute the survey and this took many months for some associations or regulatory bodies.

Statistical Analysis

At the end of data collection, the databases were exported from the online platform (www.SurveyMonkey) to SPSS 22.0 (IBM Corp., Armonk, NY). It was not possible to compare each province with each other, due to the small number of participants in some provinces, so we formed groups based on the regions traditionally identified in Canada: the provinces of Central Canada: 1) Ontario and 2) Quebec, 3) the West Coast (British Columbia), 4) the Prairies (Alberta, Saskatchewan, Manitoba), and 5) the Atlantic provinces (Nova Scotia, New Brunswick, Newfoundland and Labrador, Prince Edward Island). The participant from the territories was included in the Atlantic provinces group. Since not all the professionals engaged in the different NP activities (e.g. assessment, rehabilitation, teaching) in the past year, in some cases the denominator used to calculate the percentages was determined by the number of individuals who answered each question.

Results

Demographics

Most of the respondents were from the province of Quebec (56.4%), followed by Ontario (18.4%), British Columbia (8.5%), Alberta (6.3%). By consulting table 1A, it is possible to see that the sample for this study is representative of Canadian neuropsychologists, with regard to representativeness by estimated number of neuropsychologists in each province, but participation rate was somewhat low (estimated at 16.8% of Canadian neuropsychologists). In table 1B, we can see that the majority were women (80.9%) and that there is a greater proportion of women in the profession in Quebec and in the Atlantic provinces. Mean age was 43.6 years and the mean number of years of experience in clinical neuropsychology was 13.29.

Neuropsychologists in Quebec were generally younger than that of other provinces and had fewer years of experience, followed by neuropsychologists from the provinces of the Atlantic. Nearly half (47.2%) of neuropsychologists had a lifespan practice, 36.7% an adult-only practice, and 16.1% a pediatric-only practice. Quebec seems to have a greater proportion of neuropsychologists adopting a pediatric-only practice compared to other provinces, followed by the Atlantic provinces. Respondents were nearly evenly split three ways into those who worked only in the public sector (35.1%), those who worked exclusively in the private sector (31.6%), and those who worked in both (31.2%). Almost all (95.3%) participants performed neuropsychological assessments, 16.7% carry out forensic assessment, 41.8% performed rehabilitation, 43.8% offered clinical supervision and a minority performed tasks related to teaching (18.4%) and conducting research (27.0%). Professional activity rates were generally similar from region to region except for research, which was a more popular activity in Ontario, the Prairies and the West Coast and forensic assessment which are more frequent in Ontario and on the West Coast. Neuropsychologists of Quebec were mainly members of the QANP (93.1%), while the neuropsychologists of other regions were mainly members of the CPA (57.9-75%), followed by the INS (31.6-57.1%) or other associations. Almost all the respondents in Quebec (99.4%) reported being officially licensed to work as a neuropsychologist by the OPQ. In the West Coast, Prairies and Atlantic provinces, most respondents (66.6-71.4%) indicated that there is no official certification or license specific for neuropsychology. In Ontario, almost half of neuropsychologists mentioned having an official certification (most of them mentioned the proficiency assessment of the CPO) and the other half indicated that such certification did not exist in their province. More specifically, the respondents outside Quebec who mentioned being “certified” to practice clinical neuropsychology were mostly referring either to

provincial licensure to hold the title of psychologist ($n = 30$) or in very few cases, to certification from the ABCN ($n = 6$) or the ABN ($n = 2$).

Professional Training

Most neuropsychologists (85%) reported having doctoral-level training, and 23% reported postdoctoral training (see table 2). The regions with the highest rate of master-level neuropsychologists are Quebec and the Atlantic provinces, followed by Ontario. Among neuropsychologists with a doctorate, the proportion of Psy.D. is larger in Quebec and the Atlantic provinces while in other regions, Psy.D. seem practically absent. Neuropsychologists outside Quebec have postdoctoral training in a third or half of cases, while in Quebec, only a minority (8%) have this level of training. Regarding the quality of the neuropsychology training received, 97.2% perceived the quality of their training to be good or better. Regarding quality of clinical supervision during neuropsychology training 95.7% perceived the quality of their clinical supervision to be good or better. The perceived quality of training and clinical supervision appears to be similar from region to region.

Current Work Situation

Most of the respondents (78.7%) reported working full-time as a neuropsychologist and 18.8%, part-time (see table 3A). Also, 64.2% indicated that they were salaried and 55.7% reported that they were self-employed/independent. A little over one-third (37%) worked primarily in private clinics and about one-third worked in hospitals (32.6%). The mean net (after tax) annual income for respondents (full-time worker only) was 77,100 (estimated annual gross: 107,100, ~USD 83,932). As can be seen in Table 3B, the income was associated with several variables. First, income differ significantly

between regions of Canada: the average income was lower in Quebec and higher for Ontario, the Prairies, and the West Coast. Neuropsychologists who work in the private sector exclusively also showed significantly higher income than their colleagues working in the public sector exclusively or combining the private and public sector. Neuropsychologists who have completed postdoctoral training also showed a significantly higher income than those with master-level training. Then, neuropsychologists with an exclusively pediatric practice had a significantly lower income than those with a lifespan practice. Next, more experienced neuropsychologists (25 years +) showed significantly higher income than early career neuropsychologists. Finally, we compared the income of full-time and part-time neuropsychologists and surprisingly their income was not significantly different. Faced with this unexpected result, we compared the hourly wages of full-time and part-time neuropsychologists, and we can see that neuropsychologist working part-time had an hourly wage significantly higher than their full-time colleagues, which explains the previous result. Mean job satisfaction was 7.9/10 and mean income satisfaction, 6.4/10. The differences in income satisfaction were closely linked to the variables associated with the differences in income identified previously. Surprisingly, despite an income comparable to full-time neuropsychologists and a significantly higher hourly wage, part-time neuropsychologists showed lower income satisfaction than their full-time colleagues. The only variable associated with job satisfaction was the level of training, in the sense that neuropsychologists with postdoctoral training indicated that they had better job satisfaction than their colleagues.

Assessment

Almost all of the respondents (95.3%) indicated having performed NP assessments in the past year. They assessed on average 7.1 patients per month and the entire assessment process lasted on average about 15.4 hours (administration, scoring, and interpretation). There were no significant differences between regions. Mean duration of assessment was significantly different by type of practice, $t(113) = 2.65, p < .001$. It was longer for neuropsychologists who worked with children only, $M = 17.91, SD = 7.68$, than for neuropsychologists who worked with adults only, $M = 13.38, SD = 8.57$. Concerning test selection, most (56%) preferred the use of a flexible battery (based on the needs of individual case, not uniform across patients). Table 4A lists for the most common tests used by Canadian neuropsychologists. Regarding the scoring procedure, most of the sample reported employing normative data from their country/region (85.3%) and/or from another country (80%). Lack of normative data for their country was considered the greatest challenge regarding NP instruments (55.5%), followed by the costliness of the tests (52.8%). French-speaking neuropsychologists from Quebec reported more problems with tests on all aspects, with the greatest difference regarding lack of normative data for their country (Quebec: 64%, other regions: 35%) and lack of translation (Quebec: 39%, other regions: 3%). The three most frequent reasons for patient referral were differential diagnosis (78.5%), education planning (41.9%), and rehabilitation treatment/planning (40%). The primary referral sources were family doctor (46.4%), patients themselves (44.5%), and the neurologist (37%). During the assessment process, the professionals reported obtaining several sources of patient-related information, such as medical history (90.9%), previous NP tests (87.9%), current NP tests (86.4%), and developmental history (85.7%), among others (see table 4A for all details). Table 4B lists the cognitive functions most often targeted for assessment. Table

4C shows that the types of patients most often assessed globally and table S1 lists the patient by type of practice.

Rehabilitation

A little more than two-fifths of the Canadian neuropsychologists (41.8%) reported having engaged in NP rehabilitation (rehabilitation, remediation, or psychotherapy) in the past year, but those working with an adult-only practice were more likely (51.6%) to engage in rehabilitation than those with a pediatric-only practice (32.5%). They provided the service to approximately 9 patients per month and spent about 8.7 hours per week in this regard. Nearly three-quarters of the respondents (74.5%) indicated having provided individual treatment, 12.7% provided both individual and group therapy, and 7.3% provided only group therapy. Table 5 lists the patients most likely to receive rehabilitation, area of functioning target of intervention and technology tools used in rehabilitation. Patients most likely to receive rehabilitation services from neuropsychologists with pediatric-only practice were those with ADHD, learning disability, or anxiety disorder, while for neuropsychologists with adult-only practice it was patient with TBI, stroke/vascular and depression.

Teaching/Supervision

A minority of neuropsychologist (18.4%) claimed to have worked as a professor/instructor in neuropsychology in the past year (teaching university courses or directing theses/dissertations). Most of these professionals reported teaching university courses at the doctorate level and/or directing theses or dissertations at the doctorate level. Mean level of satisfaction with teaching role reported by respondents was good (7.7/10). Next, 43.8% of the sample indicated offering clinical supervision in

neuropsychology and, of these respondents, 38.4% are required to supervise trainees in neuropsychology in their workplace. A higher proportion of neuropsychologists working in the public sector (54.9%) provided supervision to trainees, compared to those in the private sector (34.1%). Mean number of students supervised in this context over their career was 11.7. See Table 6 for complete results.

Research

Just over one-quarter of the respondents (27%) reported engaging in research in the past year. Of these, 82.6% affirmed having a research ethics committee in their workplace, 92.8% confirmed always seeking ethics approval prior to starting a research project, and 98.6% reported obtaining informed consent from participants. Additionally, the majority of these individuals (95.7%) reported having received training in neuropsychology research during their clinical education, which might be related to the fact that 84.1% claimed to run their own statistical analyses when conducting research. Although 73.5% of these professionals indicated having received grant funding for research, a little over half (58%) claimed to have sufficient resources and materials to conduct NP research. See Table 7B for complete results.

Discussion

This is the second study to document the characteristics of professionals who practice clinical neuropsychology in Canada. The survey by Nelson et al. (2021) on a sample of a Canadian neuropsychologist took place in parallel with ours and was published before this one. Canada's ratio of neuropsychologists (design by provincial regulatory bodies/orders in ON and QC or self-declared in other provinces) per capita is among the highest in the world (1:20,000), a rate equivalent to some countries like Finland (Grote

& Novitski, 2016). It should, however, be noted that the training backgrounds of these practitioners vary widely; the number of neuropsychologists in some instances includes master-level practitioners, as well as others who have completed doctoral training without postdoctoral training, and only a minority who have completed postdoctoral training. It is also noteworthy that there is a very large disparity in the ratio of neuropsychologist per capita between regions in Canada (e.g., about 1:8,500 in Quebec, 1:33,000 in Ontario and the Atlantic and 1:31,000 in Alberta, 1:73,000 in Saskatchewan). To make a more accurate comparison with the ratio of neuropsychologists in the USA (estimated at 1:80,000 in Grote & Novitski, 2016), who all hold a doctorate, we estimated the probable number of Canadian neuropsychologists with a doctorate (using the data in the table 1 and the rate of doctoral-level neuropsychologist by region) and we came down to a number of 1400 doctoral-level neuropsychologist in Canada, which corresponds to a per capita rate of 1: 25,000, but again with wide interprovincial variation (e.g., about 1:11,000 in Quebec, 1:37,000 in Ontario and the Atlantic, and 1:3,000 in Alberta, 1:78,000 in Saskatchewan). The particularly high ratio of neuropsychologists in Quebec is probably explained, first, by the fact that Quebec initially includes a very large number of psychologists (7,728 for 8 million inhabitants) and also by the fact that a large number university (7) offers a doctoral program specializing in neuropsychology.

At time of study (2019-2020), the vast majority of neuropsychologists in Canada were women (81%), especially in Quebec, Ontario and Atlantic provinces, a situation similar to that found in countries in Europe (Branco-Lopes et al., 2019; Onida et al., 2019, Olabarrieta-Landa et al., 2016) and Latin America (Arango-Lasprilla et al., 2017). In the United States, women came to form the majority of neuropsychologists relatively

recently (51.8% reported in Sweet et al., 2011). The mean age of Canadian neuropsychologists was 43 years, but the average age was lower in Quebec (40) than in the other provinces (46-51), which could be explained by the greater number of neuropsychologists holding Psy.D. in Quebec (shorter training than the Ph.D.) and the greatest number of neuropsychologists with postdoctoral training outside Quebec (longer training). Globally the average age is therefore closer to that of American neuropsychologists (46 years old, as reported in Sweet et al., 2021) than European countries (most of them between 30-40). This no doubt had to do with the level of training required, which is more comparable to that in the United States than to that of European countries. Lifespan neuropsychologist is the most common (47.2%) practice in Canadian neuropsychologists, a difference with their American colleagues who mainly have a practice with adults (58.6%). In the United States, the lifespan practice has been on the decline (in favor of a more specialized practice in adults only or pediatric only) for the last fifteen years (Sweet et al., 2021). It is possible that the high rate of lifespan practice in Canada is related to the more recent emergence of clinical neuropsychology as a profession in Canada. Another possible explanation might be that, given the lower income level of neuropsychologists in Canada compared with the US, more of them might seek to increase their revenues by practicing in the private sector and this leads them to broaden their practice by assessing a diversified clientele. Our data supports this hypothesis, seeing how the majority of neuropsychologists who worked in the private sector (strictly private practice and combination of private and public) had a lifespan practice, whereas far fewer of those who worked exclusively in the public sector had one.

Canadian neuropsychologists took part in various professional activities, including NP assessment (95.3%), clinical supervision (43%), NP rehabilitation (41.8%), research (27%), and teaching (18.4%). Professional activity rates were generally similar from region to region except for research, which is a more popular activity in Ontario, the Prairies and the West Coast. This could be explained by the higher rate of neuropsychologists with postdoctoral training in these regions. Neuropsychologists of Quebec are mainly members of the QANP, while the neuropsychologists of other regions are mainly members of the CPA or the INS. Contrary to the results of Nelson et al. (2021) who suggested that the rate of neuropsychologists who are members of a neuropsychological organization was lower in Canada than in the United States (79.3% vs. 96.3%), our data show that 95.4% of Canadian neuropsychologists are members of at least an organization specific to neuropsychology, this difference could be explained by the absence of QANP as a response choice in Nelson's study.

Education and Professional Training

The vast majority of neuropsychologists (85%) in our sample had doctoral-level training (73% PhD and 12% PsyD) and some (23%) also had postdoctoral training. Canada thus seems to be the only country, aside from the United States, to generally require a doctoral degree to practice neuropsychology (Grote & Novitski, 2016), while in some European countries (Finland: Hokkanen et al., 2016; other Nordic countries: Norup et al., 2017; France: Branco-Lopes et al., 201; Italy: Onida et al., 2019), in Australia (Ponsford, 2016), and in Japan (Sakamoto, 2016), a master's degree is sufficient to practice. It should be noted, however, that in some of these countries, supervised postgraduate practice or “specialist education” is required/recommended to practice neuropsychology after a master degree (Hokkanen et al., 2019). There remains a small

proportion of master-level neuropsychologists in Canada (21.1% in the Atlantic provinces, 20.8% in Quebec; 9.6% in Ontario, 2.6% in the Prairies), this proportion is likely to decrease sharply over time, since most master-level neuropsychologists in the sample came from Quebec and they benefited from a grandfather clause, since the doctorate has been required for several years to obtain a psychologist's license in Quebec. Also, almost all of the holders of Psy.D. came from Quebec (30/34), this type of doctorate seems to be underdeveloped in other regions of Canada, a result also observed by Nelson et al., (2021). The percentage of neuropsychologists with postdoctoral training in Canada (23%) is lower to that in the United States, where most neuropsychologists have completed postdoctoral training (Sweet et al., 2012). Our results also suggest that obtaining postdoctoral training is more popular in the regions outside Quebec (36.8-50%) whereas this avenue was pursued by only 8% of the neuropsychologists in Quebec. This situation is likely explained in large part by the legal framework specific to Quebec governing the training certificate required to practice as a neuropsychologist. It is highly likely that Quebec neuropsychologists already feel sufficiently "certified" with the provincial certificate attesting the competency to assess NP disorders (certificate requiring a Ph.D. or a Psy.D. specialized in neuropsychology), seeing how it is a legal and official recognition of a person's ability to exercise the profession of neuropsychologist. Consequently, post-doctorate training in Quebec may be perceived to confer few added benefits to neuropsychologists, aside from greater mobility thanks to recognition of acquired competence in the United States. It may be that neuropsychologists in the predominantly English-speaking provinces and territories, which do not have such a legal framework, lean more towards the U.S. model, which encourages obtaining post-doctorate training (Bodin et al., 2016). It may also be that the issue of mobility across

provinces or to the United States is more of an incentive outside the province of Quebec. The education and training received generally seems to be of quality, given that almost all of the respondents considered it good to excellent during their doctorate (97%) and their internship (95%).

Current Work Situation

At time of study, most neuropsychologists in Canada worked full-time (78.7%), which is comparable to neuropsychologists in the United States (Sweet et al., 2021), and they were distributed almost equally across the public and private sectors (36% public only, 32% private only, and 32% both). The mean net annual income of Canadian neuropsychologists was 77,100 which corresponded to an estimated gross annual income of 107,100 (~USD 83,932). However, it must be recognized that this amount is not very representative since there are very important variations between regions, a result also observed by Nelson and colleagues (2021). The mean income by region is certainly a better reflection of local reality than the Canadian mean income. Thus, we can observe that although the average income of Canadian neuropsychologists is significantly lower in our study (estimated gross annual: 107,000 vs. 147,000) than in Nelson et al., (2021), the average income by province is closer to those found in Nelson et al., (2021), which is probably explained by the greater number of participants from Quebec in our study, which is a lower income province, which decreases the average Canadian income in our study. Despite this, some of the estimated gross annual incomes reported in our study are somewhat lower than those in Nelson et al., (2021), particularly in the regions in which we have the most participants, and for which the data are therefore likely to be more reliable, that is Quebec (84,000 vs 94,000) and Ontario (150,000 vs 172,800). Recruitment methods could explain the difference

between the samples of Nelson et al. (2021) and ours. Our recruitment was carried out mainly by the regulatory bodies/orders and psychologists' associations of each of the 13 Canadian provinces/territories and the by the CPA, while the participants of Nelson et al. (2021) were mainly recruited by the CPA and by organizations outside Canada (SCN/APA division 40, INS, NAN, AACN). Besides, we can observe that the percentages of participants in the study of Nelson who are members of these organizations or who are ABCN board-certified is generally 2 to 7 times higher than in the sample of the present study³, it is thus possible Nelson and al. (2021) recruited a sample of neuropsychologists who are more involved in clinical neuropsychology organizations (e.g. members of several provincial, national and international organizations, board certified in the USA, etc.) and also more fortunate than the average Canadian neuropsychologist.

Our analyzes showed that different variables were associated with higher income: working exclusively in the private sector, obtaining postdoctoral training, not working exclusively with pediatric clients, and having many years of experience. Also, as in Nelson (2021), our data indicates that the average income of neuropsychologists in Quebec is lower than in the other provinces, which also seems to be the case, to a lesser extent, with the income of neuropsychologists in the provinces of the Atlantic. Different reasons can explain these results. On the one hand, several variables associated with higher income were less present among neuropsychologists in Quebec, for example, lower rate of postdoctoral training in Quebec, neuropsychologists from Quebec and the Atlantic provinces had a higher proportion of pediatric practice, worked to a lesser

³ for example, we estimate (from online directories) that the number of Canadian neuropsychologists who are members of the AACN is 2% (35/1670), and we can see that this rate is 8% (24/282) in this study (table 1B) and 31% (34/111) in Nelson et al. (2021); we estimate the number of Canadian neuropsychologists who are ABCN board certified is 2% (34/1670), and we can see this rate is 2% (6/282) in this study (see table 1B) and 15% (17/111) in Nelson et al. (2021).

extent in the private sector and were less involved in forensic assessment. Also, Quebec and the Atlantic provinces historically had lower average income (Statistic Canada, 2021d) than most other Canadian provinces for different economic structural reasons, a situation known in Canada and which applies to the income of workers in general, and not only to neuropsychologists, but other factors must also be taken into consideration, for example it is well known that the cost of living, calculated with the Market Basket Measure (MBM), in Quebec and in the provinces of the Atlantic to a lesser extent, has been lower for many years (Statistics Canada, 2021e). Despite all these considerations, income still seems significantly lower in Quebec, compared to other provinces, as indicated by the lower income satisfaction in Quebec.

The estimated gross annual income of neuropsychologists in Canada (107,100, about ~USD 83,932) is much lower than in the US (USD 170,400, Sweet and al., 2021) but it is 1.76⁴ times the average gross annual income earned by other full-time workers in Canada (60,840; Statistics Canada, 2021c). This ratio seems to be average compared with most other countries (Grote & Novitski, 2016), considerably lower than that in the United States (3.24), but generally higher than in most European countries (Finland: 1.42; Spain: 0.89; France: 0.80). However, it must be noted that many services and benefits are offered free of charge under the Canadian welfare systems (e.g. public health care free of charge, lower cost for higher education, paid maternity leave) compared with the United States.

Canadian neuropsychologists thus expressed mixed satisfaction with their income (6.4/10) and the variables associated with a higher income satisfaction are generally the same as those associated with a higher income (postdoctoral training, practice in the

⁴ Calculated by province (mean income of neuropsychologist of a specific province / mean income of typical full time worker of the same specific province), this ratio is closer to 1.5 in Quebec and closer to 2.5 in other provinces.

private sector, high level of experience). Income satisfaction was also significantly lower in Quebec (5.7/10) than in other Canadian regions (6.6-7.6/10), which is certainly related to the lower income reported and the lower ratio of income compared to a typical full-time worker in Quebec. One factor that might explain this dissatisfaction with income is the duration of doctoral studies (and postdoctoral for those who go this way) and the level of debt associated with it. In 2015, Canadian doctoral graduates had on average 24,000 (USD18,844) in debt (Votta-Bleeker et al., 2016), which was, however, far less than the USD99,023 in debt accumulated by their counterparts in the United States (Grote et al., 2016). Moreover, given that a doctoral degree is generally required to practice neuropsychology in Canada, neuropsychologists begin working much later than other professionals do, which means that they have fewer years of employment during which to contribute to pension plans and retirement funds and that they are much older when they reach their maximum earning potential. So, Quebec neuropsychologists probably expect an income that is more than 1.5 times higher than the average worker. Despite this, neuropsychologists' job satisfaction is relatively high (7.9) in Canada, with very little difference between the groups studied, the only difference being that neuropsychologists with postdoctoral training have an even higher job satisfaction.

Assessment

As was the case in other countries where these questions were asked, practically all of our survey respondents conducted NP assessments (95.3%) and this activity was by far the most prevalent. The most common reason patients were referred for NP assessment was determination of diagnosis (78.5%) and it seems that this was the case in all the countries where data are available (Branco-Lopes et al., 2019; Olabarrieta-Landa et al.,

2016; Arango-Lasprilla et al., 2017; Fernandez et al., 2016). In short, despite the diversity of clinical activities that they tend to, almost everywhere in the world, neuropsychologists seem to remain above all experts in the evaluation and differential diagnosis of neurodevelopmental disorders, neurocognitive disorders and acquired NP disorders. The average duration of NP assessments conducted by Canadian neuropsychologists (15.39 hours overall; 13.38 hours in adult-only practice and 17.91 hours in pediatric-only practice) was higher than that by U.S. neuropsychologists (8.9 hours in adult-only practice and 13.5 hours in child-only practice; Sweet et al., 2021) and more than double compared with neuropsychologists in other countries, such as France (6.1 hours; Branco-Lopes et al., 2019), Spain (6.7 hours; Olabarrieta-Landa et al., 2016), Italy (4.1 hours; Onida et al., 2019), and Latin America (8.4 hours; Arango-Lasprilla et al., 2017). The time includes administration, scoring, interpretation, and report drafting. This higher average duration among Canadian neuropsychologists could be explained by different factors. First, Canada and the United States are the only two countries to require doctoral-level training to practice clinical neuropsychology and the countries where evaluation take longest to complete. The higher level of training may lead neuropsychologists to carry out more complex and in-depth evaluations. Second, compared with the study by Sweet et al. (2021) in the United States, there were more neuropsychologists in our sample who assessed children (63.3% vs. 40.3%) and pediatric assessments have been consistently reported to take longer (Sweet et al., 2015, 2021). Also, Canadian neuropsychologists seem to use a standardized battery to a greater extent than their American colleagues (21.4% vs 3% in Sweet et al., 2015), a practice known to be more time consuming. The specific healthcare economic context of the two countries could also explain these differences: for example, practice in a publicly funded health care system in Canada could make Canadian neuropsychologists

feel less pressure to carry out evaluations in a minimal amount of time compared to American neuropsychologists that may be constrained by frequent reliance on commercial insurance and Medicare. This might explain why it seems to take Canadian neuropsychologists longer to complete evaluations compared with their American counterparts.

The five most commonly used instruments for NP evaluation were the following: D-KEFS (82.6%), WAIS (81.1%), CVLT (78.9%), CPT (66.4%), and ROCFT (64.5%). These results can be explained by the fact that attention (87.4%), executive functions (87%), verbal episodic memory (72.9%), intelligence (69.6%), and visuoconstruction (69%) were the most common cognitive functions to be assessed and, possibly, that many of these instruments are designed for use with children and adults, which makes them suitable for a lifespan practice. Unsurprisingly, the medical conditions evaluated differed by type of practice. Neuropsychologists with an adults-only practice most often evaluated patients with emotional disorders (anxiety, depression), acquired NP disorders (TBI, stroke/vascular), and neurocognitive disorders (dementia). Neuropsychologists with an exclusively pediatric practice, instead, evaluated mostly patients with neurodevelopmental disorders (ADHD, learning disabilities, intellectual disabilities, ASD). For their part, neuropsychologists with a lifespan practice evaluated patients with a wide variety of conditions. These findings are similar to those reported by Sweet et al. (2021)⁵ for the United States, with the exception perhaps that Canadian neuropsychologists with an exclusively pediatric practice seemed to focus to a larger extent on neurodevelopmental disorder, whereas their U.S. counterparts seemed more

⁵ It should be noted, however, that in Sweet et al. (2021) the conditions listed were “diagnosis conditions serving as bases for neuropsychological evaluation: top five-ranking”. In our survey, neuropsychologists had to indicate the frequency of assessment of various patient groups (no limit on the number of choices), which might explain the high rate of emotional disorders (anxiety, depression) compared with Sweet et al. (2021)”.

often to assess patients with neurological disorders (TBI, seizures). This may be due to the fact that there are far fewer neuropsychologists per capita in the United States than in Canada. As a result, American neuropsychologists might focus on problems more specific to neuropsychology. Another result that supports this notion is regards who primarily refers patients to neuropsychologists. Whereas in the United States the primary referrer regardless of practice type were neurologists (Sweet et al., 2015, 2021), our results show that, in Canada, the primary referrers were family doctors, followed by patients themselves (self-referral).

In Canada, 55.5% of the participants mentioned a lack of local normative data as the greatest challenge regarding use of NP instruments. Of the five tests most used by Canadian neuropsychologists, only the WAIS-IV has Canadian norms, but only for the English-speaking population. While a Quebec French translation of the instrument is available, the editor does not provide norms from Quebec for this version, unlike, for example, the Wechsler Intelligence Scale for Children (WISC-V), which comes in a Canadian English and a Quebec French version with appropriate norms for each population. This absence of local norms is clearly all the more important for neuropsychologists in Quebec, as this is the only predominantly French-speaking province and while clinicians usually tolerate using American norms for tests with few language components (e.g., CPT, ROCFT, most of D-KEFS subtests), it would be questionable to use American norms for tests with a major spoken language (especially morphosyntactic) or reading/writing component.

Rehabilitation

About 42% of the Canadian neuropsychologists in our survey reported having engaged in NP rehabilitation, which was defined very broadly as rehabilitation, remediation, or psychotherapy. This rate was practically identical to that reported for the United States (41.3%) a few years earlier (Block et al., 2017) but contrasted with the rates reported for European countries, where the majority of neuropsychologists indicated engaging in rehabilitation: 68% in France (Branco-Lopes et al., 2019), 72% in Italy (Onida et al., 2019), and 59% in Spain (Olabarrieta-Landa et al., 2016). Neuropsychologists with an adult-only practice were more likely to engage in rehabilitation, compared to those with a pediatric only-practice. Type of patient most likely to receive rehabilitation services from neuropsychologists differed by type of practice: ADHD, learning disability, or anxiety disorder for neuropsychologist with pediatric-only practice and patients with TBI, stroke/vascular and depression for neuropsychologists with adult-only practice. The most frequent intervention target was emotional/behavioral adjustment suggesting that many neuropsychologists provided their patients not only with rehabilitation/remediation, but also with psychotherapy. The most popular mode of intervention was one-on-one (74.5%), which was also the case in the other countries surveyed. The principal technologies used by professionals to provide these services were personal computers (46.4%), mobile phones/smartphones (42.7%), and iPads/tablets (33.6%), figures practically the same as in the United States (Block et al., 2017).

Teaching/Supervision

Formal teaching was not a common activity among Canadian neuropsychologists. Only 18.4% reported having engaged in teaching activities, which we defined as teaching university courses or supervising theses. Comparisons with the situation south of the

border are difficult because the data reported for the United States (Sweet et al., 2021) relates to mean time per week (5 hours) and engagement in teaching/training activities over the entire career (75.1%). Of all the NP activities, the lowest percentage of engagement indicated by participants was for formal teaching. These are obviously weighty tasks that can be difficult to reconcile with a full-time clinical neuropsychologist job (78.7% of our sample). Neuropsychologists in Canada seemed to engage less in formal teaching than those in France (37%; Branco-Lopes et al., 2019), Italy (69%; Onida et al., 2019), Spain (40%; Olabarrieta-Landa et al., 2016), and Latin America (46%; Arango-Lasprilla et al., 2017). One possible explanation for this may be that a doctorate degree is generally required in Canada to practice neuropsychology and that supervising PhD theses or PsyD dissertations requires a higher level of competence in research, compared with other countries where neuropsychologists more typically engage in supervising dissertations at the Bachelor' or Master's level. Clinical supervision was much more prevalent among Canadian neuropsychologists (43.8%) than was formal teaching, probably because this type of teaching is easier to reconcile with a clinical practice and no doubt because supervising trainees and interns is mandatory for 38% of supervisors. Supervision was in fact the second most common activity among Canadian neuropsychologists after NP assessment, although there is scarce empirical data on this NP activity (Gauthier et al., 2020).

Research

Less than one-third of the entire sample responded to questions about research activity. Of this small group (n=69), 27% conducted research in the past year. An even smaller group (n=50) responded to the item regarding research funding, with 73% having been awarded a research grant in the past. This rate of involvement in research is similar to

those of France (26%) and the Nordic countries (28%), but lower than several other countries (Spain, 50%; Italy, 79%, Latin America, 62%), while the level of education required to be a neuropsychologist is generally lower in the latter countries. It is possible that the understanding of the term "conducting research" differs by culture. We cannot directly compare it with neuropsychologists in the US, since the question in Sweet et al. (2021) concerned the involvement in research throughout the career (31.7% of them had engaged in funded research over the span of their career).

Limitations

First, the subjective nature of a survey is a primary limitation. Regarding recruitment, the recruitment letter with the hyperlink to the survey was distributed by email by professional organizations (e.g., provincial orders/regulatory bodies of psychologists, provincial associations of psychologists, CPA clinical neuropsychology section, and QANP). Also, while all but one provincial association of psychologists agreed to distribute our recruitment letter to their members, only half of the provincial professional boards did. It is possible, then, that neuropsychologists in certain provinces who do not engage with their provincial professional associations were less represented in the sample, and this might be even more true for neuropsychologists working in remote/rural areas. Also, the neuropsychologists recruited in this project were mainly from the province of Quebec (56.4%). Although this high participation rate can be explained in part by the presence of a specific professional association of neuropsychologists that facilitated recruitment, our estimates (see Table 1) suggest that this percentage is very close to the actual proportion of Canadian neuropsychologists represented by Quebec neuropsychologists. Moreover, the self-report nature of the survey relied on the honesty of participants and was a variable that could not be

controlled. Also, the data collection took place partially during the first months of the COVID-19 pandemic and although the control analyzes that we carried out suggest that our data represent the practice of pre-COVID neuropsychologists, we did not have ways to verify this claim further. Second, the rather low participation rate combined with the small number of neuropsychologists in certain provinces forced us to carry out analyzes by regions, rather than each province, which could have obscured certain interprovincial differences. The low number of participants recruited from some regions could also make the analyzes less reliable and some differences may not have been detected due to reduced power. Finally, although the number of neuropsychologists estimated in the provinces of Quebec ($n = 956$) and Ontario ($n = 404$) is rather reliable due to the official regulations of the professional orders of these two provinces (deliverance of an official certification for NP practice and proficiency assessment, respectively), the number of neuropsychologists in other provinces is a rough estimate based on the number of self-declared neuropsychologists in online provincial directories, which makes these data less reliable.

Conclusion

The purpose of our study was to investigate various characteristics of Canadian neuropsychologists, including sociodemographic, clinical and academic training received, and types of activities engaged in. Results show that the majority of the respondent were women, with a mean age of 43.6 years, that they worked primarily in the public sector, that they were full-time employees, that they had a lifespan practice, and that they engaged primarily in NP assessment for determination of diagnosis. The number of neuropsychologists in Canada is probably around 1,670 and about 1,400 of these have doctoral level training. Canadian neuropsychologists thus seem to benefit

from a fairly balanced situation considering that the level of training and the ratio of neuropsychologists per capita are both high. This suggests that the profession remained accessible for students and that NP services remained accessible to the population.

However, it must be recognized that the per capita ratio, income, accreditation/license method specific to the profession of neuropsychologist and the level of training vary enormously from one region to another in Canada. Thus, a certain standardization of training and certification/licensing method could probably allow a more coordinated development of the profession across the country and allow better protection of the public.

References

- Aubé, W., Charbonneau, S., Chartrand, J.-P., Escudier, F., Lemay, S., Léveillé, E. et Perreau-Linck, E. (2017). L'apport de l'Association québécoise des neuropsychologues à la pratique clinique : évolution depuis sa création et ses futurs. *Neuropsychologie Clinique et Appliquée*, 1, 10-21.
- Arango-Lasprilla, J. C., Stevens, L., Morlett Paredes, A., Ardila, A., & Rivera, D. (2017). Profession of neuropsychology in Latin America. *Applied Neuropsychology: Adult*, 24(4), 318-330. doi:10.1080/23279095.2016.1185423
- Block, C., Santos, O. A., Flores-Medina, Y., Rivera Camacho, D. F., & Arango-Lasprilla, J. C. (2017). Neuropsychology and Rehabilitation Services in the United States: Brief Report from a Survey of Clinical Neuropsychologists. *Archives of Clinical Neuropsychology*, 32(3), 369-374. doi:10.1093/arclin/acx002
- Bodin, D., Butts, A. M., & Grote, C. L. (2016). Postdoctoral training in clinical neuropsychology in America: how did we get here and where do recent applicants suggest we go next? *The Clinical Neuropsychologist*, 30(8), 1371-1379. doi:10.1080/13854046.2016.1199739
- Branco-Lopes, A., Leal, G., Malvy, L., Wauquiez, G., Ponchel, A., Rivera, D., & Arango-Lasprilla, J. C. (2019). Neuropsychology in France. *Applied Neuropsychology: Adult*, 1-12. doi:10.1080/23279095.2019.1633329
- Buckman, L. R., Nordal, K. C., & DeMers, S. T. (2018). Regulatory and licensure issues derived from the summit on master's training in psychological practice. *Professional Psychology: Research and Practice*, 49(5-6), 321-326.
- Canadian Institute for Health Information (CIHI). Information retrieved online on 2020 december 5th at <https://www.cihi.ca/en/psychologists>
- College of psychologists of Ontario (2019). *Annual report 2018-2019*.
- Chartrand, J.-P., Lapierre, D., Péron, J., Saj, A., Wauquiez, G. (2019). Regards croisés sur la neuropsychologie francophone. *Neuropsychologie Clinique et Appliquée*, 3, 12-16.
- Dobson, K. S. (2016). Clinical psychology in Canada: Challenges and opportunities. *Canadian Psychology/Psychologie canadienne*, 57(3), 211-219. doi:10.1037/cap0000061
- Drapeau, M., Holmqvist, M., & Piotrowski, A. (2016). Psychology in Canada: Opportunities and challenges. *Canadian Psychology/Psychologie canadienne*, 57(3), 143-148. <https://doi.org/10.1037/cap0000062>

- Fernandez, A. L., Ferreres, A., Morlett-Paredes, A., Rivera, D., & Arango-Lasprilla, J. C. (2016). Past, present, and future of neuropsychology in Argentina. *The Clinical Neuropsychologist, 30*(8), 1154-1178. doi:10.1080/13854046.2016.1197313
- Fuerst, K. B., & Rourke, B. P. (1995). Human neuropsychology in Canada: The 1980s. *Canadian Psychology/Psychologie canadienne, 36*, 12–45. <https://doi.org/10.1037/0708-5591.36.1.12>
- Gauthier, B., Dupont, C., Gosselin, N., & de Guise, E. (2020). Neuropsychology supervision: A survey of practices in Quebec and a cross-cultural comparison. *The Clinical Neuropsychologist, 1*-26. doi:10.1080/13854046.2020.1732467
- Grote, C. L., Butts, A. M., & Bodin, D. (2016). Education, training and practice of clinical neuropsychologists in the United States of America. *The Clinical Neuropsychologist, 30*(8), 1356-1370. doi:10.1080/13854046.2016.1213885
- Grote, C. L., & Novitski, J. I. (2016). International perspectives on education, training, and practice in clinical neuropsychology: comparison across 14 countries around the world. *The Clinical Neuropsychologist, 30*(8), 1380-1388. doi:10.1080/13854046.2016.1235727
- Hayman-Abello, B. A., Hayman-Abello, S. E., & Rourke, B. P. (2003). Human neuropsychology in Canada: The 1990s (a review of research by Canadian neuropsychologists conducted over the past decade). *Canadian Psychology/Psychologie Canadienne, 44*, 100–138. <https://doi.org/10.1037/h0086931>
- Hannay, J., Bieliauskas, L., Crosson, B. A., Hammeke, T. A., Hamsher, K., & Koffler, S. (1998). Proceedings of The Houston Conference on specialty education and training in clinical neuropsychology [Special issue]. *Archives of Clinical Neuropsychology, 13*, 157–250.
- Hokkanen, L., Nybo, T., & Poutiainen, E. (2016). Neuropsychology in Finland – over 30 years of systematically trained clinical practice. *The Clinical Neuropsychologist, 30*(8), 1214-1235. doi:10.1080/13854046.2016.1196733
- Hokkanen, L., Lettner, S., Barbosa, F., Constantinou, M., Harper, L., Kasten, E., . . . Hessen, E. (2019). Training models and status of clinical neuropsychologists in Europe: Results of a survey on 30 countries. *The Clinical Neuropsychologist, 33*(1), 32-56. doi:10.1080/13854046.2018.1484169
- Hunsley, J., Ronson, A., & Cohen, K. R. (2013). Professional psychology in Canada: A survey of demographic and practice characteristics. *Professional Psychology: Research and Practice, 44*(2), 118–126. <https://doi.org/10.1037/a0029672>

- Janzen, L. A., & Guger, S. (2016). Clinical neuropsychology practice and training in Canada. *The Clinical Neuropsychologist*, *30*(8), 1193-1206. doi:10.1080/13854046.2016.1175668
- Norup, A., Egeland, J., Løvstad, M., Nybo, T., Persson, B. A., Rivera, D., . . . Arango-Lasprilla, J. C. (2017). Education, training, and practice among nordic neuropsychologists. Results from a professional practices survey. *The Clinical Neuropsychologist*, *31*(sup1), 20-41. doi:10.1080/13854046.2017.1291857
- OPQ (2020). Attention neuropsychology exigences: formation théorique. Information retrouvé le 20 décembre 2020 au: <https://www.ordrepsy.qc.ca/web/ordre-des-psychologues-du-quebec/formation-theorique>
- Olabarrieta-Landa, L., Caracuel, A., Pérez-García, M., Panyavin, I., Morlett-Paredes, A., & Arango-Lasprilla, J. C. (2016). The profession of neuropsychology in Spain: results of a national survey. *The Clinical Neuropsychologist*, *30*(8), 1335-1355. doi:10.1080/13854046.2016.1183049
- Onida, A., Di Vita, A., Bianchini, F., Rivera, D., Morlett-Paredes, A., Guariglia, C., & Arango-Lasprilla, J. C. (2019). Neuropsychology as a profession in Italy. *Applied Neuropsychology: Adult*, *26*(6), 543-557. doi:10.1080/23279095.2018.1466782
- Ponsford, J. (2016). The practice of clinical neuropsychology in Australia. *The Clinical Neuropsychologist*, *30*(8), 1179-1192. doi:10.1080/13854046.2016.1195015
- Rabin, L. A., Barr, W. B., & Burton, L. A. (2005). Assessment practices of clinical neuropsychologists in the United States and Canada: A survey of INS, NAN, and APA Division 40 members. *Archives of Clinical Neuropsychology*, *20*(1), 33-65. doi:<https://doi.org/10.1016/j.acn.2004.02.005>
- Rourke, B. P., Fisk, J. L., Strang, J. D., & Gates, R. D. (1981). Human neuropsychology in Canada: The 1970s. *Canadian Psychology/Psychologie canadienne*, *22*, 85–99. <https://doi.org/10.1037/h0081139>
- Sakamoto, M. (2016). Neuropsychology in Japan: history, current challenges, and future prospects. *The Clinical Neuropsychologist*, *30*(8), 1278-1295. doi:10.1080/13854046.2016.1204012
- Statistics Canada (2021a, april 1). *Population estimates quarterly*. <https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=1710000901>
- Statistics Canada (2021b, april 1). *Statistics on official languages in Canada*. <https://www.canada.ca/en/canadian-heritage/services/official-languages-bilingualism/publications/statistics.html>
- Statistics Canada (2021c, january 23). *Table 1 Average weekly earnings (including overtime) for all employees – Seasonally adjusted*. <https://www150.statcan.gc.ca/n1/daily-quotidien/200827/t001a-eng.htm>

Statistics Canada (2021d, September 18). *Table 14-10-0306-01: Employee wages by occupation, monthly, unadjusted for seasonality.*

DOI: <https://doi.org/10.25318/1410030601-eng>

Statistics Canada (2021d). Table 11-10-0066-01. *Market Basket Measure (MBM) thresholds for the reference family by Market Basket Measure region, component and base year.* DOI: <https://doi.org/10.25318/1110006601-eng>

DOI: <https://doi.org/10.25318/1110006601-eng>Sweet, J. J., Benson, L. M., Nelson, N. W., & Moberg, P. J. (2015). The American Academy of Clinical Neuropsychology, National Academy of Neuropsychology, and Society for Clinical Neuropsychology (APA Division 40) 2015 TCN Professional Practice and ‘Salary Survey’: Professional Practices, Beliefs, and Incomes of U.S. Neuropsychologists. *The Clinical Neuropsychologist*, *29*(8), 1069-1162. doi:10.1080/13854046.2016.1140228

Sweet, J. J., Klipfel, K. M., Nelson, N. W., & Moberg, P. J. (2021). Professional practices, beliefs, and incomes of U.S. neuropsychologists: The AACN, NAN, SCN 2020 practice and “salary survey”. *The Clinical Neuropsychologist*, *35*(1), 7-80. doi:10.1080/13854046.2020.1849803.

Sweet, J. J., Meyer, D. G., Nelson, N. W., & Moberg, P. J. (2011). The TCN/AACN 2010 "salary survey": professional practices, beliefs, and incomes of U.S. neuropsychologists. *The Clinical Neuropsychologist*, *25*(1), 12-61. doi:10.1080/13854046.2010.544165

Sweet, J. J., & Moberg, P. J. (1990). A survey of practices and beliefs among ABPP and non-ABPP clinical neuropsychologists. *The Clinical Neuropsychologist*, *4*(2), 101-120.

Sweet, J. J., Moberg, P. J., & Suchy, Y. (2000a). Ten-year follow-up survey of clinical neuropsychologists: Part I. Practices and beliefs. *The Clinical Neuropsychologist*, *14*(1), 18-37

Sweet, J. J., Moberg, P. J., & Suchy, Y. (2000b). Ten-year follow-up survey of clinical neuropsychologists: Part II. private practice and economics. *The Clinical Neuropsychologist*, *14*(4), 479-495.

Sweet, J. J., Moberg, P. J., & Westergaard, C. K. (1996). Five-year follow-up survey of practices and beliefs of clinical neuropsychologists. *The Clinical Neuropsychologist*, *10*(2), 202-221.

Sweet, J. J., Nelson, N. W., & Moberg, P. J. (2006). The TCN/AACN 2005 “salary survey”: Professional practices, beliefs, and incomes of US neuropsychologists. *The Clinical Neuropsychologist*, *20*(3), 325-364.

- Sweet, J. J., Perry, W., Ruff, R. M., Shear, P. K., & Guidotti Breting, L. M. (2012). The Inter-Organizational Summit on Education and Training (ISET) 2010 Survey on the Influence of the Houston Conference Training Guidelines. *The Clinical Neuropsychologist*, *26*(7), 1055-1076. doi:10.1080/13854046.2012.70556
- Votta-Bleeker, L., Tiessen, M., & Murdoch, M. (2016). A snapshot of Canada's psychology graduates: Initial analysis of the 2015 Psychology Graduates Survey. *Canadian Psychology/Psychologie canadienne*, *57*(3), 172–180. <https://doi.org/10.1037/cap0000059>
- Wade, T. C., & Baker, T. B. (1977). Opinions and use of psychological tests: A survey of clinical psychologists. *American Psychologist*, *32*(10), 874.

Table 1A. Characteristics of the sample: neuropsychologists by Canadian province/territory and number of participants by province

Provinces/ territories	Population (2016) ^a	% of CAN populatio n	No. of psycholo gists (2019) ^b	% of CAN psychologi sts	No. of neuro psychol ogists	% of psych. who are neuropsy ch.	% of CAN neurops ychologi sts	Ratio of neuropsych . to population	Title held by Doctorate degree holder ^c	Title held by Master degree holder ^c	No. of survey respondents (%)
Ontario	13,448,495	38.30%	4,001	20.90%	404	10.10%	24.19%	1 : 33,288	Psychologist	PA	52 (18.4%)
Quebec	8,164,360	23.20%	7,728	40.50%	956	12.37%	57.25%	1 : 8,540	Psychologist	No access/GF	159 (56.4%)
British-Columbia	4,648,055	13.20%	1,252	6.60%	63 ^j	(5%) ^j	3.77%	?	Psychologist	No access/GF	24 (8.5%)
Alberta	4,067,175	11.60%	3,928	20.60%	130 ^f	3.30%	7.78%	1 : 31,285	Psychologist	Psychologist	18 (6.3%)
Manitoba	1,278,365	3.60%	266	1.40%	22 ^e	6.39%	1.32%	1 : 75,197	Psychologist	PA	5 (1.7%)
Saskatchewan	1,098,355	3.10%	515	2.70%	15 ^d	2.91%	0.90%	1 : 73,223	Psychologist	Psychologist	5 (1.7%)
Nova Scotia	923,600	2.60%	624	3.30%	30 ^h	4.81%	1.80%	1 : 30,786	Psychologist	Psychologist	5 (1.7%)
New Brunswick	747,100	2.10%	364	1.90%	26 ^g	5.18%	1.56%	1 : 28,734	Psychologist	No access/GF	9 (3.2%)
NF&L	519,715	1.50%	281	1.50%	16 ⁱ	5.69%	0.96%	1 : 32,482	Psychologist	Psychologist	2 (0.7%)
PEI	142,905	0.40%	55	0.30%	3 ^j	(5%) ^j	0.18%	?	Psychologist	PA	2 (0.7%)
Territories	113,600	0.30%	91	0.50%	5 ^j	(5%) ^j	0.30%	?	Psychologist	Psychologist	1 (0.4%)
Total	35,151,725	100.00%	19,103	100.00%	1670		100.00%	1 : 21,048			282

Note. No access/GF, No access to any title for recent master degree holders (psychologists with a Master degree before implementation of the rule were grandfathered); PA, Psychological Associate;

a, data from latest (2016) Canadian census;

b, data from Canadian Institute for Health Information (CIHI);

c, information from CPA: <https://cpa.ca/accreditation/PTlicensingrequirements/>, except for NB: a Doctorate degree is required since July 2020 to obtain the title of psychologist in NB (College of Psychologists of New Brunswick, personal communication)

d, personal communication with Saskatchewan College of Psychologists (February 21, 2021)

e, personal communication with Psychological Association of Manitoba (March 9, 2021)

f, estimated from the number of psychologists who declared "neuropsychology" as a "methodology" in the online directory of the Psychologists Association of Alberta (n = 5/150, March 9, 2021).

g, estimated from the number of psychologist who declared "neuropsychology" as a "service offered" in the online directory of the New Brunswick College of Psychologists (n = 26/501);

h, estimated form the number of psychologists who declared "neuropsychology" as a "self-declared area(s) of practice" in the online directory of the Nova Scotia Board of Examiners in Psychology (n = 30/652, March 9, 2021);

i, estimated from the number of psychologists who declared "neuropsychological assessment" as a formal assessment service in the online directory of the Association of Psychology of Newfoundland and Labrador (n = 4/71, March 9, 2021);

j, no data available, estimated number of neuropsychologists based on the rate of 5% of psychologists in that province (mean % of psychologists who are neuropsychologists outside ONT and QC).

Table 1B. Characteristics of the sample

	West coast		Prairies		Central-ON		Central-QC		Atlantic-T		Total	
	n (%) or M (SD)		n (%) or M (SD)		n (%) or M (SD)		n (%) or M (SD)		n (%) or M (SD)		n (%) or M (SD)	
Demographic characteristics												
Gender (woman) (n=282)	13	(54.2)	16	(57.1)	39	(75.0)	142	(89.3)	18	(94.7)	228	(80.9)
Age (n=282)	51.0 ^b	(11.4)	48.07 ^b	(8.3)	47.65 ^b	(11.6)	40.0 ^a	(8.3)	46.7	(11.4)	43.6	(11.3)
Years of exp. (n=275)	16.4	(8.6)	17.6 ^b	(10.8)	17.1 ^b	(10.9)	10.8 ^a	(7.7)	14.1	(8.8)	13.3	(9.3)
Type of practice (n=248)												
Pediatric	0	(0)	2	(8.0)	1	(2.0)	35	(24.5)	2	(12.0)	40	(16.1)
Adult	3	(17.6)	11	(44.0)	22	(47.0)	48	(33.5)	7	(44.0)	91	(36.7)
Lifespan	14	(82.3)	12	(48.0)	24	(51.0)	60	(42.0)	7	(44.0)	117	(47.2)
Total	17	(100)	25	(100)	47	(100)	143	(100)	16	(100)	248	(100)
Sector of activities (n=276)												
Public only	3	(14.2)	7	(25)	13	(25)	67	(42.3)	9	(50.0)	99	(35.1)
Private only	7	(33.3)	10	(35.7)	27	(51.9)	41	(26.1)	4	(22.2)	89	(31.6)
Both	11	(52.7)	11	(39.2)	12	(23.1)	49	(31.1)	5	(27.7)	88	(31.2)
Total	21	(100)	28	(100)	52	(100)	157	(100)	18	(100)	276	(100)
Professional activities*												
Assessment (n=278)	21	(95.4)	25	(92.5)	49	(94.1)	153	(96.8)	17	(89.5)	265	(95.3)
Forensic (n=241)	7	(29.2)	5	(17.9)	14	(26.9)	18	(11.3)	3	(15.8)	47	(16.7)
Rehabilitation (n=263)	10	(50.0)	11	(40.7)	27	(54.0)	52	(35.1)	10	(55.5)	110	(41.8)
Teaching (n=261)	5	(26.3)	5	(18.5)	10	(20.0)	25	(16.9)	3	(17.6)	48	(18.4)
Supervision (n=260)	7	(36.8)	14	(51.8)	26	(52.0)	58	(39.4)	9	(52.9)	114	(43.8)
Research (n=256)	9	(47.3)	12	(44.4)	21	(42.0)	23	(16.1)	4	(23.5)	69	(27.0)
Please indicate to which professional neuropsychological association you currently belong: (n=282)*												
QANP	-	-	-	-	3	(5.8)	148	(93.1)	1	(5.3)	152	(53.9)

CPA	15 (62.5)	20 (71.4)	39 (75.0)	15 (9.4)	11 (57.9)	100 (35.5)
Other	8 (33.3)	15 (53.6)	22 (42.3)	11 (6.9)	9 (47.4)	65 (23.0)
INS	11 (45.8)	16 (57.1)	20 (38.5)	4 (2.5)	6 (31.6)	57 (20.2)
APA	7 (29.2)	5 (17.9)	7 (13.5)	5 (3.1)	1 (5.3)	25 (8.9)
AACN	4 (16.7)	10 (35.7)	8 (15.4)	2 (1.3)	- -	24 (8.5)
None	- -	- -	3 (5.7)	8 (5.0)	2 (10.5)	13 (4.6)

Do you have an official board certification which allows you to work as a neuropsychologist in your province? (n=282)

Yes	6 (25.0)	7 (25)	22 (42.3)	158 (99.4)	3 (15.7)	196 (69.5)
ABN	- -	1 (3.5)	1 (1.9)	- -	- -	2 (0.7)
ABCN	3 (12.5)	2 (7.1)	1 (3.8)	- -	- -	6 (2.1)
Other certification**	3 (12.5)	4 (14.2)	20 (38.4)	158 (99.4)	3 (15.7)	188 (66.7)
No (cert. doesn't exist)	16 (66.6)	20 (71.4)	22 (42.3)	- -	13 (68.4)	71 (25.2)
No (cert. exist)	1 (0.4)	1 (3.5)	8 (15.4)	1 (0.6)	1 (5.2)	12 (4.3)
No (I don't know)	1 (0.4)	- -	- -	- -	2 (10.5)	3 (1.1)

Note. *Multiple response options available, responses do not add up to 100%. Percentages are calculated out the total response for each question. ** "other", all the participants who chose this answer indicated the name of their provincial professional order/regulatory body.
 West coast includes British-Columbia; Prairie includes Manitoba, Saskatchewan and Alberta; Central-ON includes Ontario; Central-QC includes Quebec; Atlantic-N includes Newfoundland and Labrador, Nova-Scotia, New Brunswick, Prince Edward Island and the Territories.
 QANP, Quebec Association of Neuropsychologists; INS, International Neuropsychological Society; APA, American Psychology Association; AACN, American Academy of Clinical Neuropsychology
 Letters in superscript indicate significant differences between groups.
 No (cert. exist), No, no official certification exist in my province; No (cert. doesn't exist), No, although official certification exist in my province; No (don't know), No, I do not know if such certification exist

Table 2. Professional training in neuropsychology

	West coast n (%) or M (SD)	Prairies n (%) or M (SD)	Central-ON n (%) or M (SD)	Central-QC n (%) or M (SD)	Atlantic-T n (%) or M (SD)	Total n (%) or M (SD)
Highest degree obtained (n=282)						
Master	0 (0)	1 (3.6)	5 (9.6)	33 (20.8)	4 (21.1)	43 (15.2)
Psy.D	0 (0)	1 (3.6)	1 (1.9)	30 (18.9)	2 (10.5)	34 (12.1)
Ph.D.	24 (100)	26 (92.9)	46 (88.5)	96 (60.4)	13 (68.4)	205 (72.7)
Total	24 (100)	28 (100)	52 (100)	159 (100)	19 (100)	282 (100)
Post-doctoral training obtained (n= 282)?						
Yes	12 (50)	12 (42.0)	20 (38.5)	13 (8.2)	7 (36.8)	64 (22.7)
No	12 (50)	16 (57.1)	32 (61.5)	146 (91.8)	12 (63.2)	218 (77.3)
Total	24 (100)	28 (100)	52 (100)	159 (100)	19 (100)	282 (100)
Please, indicate when you received the majority of your training in neuropsychology? (n=282)*						
As a graduate student	22 (91.7)	25 (89.3)	50 (96.2)	153 (96.2)	14 (73.7)	264 (93.6)
Through continuing education	8 (33.3)	9 (32.1)	20 (38.5)	44 (27.7)	12 (63.2)	93 (33.0)
Postdoctoral fellow	12 (50.0)	15 (53.6)	27 (51.9)	7 (4.4)	6 (31.6)	67 (23.8)
As an undergraduate student	2 (8)	1 (3.6)	3 (5.8)	34 (21.4)	5 (26.3)	45 (16.0)
How do you rate the training that you received in neuropsychology? (n=282)						
Excellent	13 (54.2)	9 (32.1)	25 (48.1)	36 (22.6)	8 (42.1)	91 (32.3)
Very good	9 (37.5)	16 (57.1)	18 (34.6)	74 (46.5)	10 (52.6)	127 (45.0)
Good	2 (8.3)	3 (10.7)	7 (13.5)	43 (27.0)	1 (5.3)	56 (19.9)
Fair	0 -	- -	2 (3.8)	5 (3.1)	- -	7 (2.5)
Poor	0 -	- -	- -	1 (.6)	- -	1 (0.4)
Rating (1=excellent, 5=poor)	1.4 (0.7)	1.7 (0.6)	1.7 (0.8)	2.1 (0.8)	1.6 (0.6)	1.9 (0.8)
Clinical supervision during your neuropsychology training was (n=282)?						
Excellent	14 (58.3)	14 (50.0)	28 (53.8)	50 (31.4)	7 (36.8)	113 (40.1)

Very good	9 (37.5)	11 (39.3)	18 (34.6)	69 (43.4)	11 (57.9)	118 (41.8)
Good	-	3 (10.7)	5 (9.6)	31 (19.5)	1 (5.3)	39 (13.8)
Fair	-	-	1 (1.9)	5 (3.1)	-	6 (2.1)
Poor	1 (4.2)	-	-	3 (1.9)	-	4 (1.4)
Rating (1=excellent, 5=poor)	1.5 (0.9)	1.6 (0.7)	1.6 (0.8)	2.0 (1.0)	1.8 (1.1)	1.8 (0.9)

*Note.**, Multiple response options available, responses do not add up to 100%. Percentages are calculated out the total response for each question.

West coast includes British-Columbia; Prairie includes Manitoba, Saskatchewan, and Alberta; Central-ON includes Ontario; Central-QC includes Quebec; Atlantic-N includes Newfoundland and Labrador, Nova-Scotia, New Brunswick, Prince Edward Island and the Territories.

Table 3A. Current work situation in neuropsychology

	Frequency (n)	Percentage (%)
What is your current employment status as a neuropsychologist? (n=277)		
Full time	218	78.7
Part time	52	18.8
Unemployed	5	1.8
Retired	2	0.7
In your work as a neuropsychologist, are you in a: (n=282)*		
Salaried	181	64.2
Self-employed or independent	157	55.7
In training	10	3.5
Other	9	3.2
In which type of setting do you perform the majority of activities related to neuropsychology (n=265)		
Private clinic/practice	102	37
Hospital	90	32.6
Non-profit rehabilitation facility	27	9.8
College or University	17	6.2
School system (elementary/middle/High school)	10	3.6
Forensic	8	2.9
Other	5	1.8
For profit rehabilitation facility	4	1.4
Medical School	2	0.7

Note. *, Multiple response options available, responses do not add up to 100%. Percentages are calculated out the total response for each question.

Table 3B. Current work situation in neuropsychology: income and satisfaction

Variable	Income (CAD\$)				Income satisfaction			Job satisfaction		
	<i>n</i>	<i>M</i>	<i>SD</i>	EAG	<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>
By region										
West coast	8	108.6 ^b	(63.4)	158.7	21	7.6 ^b	(1.8)	22	8.2	(1.3)
Prairies	16	106.1 ^b	(39.8)	153.5	27	7.3	(2.0)	27	7.8	(1.6)
Central-ON	28	104.3 ^b	(62.2)	150.3	52	7.5	(2.3)	52	8.3	(1.7)
Central-QC	69	55.8 ^a	(18.3)	84.5	156	5.7 ^a	(2.4)	158	7.7	(1.6)
Atlantic-Territories	11	75.6	(25.8)	112.2	18	6.6	(1.9)	19	7.8	(2.0)
Total	132	77.1	(44.5)	107.1	274	6.4	(2.4)	278	7.9	(1.7)
By work setting										
Public only	47	58.7 ^a	(19.2)	79.7	95	6.3 ^a	(2.1)	99	7.9	(1.4)
Private only	31	112.4 ^b	(60.9)	164.1	88	7.2 ^b	(2.3)	88	8.1	(1.7)
Both	54	72.8 ^a	(37.7)	100.2	87	5.7 ^a	(2.6)	87	7.7	(1.8)
By highest training										
Master level	11	57.1 ^a	(13.8)	77.4	38	6.4 ^a	(2.1)	40	7.7 ^a	(1.8)
Doctoral level	83	69.1 ^a	(37.9)	94.5	172	6.2 ^a	(2.5)	174	7.7 ^a	(1.7)
Post-doctoral level	38	100.3 ^b	(54.2)	143.9	64	7.1 ^b	(2.3)	64	8.4 ^b	(1.3)
By type of practice										
Pediatric	27	55.8 ^a	(19.2)	75.6	40	5.7	(2.5)	40	7.6	(1.5)
Adult	41	78.8	(47.6)	109.7	89	6.2	(2.6)	90	7.8	(1.9)
Lifespan	57	84.1 ^b	(47.1)	118.2	115	6.7	(2.1)	117	8.0	(1.5)
By forensic practice										
Yes	25	108.6 ^b	(61.8)	157.6	40	7.3 ^b	(2.6)	40	8.1	(2.0)
No	107	69.7 ^a	(35.9)	95.4	175	6.4 ^a	(2.3)	178	8.0	(1.6)
By years of experience										
0-5	35	54.4 ^a	(18.1)	73.6	68	5.5 ^a	(2.5)	70	7.7	(1.5)
6-10	29	67.1 ^a	(30.0)	91.6	51	6.0	(2.4)	52	8.0	(1.5)
11-15	27	83.9	(49.8)	117.8	55	6.6	(2.2)	55	7.6	(1.9)
16-20	20	87.1	(49.5)	122.9	43	6.8	(2.2)	43	8.1	(1.4)
25+	20	112.4 ^b	(56.9)	164.1	52	7.6 ^b	(2.2)	53	8.2	(1.7)
By employment status										
Full-time	132	77.1	(44.5)	-	215	6.6 ^b	(2.4)	216	8.0 ^b	(1.6)
Part-time	20	83.2	(41.8)	-	48	5.6 ^a	(2.5)	50	7.5 ^a	(1.5)
Full-time (hourly)	131	45.5 ^a	(33.2)	-	-	-	-	-	-	-
Part-time (hourly)	20	90.1 ^b	(70.5)	-	-	-	-	-	-	-

Note. The survey question was about monthly net income, here we report annual net income (monthly net income *12), except if otherwise specified. West coast includes British-Columbia; Prairie includes Manitoba, Saskatchewan, and Alberta; Central-ON includes Ontario; Central-QC includes Quebec; Atlantic-N includes Newfoundland and Labrador, Nova-Scotia, New Brunswick, Prince Edward Island and the Territories.

EAG, Estimated annual gross income

Full-time workers only (except for "by employment status" category), after removing outliers for annual income : net annual income under 36,000\$ (approximately 50,000\$ annual gross, n=6) and more than 243,000\$ (approximately 500,000\$ annual gross, n=22). Boxplot and visual inspection suggest that some participants reported their net annual income, while the survey question was about net salary per month, which explains the greater number of outliers in the higher end of the distribution.

Letters in superscript indicate significant differences between groups.

Job and income satisfaction were measured on a 10-point Likert scale from 1 (extremely dissatisfied) to 10 (extremely satisfied).

Table 4A. Neuropsychological assessment

	Frequency (n)	Percentage (%)
In the past year, have you performed neuropsychological assessments? (n=282)		
Yes	265	95.3
No	13	4.7
Which of the following would describe your approach to test selection for a neuropsychological assessment? (n=252)		
Flexible battery	141	56
Personalized/flexible	57	22.6
Standardized battery	54	21.4
Which of the following neuropsychological assessment instruments do you use regularly? (20 most used) (n=265)*		
D-KEFS (Delis-Kaplan Executive Function System)	219	82.6
WAIS (Wechsler Adult Intelligence Scale)	215	81.1
CVLT (California Verbal Learning Test)	209	78.9
CPT (Continuous Performance Task)	176	66.4
ROCFT (Rey-Osterrieth Complex Figure Task)	171	64.5
WCST (Wisconsin Card Sorting Test)	160	60.4
WMS (Wechsler Memory Scale)	155	58.5
The Stroop Color and Word Test	151	57
TOMM (Test of Memory Malingering)	126	47.5
WISC (Wechsler Intelligence Scale for Children)	125	47.2
Trail Making Test	123	46.4
BNT (Boston Naming Test)	119	44.9
NEPSY (A Developmental Neuropsychological Assessment)	117	44.2
BRIEF	93	35.1
Hooper VOT (Hooper Visual Organization Test)	90	34
WPPSI (Wechsler Preschool & Primary Scale of Intelligence)	89	33.6
VMI (Developmental Test of Visual-Motor Integration)	88	33.2
Clock Drawing Test	87	32.8
Finger Tapping/Finger Oscillation Test	81	30.6
COWAT (Controlled Oral Word Association Test/FAS)	80	30.2
When scoring a neuropsychological test, which scoring procedure do you employ the most? (n=265)*		
Normative data from my country/region	226	85.3
Normative data from another country	212	80
Personalized procedures developed through clinical practice	32	12.1
Other	14	5.3

I use raw scores without comparing my patients to a normative population	11	4.2
<hr/>		
What challenges do you currently have with the neuropsychological instruments that are available to you? (n=265)*		
Lack normative data for my country	147	55.5
Too costly/expensive	140	52.8
Not adapted to my cultural setting	77	29.1
Do not have good psychometric properties	75	28.3
Not translated in my language	68	25.7
Too long to administer	61	23
Aimed at individuals with high levels of education	45	17
There are no problems with the instruments	41	15.5
Are often not applicable because my patients cannot read or write	30	11.3
Other	30	11.3
Too complicated to administer and/or score	16	6
<hr/>		
The most frequent reasons for patient referral (n=265)*		
Determination of diagnosis	208	78.5
Education planning	111	41.9
Rehabilitation treatment/planning	106	40
Assess capacity to work	73	27.5
Assess capacity for independent living	61	23
Establish baseline of function for subsequent testing	49	18.5
Forensic consult	47	17.7
Pre- and post-medical intervention	32	12.1
Other	23	8.7
<hr/>		
Indicate which type of patient-related information are gathered as part of your neuropsychological and diagnostic assessment (n=265)*		
Medical/psychiatric history	241	90.9
Previous neuropsychological test	233	87.9
Neuropsychological test	229	86.4
Developmental history	227	85.7
Mood and affect measures	221	83.4
Significant other interview	211	79.6
Referral source	201	75.8
Current social support	198	74.7
Behavioral assessment	194	73.2
Environment demand characteristics	188	70.9
School records	173	65.3
Personality test	131	49.4
Functional assessments	125	47.2
Mental status exam	122	46

Work records	55	20.8
Other	20	7.5
<hr/>		
Indicate your primary referral sources (n=265)*		
Family doctor (general medicine)	123	46.4
Self-referral	118	44.5
Neurology	98	37
Psychiatry	95	35.8
Psychology	94	35.5
School system	86	32.5
Rehabilitation	85	32.1
Pediatrics	76	28.7
Insurance company	66	24.9
Law (attorney)	55	20.8
Neurosurgery	43	16.2
Geriatrics	41	15.5
Other	27	10.2
Friends	26	9.8
Physiatrist	23	8.7
Internal medicine	11	4.2
Cardiology	9	3.4
Alcohol/drug facilities	7	2.6
Occupational medicine	7	2.6
Orthopedics	1	0.4

Note. *, Multiple response options available, responses do not add up to 100%. Percentages are calculated out the total responses for each question.

Table 4B. Neuropsychological assessment. How often do you assess the following abilities as part of your neuropsychological evaluations?

	Frequency (%)				
	Never	Rarely	Occasionally	Frequently	Always
Attention	-	-	1 (0.4)	30 (12.1)	216 (87.4)
Executive functions	-	-	2 (0.8)	30 (12.1)	215 (87)
(Visuo) construction	2 (0.7)	-	15 (6.1)	59 (24.1)	169 (69)
Academic Achievement	20 (8.2)	35 (14.2)	54 (22.2)	77 (31.7)	57 (23.5)
Motor skills	12 (4.9)	53 (21.8)	58 (23.9)	54 (22.2)	66 (27.2)
Visuospatial skills	1 (0.4)	2 (0.8)	14 (5.7)	63 (25.7)	165 (67.3)
Intelligence	3 (1.2)	4 (1.6)	18 (7.3)	50 (20.2)	172 (69.6)
Language	1 (0.4)	6 (2.4)	32 (13)	70 (28.5)	137 (55.7)
Nonverbal memory	2 (0.8)	6 (2.4)	26 (10.5)	63 (25.5)	150 (60.7)
Verbal memory	2 (0.8)	4 (1.6)	13 (5.3)	48 (19.4)	180 (72.9)
Auditory perception	51 (21.3)	90 (37.5)	42 (17.5)	31 (12.9)	26 (10.8)
Tactile perception	82 (34.3)	94 (39.3)	43 (18.0)	12 (5.0)	8 (3.3)
Praxis	19 (7.9)	51 (21.1)	87 (36.0)	56 (23.1)	29 (12.0)

Table 4C. Neuropsychological assessment. Indicate the frequency with which you perform neuropsychological evaluations with the following patient groups

	Frequency (%)				
	Never	Rarely	Occasionally	Frequently	Always
Traumatic Brain Injury	37 (15.4)	55 (22.9)	57 (23.8)	61 (25.4)	30 (12.5)
Stroke	61 (25.8)	44 (18.6)	72 (30.5)	43 (18.2)	16 (6.8)
Dementia	78 (33.2)	28 (11.9)	63 (26.8)	49 (20.9)	17 (7.2)
Multiple sclerosis	108 (47.8)	61 (27.0)	40 (17.7)	16 (7.1)	1 (0.4)
ADHD	10 (4.1)	30 (12.3)	44 (18.0)	114 (46.7)	46 (18.9)
Schizophrenia	108 (48.0)	62 (27.6)	27 (12)	23 (10.2)	5 (2.2)
Learning disabilities	21 (8.8)	39 (16.3)	49 (20.4)	92 (38.3)	39 (16.3)
Depression	18 (7.5)	47 (19.6)	78 (32.5)	87 (36.3)	10 (4.2)
Pain	89 (38.4)	46 (19.8)	49 (21.1)	43 (18.5)	5 (2.2)
Substance abuse	94 (41.0)	50 (21.8)	60 (26.2)	22 (9.6)	3 (1.3)
Intellectual disabilities	26 (10.9)	61 (25.5)	80 (33.5)	54 (22.6)	18 (7.5)
Toxic/metabolic	95 (42.8)	81 (36.5)	33 (14.9)	13 (5.9)	-
Movement disorders	73 (32.3)	68 (30.1)	57 (25.2)	21 (9.3)	7 (3.1)
Autism Spectrum Disorder	61 (26)	57 (24.3)	66 (28.1)	37 (15.7)	14 (6)
Bipolar disorder	86 (37.6)	73 (31.9)	45 (19.7)	21 (9.2)	4 (1.7)
Anxiety disorder	20 (8.3)	38 (15.8)	75 (31.3)	96 (40.0)	11 (4.6)
Personality disorder	64 (28.2)	71 (31.3)	60 (26.4)	29 (12.8)	3 (1.3)
Seizure disorder	51 (22.2)	86 (37.4)	61 (26.5)	25 (10.9)	7 (3)
CNS tumor	84 (36.5)	78 (33.9)	38 (16.5)	21 (9.1)	9 (3.9)
AIDS	149 (66.8)	63 (28.3)	8 (3.6)	3 (1.3)	-

Note. ADHD, Attention deficit/hyperactivity disorder; CNS tumor, Central nervous system tumor; AIDS, acquired immunodeficiency syndrome.

Table 5. Neuropsychological rehabilitation

	Frequency (n)	Percentage (%)
In the past year, have you worked in neuropsychological rehabilitation (rehabilitation, remediation, or psychotherapy)? (n=263)		
Yes	110	41.8
No	153	58.2
What modality of treatment/therapy do you provide? (n=104)		
Individual	82	74.5
Both	14	12.7
Group	8	7.3
Indicate the diagnostic groups to which you provide rehabilitation services? (n=110)*		
Traumatic Brain Injury	69	62.7
Anxiety disorders	49	44.5
Depression	48	43.6
Stroke/vascular	44	40
ADHD	43	39.1
Pain	28	25.5
Learning disabilities	25	22.7
Multiple sclerosis	15	13.6
Personality disorders	15	13.6
CNS tumor	15	13.6
Other	15	13.6
Autism spectrum	14	12.7
Substance abuse	13	11.8
Seizure disorder	12	10.9
Intellectual disabilities	12	10.9
Dementia	11	10
Bipolar disorders	10	9.1
Movement disorders	9	8.2
Schizophrenia	6	5.5
Toxic/metabolic	6	5.5
AIDS	1	0.9
Indicate which areas of functioning are the targets of intervention when conducting? (n=110)*		
Emotional/behavioral adjustment & well-being	84	76.4
Attention/concentration	79	71.8
Executive functioning	78	70.9
Memory	68	61.8
Awareness of disability/disease	60	54.5
Returning to work	54	49.1

NEUROPSYCHOLOGY IN CANADA

10

Family functioning	44	40
Autonomy & independence	39	35.5
Communication/Speech & language	20	18.2
Visual-perceptual & constructional abilities	11	10
Sexual adjustment problems	11	10
Other	9	8.2
Motor skills/strength	4	3.6

Indicate which of the following technologies you use in rehabilitation (n=110)*

Personal computers (PC, Mac, etc.)	51	46.4
Mobile phones/smartphones	47	42.7
iPads/ tablets	37	33.6
Other	8	7.3
Neurofeedback	6	5.5
Virtual Reality	3	2.7
Neuromodulation (TMS, tDCS)	1	0.9

Note. ADHD, Attention deficit/hyperactivity disorder; CNS tumor, Central nervous system tumor; AIDS, acquired immunodeficiency syndrome; TMS, Transcranial magnetic stimulation; tDCS, Transcranial Direct Current Stimulation; *Multiple response options available, responses do not add up to 100%. Percentages are calculated out the total responses for each question.

Table 6. Teaching/supervision in neuropsychology

	Frequency (n)	Percentage (%)
In the past year, have you worked as a professor/instructor in neuropsychology (teaching courses in a university or directing theses/dissertation)? (n=261)		
Yes	48	18.4
No	213	81.6
In what type of institution do you work as a professor/instructor in neuropsychology? (n=48)		
Public	41	85.4
Private	3	6.3
Both	4	8.3
At which level do you teach courses in neuropsychology? (n=48)*		
Doctorate	34	70.8
Undergraduate	15	31.3
Master	11	22.9
At which level have you directed theses or dissertations? (n=48)*		
Doctorate	23	47.9
Master	17	35.4
Undergraduate	14	29.2
Post-doctoral	7	14.6
Do you offer clinical supervision in neuropsychology (practicum, internship/residency, postdoctoral)? (n=260)		
Yes	114	43.8
No	146	56.2
Number and percentage of neuropsychologist offering clinical supervision by sector (n=255)		
Public only (n=91)	50	54.9
Private only (n=85)	29	34.1
Both (n=79)	34	43.0
Are you required to supervise trainees in neuropsychology in your workplace? (n=112)		
Yes	43	38.4
No	69	61.6

Note. *Multiple response options available, responses do not add up to 100%. Percentages are calculated out the total responses for each question.

Table 7A. Research in neuropsychology

	Frequency (n)	Percentage (%)
In the past year, have you conducted research in the area of neuropsychology? (n=256)		
Yes	69	27
No	187	73
Does the institution where you work have an ethics committee? (n=69)		
Yes	57	82.6
No	12	17.4
Do you always seek ethics committee approval prior to starting your research projects? (n=69)		
Yes	64	92.8
No	5	7.2
When conducting research in neuropsychology, do you obtain informed consent from participants? (n=69)		
Yes	68	98.6
No	1	1.4
Have you received training in neuropsychology research during your clinical education/ training? (n=69)		
Yes	66	95.7
No	3	4.3
Have you ever received grant funding for research in neuropsychology? (n=68)		
Yes	50	73.5
No	18	26.5
Do you have sufficient resources and materials (e.g., personnel, lab space neuropsychological tests, access to journals, etc.) to conduct neuropsychological research? (n=69)		
Yes	40	58
No	29	42
Do you conduct your own statistical analyses when performing research? (n=69)		
Yes	58	84.1
No	11	15.9
	Mean	SD
How many publications do you have in the area of neuropsychology?		
Peer-reviewed (n= 66)	23.7	42.4
Non-peer-reviewed (n= 39)	3	6.8
Book chapters (n= 50)	4.1	9.4
Books (n= 35)	0.5	1.4

Table 7B. Research in neuropsychology. What is your level of proficiency with the following statistical software?

	Frequency (%)			
	None	Low	Medium	High
Excel	-	9 (13.0)	30 (43.5)	30 (43.5)
Epi Info	64 (98.5)	1 (1.5)	-	-
SAS	43 (65.2)	20 (30.3)	3 (4.5)	-
SPSS	2 (2.9)	9 (13)	29 (42)	29 (42)
SATA	62 (96.9)	2 (3.1)	-	-
MATLAB	49 (75.4)	11 (16.9)	5 (7.7)	-
R	47 (74.6)	12 (19.0)	3 (4.8)	1 (1.6)

Table S1. Neuropsychological assessment. Patient groups most often assessed by type of practice

Position	Type of practice		
	Lifespan (n = 117)	Adult only (n = 91)	Pediatric only (n = 40)
1	ADHD (78%)	Depression (52%)	ADHD (95%)
2	Learning disabilities (70%)	Dementia (50%)	Learning disabilities (87%)
3	Anxiety disorders (54%)	TBI (48%)	Intellectual disabilities (53%)
4	Depression (43%)	Anxiety disorders (43%)	ASD (39%)
5	TBI (41%)	Stroke/vascular (38%)	Anxiety disorders (21%)
6	Intellectual disabilities (33%)	ADHD (37%)	Seizures disorders (16%)
7	ASD (29%)	Pain (30%)	CNS tumor (8%)
8	Stroke/vascular (23%)	Learning disabilities (18%)	Schizophrenia (8%)
9	Dementia (20%)	Personality disorder (17%)	Stroke/vascular (5%)
10	Pain (21%)	Movement disorders (15%)	Movement disorders (5%)
11	Seizures disorders (17%)	Intellectual disabilities (14%)	Depression (5%)
12	Substance abuse (15%)	Bipolar disorder (14%)	Personality disorder (3%)
13	Personality disorder (15%)	Schizophrenia (13%)	Bipolar disorder (3%)
14	CNS tumor (14%)	CNS tumor (13%)	TBI (3%)
15	Schizophrenia (13%)	Multiple Sclerosis (11%)	Multiple Sclerosis (3%)
16	Movement disorders (11%)	Substance abuse (10%)	Toxic/metabolic (3%)
17	Bipolar disorder (11%)	Seizures disorders (9%)	Substance abuse (0%)
18	Multiple Sclerosis (6%)	Toxic/metabolic (6%)	Pain (0%)
19	Toxic/metabolic (6%)	AIDS (3%)	Dementia (0%)
20	AIDS (1%)	ASD (2%)	AIDS (0%)

Note. % determined by the answer "frequently" and "always" to the question "Please indicate the frequency with which you perform neuropsychological evaluations with the following patient groups".

TBI, traumatic brain injury; ASD, Autism spectrum disorder; ADHD, Attention deficit/hyperactivity disorder; CNS tumor, Central nervous system tumor; AIDS, acquired immunodeficiency syndrome;