HPV sampling options for cervical cancer screening: preferences of urban-dwelling Canadians in a changing paradigm

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ABSTRACT

Introduction  Of women in Canada diagnosed with invasive cervical cancer, 50% have not been screened according to guidelines. Interventions involving self-collected samples for human papillomavirus (HPV) screening could be an avenue to increase uptake. To guide the development of cervical cancer screening interventions, we assessed

- preferred sample collection options,
- sampling preferences according to previous screening behaviours, and
- preference for self-sampling among women not screened according to guidelines, as a function of their reasons for not being screened.

Methods  Data were collected in an online survey (Montreal, Quebec; 2016) and included information from female participants between the ages of 21 and 65 years who had not undergone hysterectomy and who had provided answers to survey questions about screening history, screening interval, and screening preferences (n = 526, weighted n = 574,392).

Results  In weighted analyses, 68% of all women surveyed and 82% of women not recently screened preferred screening by self-sampling. Among women born outside of Canada, the United States, or Europe, preference ranged from 47% to 60%. Nearly all women (95%–100%) who reported fear or embarrassment, dislike of undergoing a Pap test, or lack of time or geography-related availability of screening as one of their reasons for not being screened stated a preference for undergoing screening by self-sampling.

Conclusions  The results demonstrate a strong preference for self-sampling among never-screened and not-recently-screened women, and provides initial evidence for policymakers and researchers to address how best to integrate self-sampling HPV screening into both organized and opportunistic screening contexts.

Key Words  Cervical cancer, HPV, self-sampling

INTRODUCTION

Of women in Canada diagnosed with invasive cervical cancer, 50% have not been screened according to guidelines1. That burden is disproportionately borne by women who are immigrants or who have a low socioeconomic status2–5. Several barriers to screening have been identified, including not having access to a primary care physician, perceived absence of a need for screening6–8, and test-related emotional and physical discomfort6–8. Interventions addressing those barriers could improve uptake, reduce inequalities, and lower the burden of cervical cancer.

Oncogenic human papillomaviruses (HPVs) have been identified as a necessary cause of cervical cancer9. Screening by HPV testing is more sensitive than screening by cytology, and thus some jurisdictions, such as the Netherlands, England, Australia, and New Zealand, are phasing in HPV testing as their primary screening method10–14, and the U.S. Preventive Services Task Force recommendations now include HPV testing as a primary screening modality15.
In addition to HPV tests that use samples collected by clinicians, tests based on self-collected samples have been explored in some jurisdictions as a way to increase uptake\(^{10,16}\). Compared with cytologic tests, which are currently the primary screening modality in many jurisdictions, self-sampled HPV tests have greater sensitivity\(^{17}\), and a recent meta-analysis reported that self-sampled tests that are analyzed using polymerase chain reaction–based techniques have a sensitivity and specificity comparable to those for HPV tests using clinician-collected samples\(^{18}\).

The Canadian Task Force on Preventive Health Care recommends that women 25–69 years of age receive Pap tests every 2–3 years\(^ {19}\). However, given that health care is administered provincially, each jurisdiction implements its own guidelines and cancer prevention programs\(^ {20}\). Many provinces have implemented organized screening programs, and some are also now moving toward screening that, instead of cytology, uses HPV tests with clinician-collected samples\(^ {20}\). At least one province, Manitoba, is moving toward integrating HPV testing with self-collected samples. A recent pilot study within CervixCheck, the Manitoba organized cervical cancer screening program, found that participation increased when self-sample HPV tests were sent to women who had not responded to screening reminder letters\(^ {21}\).

Quebec is the 2nd most populous province in Canada\(^ {22}\), and the only one in which cervical cancer screening is conducted completely opportunistically\(^ {23}\). In Quebec, screening is recommended every 2–3 years for women 21–65 years of age\(^ {23}\). A recent study reported that, of women residing in the greater Montreal metropolitan area (where half the Quebec population resides), 14% had never been screened, and 12% had not recently been screened, placing them at higher risk of a diagnosis of invasive cancer\(^ {5}\). Consistent with other studies\(^ {4,5}\), that risk is most pronounced among recent immigrants, 44% of whom had never been screened\(^ {5}\). Interventions involving self-collected samples could be a promising avenue to increase HPV screening uptake not only among women who have never been screened, but also among those who have been screened at longer-than-optimal intervals.

The acceptability of self-sampling as an HPV screening modality for women in Quebec has not previously been investigated. To guide the development of cervical cancer screening interventions, we assessed

- preferred sample collection options,
- sampling preferences according to previous screening behaviours, and
- preference for self-sampled screening tests among women not screened according to guidelines, as a function of their reasons for not being screened.

**METHODS**

**Data Collection**

Data were collected in 2016 as part of a study designed to assess the acceptability of several health-promoting activities among residents on the Island of Montreal. We used a recognized polling firm to create an online survey (available in English and French) offered to an existing panel of Internet users who regularly participate in Web-based surveys. The participants were initially recruited to the panel in a probabilistic sampling approach conducted by telephone. Invitations were sent to 2956 potential participants in total, and 1183 male and female participants completed the entire survey. Panel members accessed the survey at a secured Web site where a full institutional consent form could be read before the survey began. Our analysis included data from female participants between the ages of 21 and 65 years who had not had a hysterecomy and who had provided answers to survey questions about their screening history, screening interval, and screening preferences (\( n = 526\)). Weights were applied to better represent the general population in terms of age, first language, educational attainment, and living alone (weighted \( n = 574,392\)). Because it was not within the scope of this pilot project to produce sampling weights in addition to population weights, we present unweighted estimates that provide realistic confidence intervals, together with weighted point estimates.

**Outcomes**

The primary outcome of interest was women’s preference for cervical cancer screening by self-sample kit rather than by standard clinician sampling during a clinic visit. That outcome was measured using the question “If an easy-to-use kit was available to do the screening test at home, would you prefer this option rather than having the Pap test (test used to screen for cervical cancer) done in a health centre by a professional?” Response options were “yes,” “no,” and “I don’t know/prefer not to answer.” We assessed that outcome overall, according to previous screening behaviours, and according to reasons for not being screened (among women who had never been screened or who had not been screened in the preceding 3 years).

**Covariates**

The survey additionally requested information about previous screening behaviours. Women who reported never being screened were considered “never screened.” Women who reported not being screened in the preceding 3 years, but who reported being screened in their lifetime, were considered “not screened according to guidelines”\(^ {23}\). Several sociodemographic characteristics were collected in the survey or were available because of membership in the online panel. Characteristics assessed in relation to the outcome included age, immigrant status, place of birth, family income, and educational attainment. Four categories were used to describe age (21–34, 35–44, 45–54, and 55 years of age and older). Immigrant status was categorized according to place of birth (Canada; United States or Europe; other country). Annual family income was classified in 5 categories: less than $25,000, $25,000–$54,999, $55,000–$99,999, $100,000 or more, and no response provided. Educational attainment was categorized as secondary or less, college, and university. “Missing indicator” categories were used for nonresponse to survey questions eliciting education, income, birthplace, or reasons for not being screened.

Women who had never been screened or who had not been screened in the preceding 3 years were asked to select
the 3 most important reasons for not being screened, with the possible options being adopted from a similar question in the Canadian Community Health Survey\textsuperscript{24}. We created two classifications:

- Respondents who reported each reason on the list as any of their 3 reasons ("all reasons")
- Respondents who reported each reason as the most important reason for not being screened in the preceding 3 years ("primary reason")

The study protocol was approved by the research ethics committee of the Centre hospitalier de l’Université de Montréal.

**Analyses**

Chi-square statistics were calculated to assess the statistical significance of associations between sociodemographic characteristics and screening behaviours (ever vs. never, recent vs. non-recent). The proportion of women who reported a preference for self-sampling and confidence intervals—by Clopper–Pearson (exact) calculations with continuity—were generated according to sociodemographic characteristics and screening history. Weights were applied to better represent the general population in terms of age, first language, educational attainment, and living alone. Cross-tabulations of preference for self-sampling according to sociodemographic characteristics were generated separately for women who had never been screened and for women who were not screened according to guidelines. The proportion of women who reported a preference for self-sampling was calculated separately for women who had not been screened or not screened according to guidelines, according to the reported reasons for not being screened. Analyses were conducted in the SAS software application (version 9.4: SAS Institute, Cary, NC, U.S.A.).

**RESULTS**

The analytic sample consisted of 526 women (weighted \( n = 574,392 \)). In weighted analyses, 15% of women overall reported never having been screened, and 14% reported not having been screened in the preceding 3 years; 71% had been screened according to guidelines (Table i). Compared with women who had been screened in their lifetime, those who had never been screened were more likely to be younger, to have a lower income, and to be born outside of Canada (Table i). Compared with women who had been screened in the preceding 3 years, those who had been screened in their lifetime, but not in the preceding 3 years, were older and had a lower income.

Overall, 68% of women reported that participating in screening by self-sampling at home would be their preferred screening modality compared with screening by a professional in a clinical setting (Table ii). Of women who had never been screened, 66% reported that self-sampling would be a preferable screening method. Of women who had not been screened in the preceding 3 years, but who had been screened in their lifetime, 82% reported that self-sampling would be a preferable screening modality. Of women who had been screened according to guidelines, the proportion was 66%.

Of women who had never been screened, preference for self-sampling varied with certain demographic characteristics (Table ii). However, because of small sample sizes, confidence intervals for all estimates are wide. Compared with women born in other countries (51%), greater proportions of women born in Canada (76%) or in the United States or Europe (77%) reported a preference for self-sampling. Of women who had not recently been screened, an even smaller proportion of women who had been born outside of Canada, the United States, or Europe reported a preference for self-sampling (44% vs. 84% for those born in Canada and vs. 90% for those born in the United States or Europe). Among women who had never been screened, differences in screening preferences were observed in terms of household income, with 47% of women in the lowest income category and 78% of those in the highest income category reporting a preference for HPV screening by self-sampling. Differences in screening preferences were not observed according to educational attainment in any screening history category.

Among women who had not been screened or not screened according to guidelines (\( n = 113 \), weighted \( n = 124,426 \)), we assessed preference for self-sampling by the reported reasons for not being screened in the preceding 3 years (Table iii). All women who reported, as one of the 3 most important reasons for not being screened, a lack of availability in the region or at the time it was necessary, a communication or language issue, immobility because of health problems, or fear and embarrassment indicated a preference to undergo screening by self-sampling (100%). Almost all women who reported, as one of the 3 most important reasons for not being screened, that they did not like undergoing cervical screening indicated a preference for screening by self-sampling (95%). Of women who indicated that time constraint was the most important reason for not being screened, 75% reported that they would prefer to be screened by self-sampling.

**DISCUSSION AND CONCLUSIONS**

Our study addresses the lack of literature about the self-sampling preferences of women for HPV testing in an opportunistic screening setting in which screening is offered free of charge in a publicly financed health care system—a critical step toward informing the development of potential interventions. We found that 68% of all women surveyed would prefer screening by self-sampling, with a greater proportion of women who have not been screened recently, but who have been screened sometime during their life, expressing a preference for self-sampling (82%). Of women born outside of Canada, the United States, and Europe, the preference for self-sampling ranged from 44% to 64%. Nearly all women (95%–100%) who reported fear or embarrassment, not liking undergoing a Pap test, or lack of time or geography-related unavailability of screening as one of their reasons for not being screened stated a preference for undergoing screening by self-sampling.

Our findings are consistent with those from international studies. A recent meta-analysis of thirty-seven studies, synthesizing data from 24 countries and 18,516 participants, showed that 97% of women (95%–98%) found...
TABLE I  Participant characteristics by history of screening for cervical cancer, Montreal, 2016 (weighted \( n = 574,392 \))

| Characteristic | Screening status | (n) | (%) | (n) | (%) | (n) | (%) | (n) | (%) | (n) | (%) |
|---------------|-----------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
|               | All             |     |     |     |     |     |     |     |     |     |     |
|               | Never           |     |     |     |     |     |     |     |     |     |     |
|               | Recently         |     |     |     |     |     |     |     |     |     |     |
|               | Missing         |     |     |     |     |     |     |     |     |     |     |

|               | Overall         | 574,392 | 100 | 87,140 | 15 | 82,028 | 14 | 405,224 | 71 | 40,373 | 7 |
|---------------|-----------------|---------|-----|---------|----|---------|----|---------|----|---------|---|
|               | Weighted        | 526     | 100 | 53      | 10 | 89      | 17 | 384     | 73 | 35      |   |
|               | Unweighted      | 526     | 100 | 53      | 10 | 89      | 17 | 384     | 73 | 35      |   |

|               | Age group       |         |     |         |     |         |     |         |     |         |     |
|---------------|-----------------|---------|-----|---------|----|---------|----|---------|----|---------|---|
|               | 21–34 Years     |         |     |         |     |         |     |         |     |         |     |
|               | Weighted        | 200,394 | 35  | 44,807  | 51 | 15,324  | 19 | 140,263 | 35 | 25,781  |   |
|               | Unweighted      | 102     | 19  | 16      | 30 | 9       | 10 | 77      | 20 | 12      |   |
|               | 35–44 Years     |         |     |         |     |         |     |         |     |         |     |
|               | Weighted        | 126,493 | 22  | 23,531  | 27 | 17,419  | 21 | 85,542  | 21 | 4,166   |   |
|               | Unweighted      | 138     | 26  | 17      | 32 | 17      | 19 | 104     | 27 | 7       |   |
|               | 45–54 Years     |         |     |         |     |         |     |         |     |         |     |
|               | Weighted        | 128,673 | 22  | 8,811   | 10 | 19,041  | 23 | 100,820 | 25 | 4,856   |   |
|               | Unweighted      | 137     | 26  | 11      | 21 | 22      | 25 | 104     | 27 | 8       |   |
|               | ≥55 Years       |         |     |         |     |         |     |         |     |         |     |
|               | Weighted        | 118,830 | 21  | 9,989   | 11 | 30,242  | 37 | 78,598  | 19 | 5,568   |   |
|               | Unweighted      | 149     | 28  | 9       | 17 | 41      | 46 | 99      | 26 | 8       |   |

|               | Education       |         |     |         |     |         |     |         |     |         |     |
|---------------|-----------------|---------|-----|---------|----|---------|----|---------|----|---------|---|
|               | Secondary or less|      |     |         |     |         |     |         |     |         |     |
|               | Weighted        | 177,302 | 31  | 33,206  | 38 | 33,665  | 41 | 110,430 | 27 | 9,482   |   |
|               | Unweighted      | 94      | 18  | 14      | 26 | 20      | 22 | 60      | 16 | 5       |   |
|               | College         |         |     |         |     |         |     |         |     |         |     |
|               | Weighted        | 115,148 | 20  | 20,867  | 24 | 16,215  | 20 | 78,066  | 19 | 5,610   |   |
|               | Unweighted      | 117     | 22  | 14      | 26 | 22      | 25 | 81      | 21 | 6       |   |
|               | University      |         |     |         |     |         |     |         |     |         |     |
|               | Weighted        | 259,572 | 45  | 32,350  | 37 | 32,147  | 39 | 195,075 | 48 | 25,279  |   |
|               | Unweighted      | 307     | 58  | 24      | 45 | 47      | 53 | 236     | 61 | 24      |   |
|               | Missing         |         |     |         |     |         |     |         |     |         |     |
|               | Weighted        | 22,368  | 4   | 716     | 1  | 0       | 0   | 21,653  | 5  | 0       |   |
|               | Unweighted      | 8       | 2   | 1       | 2  | 0       | 0   | 7       | 2  | 0       |   |

|               | Annual household income | <0.0001 | 0.01 |
|---------------|-------------------------|---------|-----|
|               | <$25,000                |         |     |
|               | Weighted                | 67,841  | 11  | 25,038 | 29 | 16,069  | 20 | 26,733  | 7  | 9,573   |   |
|               | Unweighted              | 37      | 7   | 11     | 21 | 11      | 12 | 15      | 4  | 4       |   |
|               | $25,000–$54,999         |         |     |         |     |         |     |         |     |         |     |
|               | Weighted                | 136,696 | 24  | 25,083 | 29 | 15,508  | 19 | 96,105  | 24 | 5,787   |   |
|               | Unweighted              | 117     | 22  | 21     | 40 | 17      | 19 | 79      | 21 | 6       |   |
|               | $55,000–$99,999         |         |     |         |     |         |     |         |     |         |     |
|               | Weighted                | 131,693 | 23  | 15,818 | 18 | 17,372  | 21 | 98,503  | 24 | 9,285   |   |
|               | Unweighted              | 133     | 25  | 7      | 13 | 18      | 20 | 108     | 28 | 8       |   |
|               | ≥$100,000               |         |     |         |     |         |     |         |     |         |     |
|               | Weighted                | 106,105 | 18  | 6,557   | 8  | 13,090  | 16 | 86,456  | 21 | 3,438   |   |
|               | Unweighted              | 129     | 25  | 7      | 13 | 19      | 21 | 103     | 27 | 7       |   |
|               | No response             |         |     |         |     |         |     |         |     |         |     |
|               | Weighted                | 132,054 | 23  | 14,642 | 17 | 19,987  | 24 | 97,425  | 24 | 12,288  |   |
|               | Unweighted              | 110     | 21  | 7      | 13 | 24      | 27 | 79      | 21 | 10      |   |
HPV screening by self-sampling to be acceptable, and 59% (48%–69%) preferred self-collected to physician-collected samples. Randomized studies of screening non-attenders have similarly shown that women are more likely to participate in screening using self-sampled tests than to respond to an invitation to receive screening from a medical professional. In a meta-analysis of sixteen randomized studies, Verdoord et al. found, in intention-to-treat analyses, that pooled participation in screening was 23.6% for women sent a self-sampled test for HPV and 10.3% for women who were sent reminder letters to be screened. Different results were observed depending on the method used to deliver self-sampled tests, with screening participation being only 9.7% among women who were asked to opt in to receive a self-sampling kit.

The results from the current study are also consistent with other Canadian studies reporting that self-sampling for HPV is either an acceptable or a preferable screening modality for women from vulnerable groups. In a study of urban-dwelling Muslim women in Ontario, researchers observed that more than half expressed a preference for screening by self-sampling than by clinical sampling, citing convenience and privacy as barriers that self-sampling overcomes. That finding is of particular relevance to our results because 28% of recent immigrants to Quebec self-report as being Muslim and a recent study in Montreal showed that 37% of women from Africa—the geographic origin for many Muslim immigrants—have never been screened for cervical cancer. Lofters et al. also noted that, with respect to barriers to participating in self-sampling for HPV testing, women in their study expressed concern that they might not obtain a sufficient sample. That concern was similar to concerns expressed by participants in other studies of Ontario women and should be addressed as a part of the development of any intervention using self-sampling.

Just as international studies have reported, randomized studies in Canada have observed that, for increasing screening uptake, sending a self-sampling kit is more effective than sending an invitation letter. One trial, conducted in rural southwestern Ontario, found that 35% of women in the self-sampling arm, 15% of women in the invitation arm, and 8.5% of women in the standard-of-care (opportunistic screening) arm participated in screening. Additionally, 80% of women in the self-sampling arm reported that they would likely participate in screening by self-sampling in the future. A randomized study of women living in the Robinson–Superior Treaty First Nations also reported somewhat higher screening uptake when women were offered screening by self-collected test than by Pap test (20.6% vs. 16% in an intention-to-treat analysis) again indicating that self-collection can be an effective tool in increasing screening among vulnerable women. A community-based cohort study in Newfoundland and Labrador, where population-level screening rates were as low as 43% in 2007–2009, reported that increases in screening participation were statistically significantly greater in communities where screening by self-sampled test was offered (15.2%) than in communities where only education (2.9%) or no intervention (8.5%) was offered.

Consistent with studies conducted in organized screening contexts, studies examining the use of self-sampled screening tests in opportunistic settings such as those in Switzerland, Australia, the United States, and Argentina have reported similar results. Most of the studies have shown that distributing self-sampling kits increases screening uptake, including among vulnerable women. However, one study in Switzerland indicated that uptake...
TABLE II  Proportion of women who prefer HPV self-sampling according to screening history and sociodemographic characteristics, Montreal, 2016 (weighted \( n = 574,392 \))

| Characteristic           | Screening status | Overall                  |                     |                     |                     |                     |                     |
|--------------------------|------------------|--------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
|                          |                  | (n)c (%) 95% Cl\[d\]     | (n) (%) 95% Cl\[d\] | (n) (%) 95% Cl\[d\] | (n) (%) 95% Cl\[d\] |
|                          |                  | Weighted                 | Unweighted          | Weighted            | Unweighted          |
|                          |                  | 391,204 68              | 358 68 64 to 72    | 57,508 66           | 36 68 54 to 80     |
|                          |                  | 66,917 82              |                     |                     | 77 87 78 to 93     |
|                          |                  | 266,778 66             |                     |                     | 245 64 59 to 69    |
| Overall                  |                  |                          |                     |                     |                     |                     |
| Age group                |                  |                          |                     |                     |                     |                     |
| 21–34 Years              |                  |                          |                     |                     |                     |                     |
| Weighted                 |                  | 122,454 61              | 63 62 52 to 71     | 28,801 64           | 9 56 30 to 80      |
| Unweighted               |                  | 9,099 40               | 6 67 30 to 93      | 16,848 97           | 19 86 65 to 97     |
| 35–44 Years              |                  |                          |                     |                     |                     |                     |
| Weighted                 |                  | 92,565 73              | 93 68 59 to 76     | 17,408 74 57 to 96 | 16 94 71 to 100    |
| Unweighted               |                  | 68 65 55 to 74         |                     |                     | 67 64 54 to 74     |
| 45–54 Years              |                  |                          |                     |                     |                     |                     |
| Weighted                 |                  | 89,645 70              | 89 68 49 to 79     | 4,999 57            | 16,865 89          |
| Unweighted               |                  | 67,781 67              |                     |                     | 58,308 68          |
| 55 Years                 |                  |                          |                     |                     |                     |                     |
| Weighted                 |                  | 86,538 73              | 86,538 73          | 87,553 62           | 16 94 71 to 100    |
| Unweighted               |                  | 53,134 68              |                     |                     | 62 63 52 to 72     |
| Education                |                  |                          |                     |                     |                     |                     |
| Secondary or less        |                  |                          |                     |                     |                     |                     |
| Weighted                 |                  | 126,675 71             | 66 70 60 to 79     | 24,842 75           | 18 90 68 to 99     |
| Unweighted               |                  | 25,662 76              |                     |                     | 93 65 52 to 77     |
| College                  |                  |                          |                     |                     |                     |                     |
| Weighted                 |                  | 73,417 64              | 79 68 58 to 76     | 11,398 55           | 21 95 77 to 100    |
| Unweighted               |                  | 15,644 96              |                     |                     | 46,374 59          |
| University               |                  |                          |                     |                     |                     |                     |
| Weighted                 |                  | 176,030 68             | 206 67 62 to 72    | 20,551 64           | 38 81 67 to 91     |
| Unweighted               |                  | 129,868 67             |                     |                     | 151 64 58 to 70    |
| Missing                  |                  |                          |                     |                     |                     |                     |
| Weighted                 |                  | 15,081 67              | 15,081 67          | 27,104 90           | 19 86 65 to 97     |
| Unweighted               |                  | 14,365 66              |                     |                     | 62 63 52 to 72     |
| Annual household income  |                  |                          |                     |                     |                     |                     |
| <$25,000                 |                  |                          |                     |                     |                     |                     |
| Weighted                 |                  | 35,867 53              | 98 74 65 to 81     | 11,772 47           | 35 91 40 to 50     |
| Unweighted               |                  | 8,066 50               |                     |                     | 16,028 60          |
| $25,000–$54,999          |                  |                          |                     |                     |                     |                     |
| Weighted                 |                  | 94,491 69              | 80 68 59 to 77     | 18,231 73           | 14,539 94          |
| Unweighted               |                  | 14,539 94              |                     |                     | 61,719 64          |
| $55,000–$99,999          |                  |                          |                     |                     |                     |                     |
| Weighted                 |                  | 100,967 77             | 100,967 77         | 10,434 66           | 17,059 98          |
| Unweighted               |                  | 73,473 75              |                     |                     | 73,473 75          |
| ≥$100,000                |                  |                          |                     |                     |                     |                     |
| Weighted                 |                  | 68,992 64              | 85 66 57 to 74     | 5,108 78            | 11,318 86          |
| Unweighted               |                  | 51,665 60              |                     |                     | 63,891 66          |
| No response              |                  |                          |                     |                     |                     |                     |
| Weighted                 |                  | 91,786 70              | 85 66 57 to 74     | 11,960 82           | 15,934 80          |
| Unweighted               |                  | 63,891 66              |                     |                     | 63,891 66          |

\( \text{CI} \) = \text{Confidence Interval}
was similar among women offered self-sampled screening and women offered cytologic screening, potentially because of already-elevated screening rates in Switzerland. Although trials investigating the use of self-sampled HPV screening tests have, up to now, focused on screening non-attendees, it is interesting to note that most women in the present study stated a preference for self-sampled screening tests regardless of their prior screening behaviour. Preference for self-sampled screening tests was, in fact, highest among women who had been screened, but not in the preceding 3 years. A recent study in the Netherlands comparing performance for high-risk HPV screening between self-sampled and physician-sampled tests for screening attendees reported 98.6% concordance between the sampling techniques for the prevalence of high-risk HPV. The use of self-sampled HPV screening tests carries potential advantages in terms of resource use and cost savings. Thus, as improvements in self-sampling devices and HPV tests make self-sampled and clinician-sampled HPV tests increasingly similar in terms of performance, it is possible that self-sampled tests could, in some contexts, ultimately replace clinician-sampled tests for population-level screening.

Even with population-level HPV vaccination programs, experts recommend that population-level screening programs be continued for the foreseeable future. Additionally, in Quebec, HPV vaccine coverage is lower in geographic areas with higher concentrations of immigrants and of people with lower educational attainment. Given that women who are immigrants and who have lower educational attainment have been shown to have lower screening rates, women from certain social groups are both less likely to be vaccinated and less likely to be screened by conventional methods. Screening by self-sampled HPV tests might provide a means to reach some of those groups.

More research is necessary to assess the optimal method for distributing HPV test kits, within organized and opportunistic screening settings alike. Frequently-used methods include clinic distribution, direct mailing, or opt-in mailing. More work should also be done to assess efficacious ways to provide pertinent information which ensures that women are comfortable with self-collection and their ability to collect a testable sample.

The present study has some limitations. We used an existing online panel of willing participants from which to draw our sample. By definition, that group includes only individuals who use the Internet. In 2016, 86% of adults residing in Quebec used the Internet every day. Still, the women in our sample might be different from those in the general population. However, after weighting the sample, we observed only slight differences in the distribution of respondent characteristics in our sample compared with those observed in a recent study using data from the Canadian Community Health Survey. The proportions of participants reporting each outcome were similar (never-screened: 15% current sample vs. 14% in Datta et al.; no recent screening: 14% current sample vs. 12% in Datta et al.). The proportion born in Canada was also similar in the two samples (79% vs. 77% respectively). However, the proportion who reported postsecondary education appeared different (65% vs. 72% respectively). Notably, both telephone- and Internet-based surveys rarely included the most vulnerable women, who, in Canada, might be women who speak neither English nor French, the two languages in which our survey was available. Additionally, although we were able to capture information about several important sociodemographic indicators, our survey was limited with respect to the amount of health-related data it collected. Another limitation is the amount of education about self-sampling that survey responders received. Other than the information provided in the question, no additional information was available. Some studies have shown that sampling education increases the likelihood of women finding self-sampling to be acceptable. However, the association between sampling education and

**TABLE II** Continued

| Characteristic   | Screening status |          |          |          |          |          |
|------------------|------------------|----------|----------|----------|----------|----------|
|                  | All              | (%)      | 95% CI   | Never    | (%)      | 95% CI   | Not recently | (%)      | 95% CI   | Recently | (%)      | 95% CI   |
| Birthplace       | (n)c             | (%)      | 95% CI   | (n)      | (%)      | 95% CI   | (n)        | (%)      | 95% CI   | (n)      | (%)      | 95% CI   |
| Canada           |                  |          |          |          |          |          |            |          |          |          |          |          |
| Weighted         | 316,074          | 70       |          | 37,124   | 76       |          | 58,993     | 90       |          | 219,957  | 65       |          |
| Unweighted       | 308              | 66       | 55       | 26       | 79       | 51       | 71         | 89       | 80        | 95       | 211      | 64       | 58 to 69  |
| United States or Europe |          |          |          |          |          |          |            |          |          |          |          |          |
| Weighted         | 25,420           | 75       |          | 2,937    | 77       |          | 1,496      | 84       |          | 20,987   | 74       |          |
| Unweighted       | 24               | 71       | 53 to 85 | 3        | 60       | 15 to 95 | 3          | 75       | 19 to 99  | 18       | 72       | 51 to 88  |
| Other country    |                  |          |          |          |          |          |            |          |          |          |          |          |
| Weighted         | 49,709           | 56       |          | 17,447   | 51       |          | 6,428      | 44       |          | 25,833   | 64       |          |
| Unweighted       | 26               | 55       | 40 to 70 | 7        | 47       | 21 to 73 | 3          | 60       | 15 to 95  | 16       | 59       | 39 to 78  |

a Women reported being screened in their lifetime, but not in the preceding 3 years.
b Women reported being screened in the preceding 3 years.
c “Unweighted” row has missing values for screening status, screening interval, or self-sampling acceptability (n = 35).
d Clopper–Pearson (exact) confidence interval with continuity correction.
HPV = human papillomavirus; CI = confidence interval.
TABLE III  Proportion of women who prefer HPV self-sampling according to screening history and reasons for not being screened in the preceding 3 years, Montreal, 2016 (weighted n = 124,426)

| Reason | Screening status | All 3 reasons given<sup>a</sup> | Primary reason given<sup>b</sup> |
|--------|------------------|---------------------------------|--------------------------------|
|        |                  | All (n) (%) | Never (n) (%) | Not recently (n) (%) | All (n) (%) | Never (n) (%) | Not recently (n) (%) |
| I have not had the time to take care of it | Weighted | 36,432 74 | 21,849 71 | 14,583 80 | 13,714 75 | 8,019 84 | 5,694 65 |
|        | Unweighted | 38 79 | 17 77 | 21 81 | 17 74 | 8 80 | 9 69 |
| It is not necessary in my opinion | Weighted | 37,719 79 | 18,711 66 | 19,008 96 | 12,360 88 | 6,522 80 | 5,837 100 |
|        | Unweighted | 32 82 | 12 67 | 20 95 | 14 93 | 5 83 | 9 100 |
| I did not know where to go or I was misinformed | Weighted | 34,430 76 | 26,959 72 | 7,470 93 | 10,832 59 | 8,756 81 | 2,076 19 |
|        | Unweighted | 23 77 | 14 70 | 9 90 | 5 56 | 3 50 | 2 67 |
| It is not necessary according to my doctor | Weighted | 23,667 73 | 13,301 68 | 10,366 81 | 17,096 68 | 11,473 67 | 5,622 33 |
|        | Unweighted | 22 73 | 7 64 | 15 79 | 14 67 | 5 56 | 9 75 |
| The wait time is too long | Weighted | 17,010 64 | 3,208 100 | 13,802 81 | 9,457 76 | 1,236 48 | 8,221 84 |
|        | Unweighted | 20 74 | 4 57 | 16 80 | 10 77 | 2 67 | 8 80 |
| I do not like undergoing this test | Weighted | 17,487 95 | 3,357 100 | 14,130 94 | 4,486 100 | 1,448 100 | 3,037 100 |
|        | Unweighted | 20 95 | 3 100 | 17 94 | 6 100 | 1 100 | 5 100 |
| Too many personal or family responsibilities | Weighted | 22,705 88 | 8,308 88 | 14,397 89 | 9,344 100 | 0 0 | 9,344 100 |
|        | Unweighted | 14 82 | 3 75 | 11 85 | 5 100 | 0 0 | 5 100 |
| The service was not available when required | Weighted | 9,267 100 | 0 0 | 9,267 100 | 2,865 100 | 0 0 | 2,865 100 |
|        | Unweighted | 12 100 | 0 0 | 12 100 | 4 100 | 0 0 | 4 100 |
| Because of fear or embarrassment | Weighted | 25,514 100 | 19,725 100 | 5,788 100 | 13,562 100 | 9,762 100 | 3,799 100 |
|        | Unweighted | 12 100 | 7 100 | 5 100 | 6 100 | 3 100 | 3 100 |
| The service was not available in the region | Weighted | 826 100 | 0 0 | 826 100 | 0 0 | 0 0 | 0 0 |
|        | Unweighted | 2 100 | 0 0 | 2 100 | 0 0 | 0 0 | 0 0 |
| I cannot leave my home because of a health problem | Weighted | 2,386 100 | 716 100 | 1,670 100 | 2,386 100 | 716 100 | 1,670 100 |
|        | Unweighted | 3 100 | 1 100 | 2 100 | 3 100 | 1 100 | 2 100 |
| The cost of the test is too high | Weighted | 2,164 52 | 2,164 52 | 0 0 | 0 0 | 0 0 | 0 0 |
|        | Unweighted | 2 67 | 2 67 | 0 0 | 0 0 | 0 0 | 0 0 |
HPV self-sampling acceptability is not consistent across studies. Determining how much of an effect the lack of specific education about sampling had on our findings is therefore difficult.

Most women in the present study, set in Montreal and including women from groups who have historically had low screening uptake, stated a preference for cervical cancer screening by self-sampled test. Additionally, more than half the women who had not been screened in the preceding 3 years and who reported reasons for not being screened that could be addressed by the use of self-collected samples, stated a preference for screening by self-sampling. Future studies should assess the efficacy of various methods of providing self-sampled HPV tests to women. Policymakers and researchers should also consider whether self-sampled tests should be offered primarily to never- or infrequently-screened women, or be rolled out to all eligible women, and how best to integrate screening by self-sampled HPV tests into both organized and opportunistic screening contexts.

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CONFLICT OF INTEREST DISCLOSURES
We have read and understood Current Oncology’s policy on disclosing conflicts of interest, and we declare that we have none.

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