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Complex role of digital health literacy in awareness and use of digital sexually transmitted and blood-borne infections testing: a structural equation modelling analysis of the 2022 GetCheckedOnline survey

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ABSTRACT

Background Although digital health literacy (DHL) is recognised as a determinant of access to digital sexually transmitted and blood-borne infection (STBBI) testing, empirical evidence about its contribution to access disparities remains limited. We applied multidimensional DHL measures to examine inequities in awareness and use of GetCheckedOnline, British Columbia's (BC) publicly funded digital STBBI testing service.

Methods We analysed data from GetCheckedOnline's 2022 community survey of English-speaking BC residents aged ≥16 years who were sexually active in the past year. Outcomes were awareness and use of GetCheckedOnline (yes/no). DHL was measured using latent factors from the eHealth Literacy Scale: Information Navigation, Resource Appraisal and Confidence in Use. Structural equation modelling (SEM) was used to estimate associations and mediation pathways between DHL, sociodemographic characteristics and service outcomes. Model fit was assessed using standard SEM indices.

Results Among 1657 respondents (mean age 33 years, SD 11.77), Information Navigation was positively associated with awareness (β=0.162, p<0.001) and use (β=0.063, p=0.020) of GetCheckedOnline. Confidence in Use was positively associated with awareness (β=0.206, p=0.014) and use (β=0.115, p=0.020). In contrast, Resource Appraisal was negatively associated with awareness (β=−0.263, p=0.006) and use (β=−0.150, p=0.010). DHL factors mediated the effects of age, income, education and digital access on both outcomes.

Conclusions DHL operates as a multidimensional and socially patterned determinant of access to digital STBBI testing services. While information navigation and confidence in use facilitate access, higher resource appraisal may reduce use, potentially reflecting concerns about service fit, privacy or trust. Findings highlight the need for digital interventions that are not only accessible but also contextually relevant, trusted and responsive to the needs of diverse users.

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ Digital health literacy (DHL) is recognised as a key determinant of access to digital sexually transmitted and blood-borne infection (STBBI) testing, yet its role in shaping awareness and use remains poorly understood. Most studies rely on unidimensional measures that may obscure how different DHL skills influence engagement.

WHAT THIS STUDY ADDS

⇒ This study is the first to apply a multidimensional DHL framework to examine awareness and use of a publicly funded digital STBBI testing service. We found that Information Navigation and Confidence in Use were positively associated with awareness and use, while higher Resource Appraisal was inversely associated, suggesting that more critical users may mistrust digital STBBI testing or perceive misalignment between their needs and service offerings. DHL also mediated disparities in awareness and use by education, income, digital access and age on testing behaviours.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ Findings underscore the importance of designing digital STBBI testing services that are not only accessible but also trusted, contextually relevant and tailored to users' needs. Policy and programme interventions should address structural determinants of DHL and incorporate co-designed, community-based models to ensure equitable uptake.

INTRODUCTION

Digital interventions for sexually transmitted and blood-borne infection (STBBI) testing have emerged as low-barrier alternatives to clinic-based services, offering timely and cost-effective access,

particularly for asymptomatic individuals.[1–3] They have also been promoted as inherently more equitable testing alternatives.[4] Yet, recent evidence shows their uptake often mirrors existing social inequities.[5 6] Populations disproportionately affected by STBBIs, including men who have sex with men, lower-income and racialised communities, often benefit the least from these services.[5 6]

Digital health literacy (DHL)—the ability to access, understand, appraise and apply digital health information for decision-making—has been identified as a key driver of observed uptake of these digital testing services.[5 7] More broadly, DHL is increasingly recognised as a 'super-determinant' of health, shaping access to healthcare, employment and other social services relevant for health outcomes.[8] Yet, beyond a general recognition of DHL as a determinant of health, empirical evidence of its role in uptake of digital STBBI testing services is limited,[9] particularly regarding its role in mediating social inequities in service access and uptake.

Popular tools for measuring DHL, like the eHealth Literacy Scale (eHEALS), are often limited by their unidimensional structure, despite being grounded in multidimensional theoretical models.[7] This simplification can reduce their usefulness in guiding programme adaptations or informing public health interventions. Therefore, using a revised multidimensional DHL scale derived from the eHEALS, we reviewed data obtained from the 2022 GetCheckedOnline.com community survey.[10] The original survey assessed awareness, access and use of GetCheckedOnline.com—a publicly funded digital STBBI testing service in British Columbia (BC), Canada. GetCheckedOnline has been demonstrated to increase access to STBBI testing and treatment, especially among populations most affected by STBBIs, while relieving demands on primary care for testing.[5 11] In this study, we examined associations between latent DHL factors derived from eHEALS and both awareness and use of GetCheckedOnline. We also explored whether DHL mediated associations between sociodemographic factors and these outcomes.

METHODS

Programme and study setting

GetCheckedOnline has been operated by the BC Centre for Disease Control since 2014.[2] Available in nine communities across BC, it offers low-barrier access for individuals facing challenges with clinic-based testing due to stigma, privacy concerns, geographic distance or time constraints. Users create an account, complete a sexual risk assessment and generate a lab requisition for chlamydia, gonorrhoea, syphilis, HIV and hepatitis C testing. Specimens are submitted by users at partner laboratories, and results are accessed online. Public health nurses contact individuals with positive results to provide counselling and linkage to treatment. The service is integrated with provincial laboratory, surveillance and case management systems, with support from regional health authorities and community partners.

Study design, sampling and recruitment

This cross-sectional study complies with Strengthening the Reporting of Observational Studies in Epidemiology guidelines (online supplemental table S1) and used data from the 2022 GetCheckedOnline community survey, conducted in five communities where GetCheckedOnline expanded beyond Vancouver.[12] A non-probability sampling strategy was employed, combining online and in-person recruitment. Online recruitment included geotargeted ads, local message boards, Facebook groups and QR codes on posters in community spaces. In-person recruitment involved venue-based sampling at local events (eg, Pride parades, music festivals and harm reduction events) and snowball sampling through networks of community leaders and partner organisations. This approach enhanced the representation of historically marginalised populations likely to face STBBI testing barriers.[13] Participants could opt into a draw to win one of five US$100 Visa gift cards. Participation was voluntary, anonymous and preceded by informed consent. Eligible participants were English-speaking BC residents, aged ≥16 years and who had oral, vaginal or anal sex with at least one partner in the past year. Individuals were excluded if they had previously completed the survey or if they reported forward sortation area (FSA) codes indicating residence outside BC.

Data collection instrument

The survey was conducted between July and September 2022, with questionnaire input from a Community Advisory Board comprising individuals with lived experience of STBBI testing in BC and representatives from community organisations serving affected populations. Regional health authority partners also reviewed the instrument. The survey collected data on awareness and use of GetCheckedOnline, STBBI testing history, sexual health experiences and sociodemographic characteristics (age, gender identity, sexuality, income, education and ethnicity; online supplemental table S2). Digital access was assessed through questions about ease of going online and frequency of social media use. DHL was measured using the validated eight-item eHEALS, with responses recorded on a five-Likert scale ('strongly disagree' to 'strongly agree').[7] In previous work by our research team (unpublished report), we derived three latent factors from the eHEALS: Information Navigation (skills for locating and accessing online health resources), Resource Appraisal (ability to critically evaluate digital content in relation to personal health goals) and Confidence in Use (self-efficacy in applying online health information to improve health outcomes).[10]

Analytic dataset and variables

The analytic sample included all respondents with FSAs indicating residence in BC, as well as those with missing FSAs who were assumed to reside in BC. Primary outcomes were self-reported awareness (having heard of the service before the survey) and self-reported use of GetCheckedOnline for STBBI testing (ever testing on GetCheckedOnline). Both outcomes were coded as binary variables (yes/no). The primary exposure, DHL, was assessed using the three derived eHEALS factors: Information Navigation, Resource Appraisal and Confidence in Use. Covariates included age, gender identity, sexual orientation, education, household income, ethnicity, health authority region (derived from participants' reported FSA codes), digital access (ease of going online), prior barriers to STBBI testing, history of previous STBBI diagnosis, having a regular healthcare provider and recruitment method (online vs in-person). All covariates were selected based on theoretical relevance and prior literature.[5 6 14]

Data analysis

Descriptive analyses summarised the sample and compared awareness and use of GetCheckedOnline across sociodemographic subgroups. We used structural equation modelling (SEM) to assess relationships between sociodemographic variables, the three latent DHL factors and two binary outcomes: awareness and use of GetCheckedOnline. The analysis was guided by the health equity measurement framework,[14] which highlights how sociodemographic factors hierarchically shape access and

outcomes. Therefore, we specified our models according to conceptual proximity, with distal sociodemographic factors predicting more proximal material circumstances (eg, income and education), which in turn influenced the latent digital health literacy factors. The latent factors were estimated directly from the eight eHEALS items within the SEM framework (see online supplemental table S3 for factor structure). Mediation was assessed by estimating indirect effects of sociodemographic characteristics (eg, age, income, education and digital access) on the outcomes via each DHL domain. SEM allowed simultaneous estimation of direct, indirect and total effects, accounting for measurement error in the latent constructs.

Models were estimated using diagonally weighted least squares with theta parameterisation and a polychoric correlation matrix, appropriate for ordinal indicators and binary outcomes.[15] Missing data were addressed using multiple imputation (20 datasets), with parameter estimates pooled using Rubin's rules. A sensitivity analysis using listwise deletion was conducted to assess the robustness of results. Model fit was evaluated using the Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), root mean square error of approximation (RMSEA) with 90% CIs and standardised root mean square residual (SRMR), with robust (scaled) corrections applied. Fit was considered acceptable based on CFI and TLI ≥0.95, RMSEA ≤0.06 and SRMR ≤0.08.[16] All analyses were conducted in R (V.4.4.1) using the Lavaan and semTools packages.[17 18]

RESULTS

Description of participants

Overall, 1657 participants were included, with a mean age of 33 years (SD 11.77). Among these, 47.3% (n=784) identified as women, 14.5% (n=240) as gender diverse, and 30.4% (n=503) identified with racialised minority groups (table 1). Furthermore, 584 (35.2%) reported awareness of GetCheckedOnline, and among these, 324 (55.5%) reported use. Compared with the sample, individuals who were aware of GetCheckedOnline were younger (mean age 30.62 years, SD 8.57), a greater proportion identified as sexual minorities (61.1%) and reported completing a bachelor's degree or higher (36.6%). Among those reporting use of GetCheckedOnline, 63.3% identified as sexual minorities, and 36.7% reported at least a bachelor's level of education. Awareness and use of GetCheckedOnline were more prevalent among participants recruited online (60.6% of those aware and 71.9% of participants reporting use of GetCheckedOnline) and among those who reported previous STBBI diagnoses or experiencing STBBI testing barriers (69.7% of those aware and 75.3% of those reporting use).

Structural equation modelling results

The pooled structural equation modelling showed excellent fit (CFI=0.987, TLI=0.993, RMSEA=0.042, 90% CI 0.039 to 0.045, SRMR=0.045). Reported standardised coefficients (β) represent the expected SD change in outcomes per SD change in predictors. Two DHL factors, Information Navigation (β=0.162, p<0.001) and Confidence in Use (β=0.206, p=0.014), were positively associated with awareness of GetCheckedOnline (figure 1 and online supplemental material S4). These factors were also associated with use of GetCheckedOnline (Information Navigation: β=0.063, p=0.020 and Confidence in Use: β=0.115, p=0.020). Resource Appraisal was negatively associated with both awareness (β=–0.263, p=0.006) and use (β=–0.150, p=0.010). Higher income and education were positively associated with all three DHL factors. Digital access was associated with both Information Navigation (β=0.492, p<0.001) and Resource Appraisal (β=0.818, p<0.001). Older age was associated with lower Confidence in Use (β=–0.017, p<0.001) and Resource Appraisal (β=–0.008, p=0.035). Additional predictors of awareness included online recruitment (β=0.315, p<0.001), having a regular healthcare provider (β=0.078, p=0.005) and heterosexual identity (β=–0.116, p<0.001). Use of GetCheckedOnline was associated with awareness (β=0.460, p<0.001). Other significant predictors of use included prior STBBI diagnosis (β=0.082, p<0.001), digital access (β=0.135, p=0.014), online recruitment (β=0.114, p<0.001) and having a regular healthcare provider (β=–0.038, p=0.030).

Mediation analysis

Mediation models identified several significant indirect and total effects of sociodemographic predictors on awareness and use of GetCheckedOnline, operating through DHL factors (table 2). Age was inversely associated with awareness via Confidence in Use (β=–0.002, p=0.034, 90% CI –0.004 to –0.001) and with testing both directly and through awareness. Digital access was positively associated with awareness and testing through Information Navigation (β=0.098, p=0.002 for awareness), but inversely associated with outcomes via Resource Appraisal, including a negative indirect effect on awareness (β=–0.174, p=0.013) and testing (β=–0.111, p=0.018). Education was positively associated with both awareness and testing through Confidence in Use and Information Navigation. The indirect effect of education on awareness occurred in Confidence in Use (β=0.044, p=0.032) and Information Navigation (β=0.022, p=0.014). Higher income increased awareness and testing through each of the DHL mediators, including a significant indirect effect via Confidence in Use (β=0.03, p=0.033 for awareness) and Information Navigation (β=0.022, p=0.002). Notably, income also had negative indirect effects via Resource Appraisal, mirroring findings for digital access (online supplemental material S5).

Total effects were consistent with these indirect pathways: education was positively associated with awareness (β=0.037, p=0.005) and testing (β=0.017, p=0.020), and income had a significant total effect on testing (β=0.103, p=0.019). Additionally, identifying as a woman was associated with lower GetCheckedOnline awareness in total effect models (β=–0.088, p=0.013), though no significant mediated paths were observed.

Sensitivity analysis

Sensitivity analyses showed a robust positive association between Information Navigation and awareness of GetCheckedOnline (β=0.090, p=0.022). In contrast, Resource Appraisal and Confidence in Use were not significantly associated with awareness. For the use of GetCheckedOnline, no DHL factor showed significant direct effects (table 3). However, with only 653/1657 (39.4%) retained from the main analysis, these results are less reliable.

DISCUSSION

In this study of 1657 participants in selected communities where GetCheckedOnline is available, 35.2% reported awareness of the service, and among these, 55.5% had used it. SEM showed that two DHL factors, Information Navigation and Confidence in Use, were positively associated with both awareness and use. Contrastingly, Resource Appraisal was negatively associated with these outcomes. Mediation analyses showed that all DHL factors significantly mediated associations between age, education,

Table 1 Sample characteristics by awareness and use of GetCheckedOnline—2022 GetCheckedOnline Survey (n=1657)

	Overall	Aware of GetCheckedOnline	Used GetCheckedOnline
Characteristic	**n=1657 (100%)**	**n=584 (35.2%)**	**n=324 (55.5%)***
Age in years (mean (SD))	33 (11.77)	30.62 (8.57)	30.16 (6.80)
Gender			
Man	470 (28.4)	116 (28.4)	96 (29.6)
Woman	784 (47.3)	237 (40.6)	115 (35.5)
Gender diverse†	240 (14.5)	117 (20.0)	72 (22.2)
Not disclosed	163 (9.8)	64 (11)	41 (12.7)
Ethnicity			
Racialised minority	503 (30.4)	213 (36.5)	121 (37.3)
White	892 (53.8)	267 (45.7)	121 (37.3)
Not disclosed	262 (15.8)	104 (17.8)	64 (19.8)
Sexuality			
Non-heterosexual	820 (49.5)	357 (61.1)	205 (63.3)
Heterosexual only	653 (39.4)	161 (27.6)	77 (23.8)
Not disclosed	184 (11.1)	66 (11.3)	42 (13)
Education			
High school or less	415 (25.0)	126 (21.6)	64 (19.8)
Post-secondary education	495 (29.9)	172 (29.5)	97 (29.9)
Bachelor's degree or higher	534 (32.2)	214 (36.6)	119 (36.7)
Not disclosed	213 (12.9)	72 (12.3)	44 (13.6)
Income per annum (USD)			
<20 000	389 (23.5)	88 (15.1)	41 (12.7)
20 000–39 000	318 (19.2)	124 (21.2)	63 (19.4)
40 000–59 000	284 (17.1)	123 (21.1)	70 (21.6)
60 000–79 000	178 (10.7)	85 (14.6)	58 (17.9)
80 000 or more	175 (10.6)	58 (9.9)	34 (10.5)
Not disclosed	313 (18.9)	106 (18.2)	58 (17.9)
Health authority			
Region 1	229 (13.8)	45 (7.7)	21 (6.5)
Region 2	445 (26.9)	136 (23.3)	60 (18.5)
Region 3	378 (22.8)	141 (24.1)	78 (24.1)
Region 4	66 (4.0)	28 (4.8)	11 (3.4)
Missing	539 (32.5)	234 (40.1)	154 (47.5)
Ease of going online (digital access)			
Easy	1334 (80.5)	462 (79.1)	256 (79.0)
Not easy	131 (7.1)	34 (5.8)	14 (4.3)
Not disclosed	192 (11.6)	88 (15.1)	54 (16.7)
Survey recruitment channel			
In-person	1057 (63.8)	230 (39.4)	91 (28.1)
Online	600 (36.2)	354 (60.6)	233 (71.9)
Has a usual healthcare provider			
No	443 (26.7)	132 (22.6)	85 (26.2)
Yes	878 (53.0)	347 (42.3)	192 (59.3)
Not disclosed	336 (20.3)	54 (9.2)	47 (14.5)
Previous STBBI diagnosis			
No	959 (57.9)	283 (48.5)	128 (39.5)
Yes	520 (31.4)	247 (42.3)	167 (51.5)
Not disclosed	178 (10.7)	54 (9.2)	29 (9)
Previous experience of STBBI testing barriers			
No	493 (29.8)	132 (22.6)	61 (18.8)
Yes	990 (59.7)	407 (69.7)	244 (75.3)
Not disclosed	174 (10.5)	45 (7.7)	19 (5.9)
eHEALS score (median (IQR))	31.0 (27–34)	30.0 (26–33)	32 (29–35.5)

Median (IQR) values reflect the observed eHEALS summary score (range 8–40). Latent digital health literacy constructs were estimated within the structural equation modelling framework; their distributions cannot be directly summarised outside the model. The summary score is presented here to provide a descriptive sense of variability across participant groups.
*Indicates percentage of participants who have used GetCheckedOnline among those who are aware of the service
†Includes individuals identifying as gender fluid, gender queer, agender, non-binary or selecting multiple gender categories. Trans men and trans women are included within the corresponding binary gender categories.
eHEALS, eHealth Literacy Scale; STBBI, sexually transmitted and blood-borne infection.

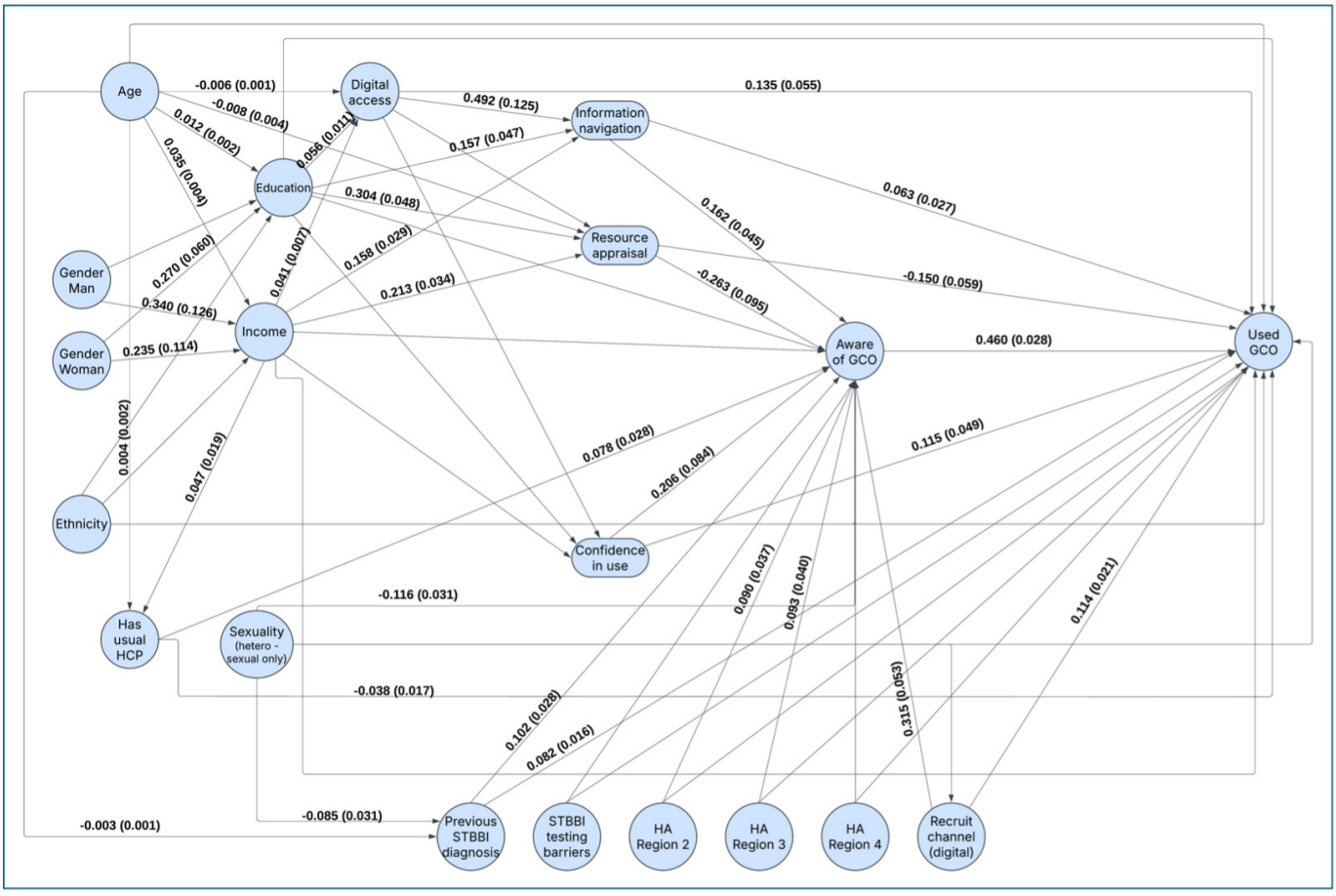

Figure 1 Structural equation model illustrating predictors of awareness and use of GetCheckedOnline, mediated by DHL. This structural equation model presents significant pathways (p<0.05, bold values) linking sociodemographic, digital access and health system factors to awareness and use of GetCheckedOnline, a publicly funded internet-based sexually transmitted infection testing service in British Columbia, Canada. The model incorporates latent DHL constructs—Information Navigation, Resource Appraisal and Confidence in Use—derived from a revised eHealth Literacy Scale. Estimates represent standardised path coefficients with Standard Errors in parentheses. *Pooled estimates are standardised coefficients from structural equation modelling generated using Rubin's rule. DHL, digital health literacy; GCO, GetCheckedOnline; HA, health authority; HCP, healthcare provider; STBBI, sexually transmitted and blood-borne infections.

income, digital access and GetCheckedOnline outcomes. For instance, digital access and education increased awareness and use via Information Navigation and Confidence in Use, while both digital access and income were negatively associated with outcomes via Resource Appraisal. Total effect models confirmed positive associations of education and income with both outcomes.

Interpretation of DHL pathways

Information Navigation, the ability to locate and access digital health resources, emerged as a consistent and positive pathway to awareness and use of GetCheckedOnline. Its strong associations with education and digital access reinforce evidence that foundational digital capabilities are structurally determined and shape the use of digital health services.[8 19] Findings emphasise important mediating roles of DHL in supporting equitable access to online STBBI services, especially for populations experiencing structural and socioeconomic barriers.[5 8]

Confidence in Use, reflecting individuals' self-efficacy in applying online health information, also contributed positively to awareness and use. This pathway suggests that users must not only access information but also feel empowered to act on this knowledge.[20] Participants with higher income and education were more likely to score highly in this domain, reinforcing the need for human-centred platforms that facilitate decision-making through clear instructions and embedded support, especially for those with less self-efficacy.[11 19]

Resource Appraisal was unexpectedly negatively associated with both awareness and use. This may reflect a more complex reality. First, concerns about data privacy, surveillance or algorithmic surveillance, especially in relation to sexual health, may fuel scepticism among critical users given associations with awareness of GetCheckedOnline.[21–23] However, individuals with higher Resource Appraisal skills, particularly individuals with recent risky sexual exposure, may assess GetCheckedOnline as misaligned with their needs, given its focus on asymptomatic testing.[5 6 11] It may also be perceived as lacking wraparound care, especially among women navigating contraception and pregnancy care.[11] Therefore, disengagement may represent thoughtful judgement rather than distrust or digital exclusion. Findings suggest that lower Resource Appraisal scores may reflect user discernment and critical evaluation, rather than a deficit, when assessing the fit of digital services with personal health needs and values.

Table 2 Significant indirect mediation pathways and total effects in the structural equation model—2022 GetCheckedOnline community survey

Effect type	Predictor	Mediator	Outcome	Estimate*	P value	90% CI
Indirect effect	Age	Confidence in Use	Awareness	−0.002	0.034	(−0.004 to 0.001)
Indirect effect	Age	Confidence in Use	Testing	−0.001	0.039	(−0.003 to 0.000)
Indirect effect	Age	Confidence in Use through awareness	Testing	−0.001	0.035	(−0.002 to 0.000)
Indirect effect	Digital Access	Information Navigation	Awareness	0.098	0.002	(0.046 to 0.150)
Indirect effect	Digital Access	Information Navigation	Testing	0.037	0.029	(0.009 to 0.064)
Indirect effect	Digital Access	Information Navigation through awareness	Testing	0.046	0.003	(0.020 to 0.071)
Indirect effect	Digital Access	Resource Appraisal	Awareness	−0.174	0.013	(−0.289 to 0.059)
Indirect effect	Digital Access	Resource Appraisal	Testing	−0.111	0.018	(−0.188 to 0.034)
Indirect effect	Digital Access	Resource Appraisal through awareness	Testing	−0.081	0.014	(−0.136 to 0.027)
Indirect effect	Education	Confidence in Use	Awareness	0.044	0.032	(0.010 to 0.077)
Indirect effect	Education	Confidence in Use	Testing	0.027	0.038	(0.006 to 0.049)
Indirect effect	Education	Confidence in Use through awareness	Testing	0.020	0.033	(0.005 to 0.036)
Indirect effect	Education	Information Navigation	Awareness	0.022	0.014	(0.007 to 0.037)
Indirect effect	Education	Information Navigation through awareness	Testing	0.010	0.016	(0.003 to 0.017)
Indirect effect	Income	Confidence in Use	Awareness	0.030	0.033	(0.007 to 0.053)
Indirect effect	Income	Confidence in Use	Testing	0.019	0.037	(0.004 to 0.034)
Indirect effect	Income	Confidence in Use through awareness	Testing	0.014	0.034	(0.003 to 0.025)
Indirect effect	Income	Information Navigation	Awareness	0.022	0.002	(0.010 to 0.034)
Indirect effect	Income	Information Navigation	Testing	0.008	0.032	(0.002 to 0.015)
Indirect effect	Income	Information Navigation through awareness	Testing	0.010	0.003	(0.005 to 0.016)
Indirect effect	Income	Resource Appraisal	Awareness	−0.025	0.021	(−0.044 to 0.007)
Indirect effect	Income	Resource Appraisal	Testing	−0.016	0.029	(−0.028 to 0.004)
Indirect effect	Income	Resource Appraisal through awareness	Testing	−0.012	0.021	(−0.020 to 0.003)
Total effect	Age		Awareness	−0.004	0.006	(−0.006 to 0.001)
Total effect	Education		Awareness	0.037	0.005	(0.015 to 0.058)
Total effect	Education		Testing	0.017	0.020	(0.005 to 0.029)
Total effect	Gender Woman		Awareness	−0.088	0.013	(−0.147 to 0.03)
Total effect	Income		Testing	0.103	0.019	(0.031 to 0.175)

Estimates are standardised coefficients; indirect effects represent paths through DHL mediators; 'through awareness' indicates a serial mediation pathway (DHL→awareness→use); 90% CIs are reported in accordance with mediation best practice; Only estimates with p values <0.05 were reported; predictors and mediators were modelled using latent variables where applicable.
DHL, digital health literacy.

Comparison with previous studies and contribution to knowledge

To our knowledge, this is the first study to examine how distinct DHL dimensions influence awareness and use of a publicly funded digital STBBI testing service. Prior research has relied on unidimensional measures, yielding mixed or counterintuitive results. For example, higher eHealth literacy among women has been linked to increased HIV risk behaviours.[24] By disaggregating DHL into distinct pathways, our findings provide greater conceptual clarity and align with emerging evidence linking DHL to health-promoting behaviours, while highlighting how specific digital skills can either reinforce or mitigate inequities in service use.[25–27]

Table 3 Estimates of the effects of Digital Health Literacy factors on awareness and use of GetCheckedOnline—2022 GetCheckedOnline community survey (sensitivity analysis)

Predictor	Estimate	SE	P value
Aware of GetCheckedOnline			
Information Navigation	0.090	0.039	0.022*
Resource Appraisal	−0.057	0.055	0.297
Confidence in Use	0.032	0.054	0.559
Used GetCheckedOnline			
Information Navigation	0.019	0.020	0.339
Resource Appraisal	−0.030	0.032	0.343
Confidence in Use	0.003	0.033	0.936

*p<0.05.

Implications for practice

Our findings suggest that effective interventions must address both digital access and contextual fit. Structural investments in affordable devices and internet plans, mobile-optimised content and search engine optimisation strategies using plain language and culturally relevant keywords can improve Information Navigation.[28] These findings highlight the need to move beyond individual-level DHL and address the structural determinants that shape interactions with digital health services.[29 30] Such shifts must also consider health systems' capabilities to deliver digital STBBI testing services.[31] To enhance Confidence in Use, designers should integrate features that support self-efficacy, including embedded AI chatbots, privacy-first design and simplified workflows.

Findings related to Resource Appraisal suggest that uptake may be limited not by access barriers but by perceived misalignment between the service and users' needs, support expectations or health priorities.[5 11] Addressing this requires closer integration of digital STBBI testing with wraparound services like contraception and culturally safe care options, including

self-sampling and self-testing options.[11] Collaborations with trusted community organisations, co-designed user journeys and clear messaging about confidentiality and data practices can also improve service fit for users with high appraisal skills and historically rooted mistrust in healthcare.[6 22 32] This is particularly important given the heightened mistrust in health systems following the COVID-19 pandemic.[33]

Future research directions

Future work should explore how social and structural conditions influencing trust, gender dynamics and historical marginalisation interact with DHL to shape engagement with digital STBBI testing services. Longitudinal and mixed-methods studies are needed to clarify causal relationships and better explain the complex patterns identified in our study. There is also a pressing need for intervention research testing co-designed, community-based models of digital STBBI testing that integrate sexual and reproductive healthcare and are scalable, trustworthy and responsive to the intersecting needs of women, men who have sex with men, racialised and other underserved populations.[5 11]

Strengths and limitations

This study draws on a large and diverse sample recruited both online and through in-person outreach across BC, enhancing the generalisability to populations served by GetCheckedOnline. Using a theoretically grounded, multidimensional DHL framework informed by validated psychometric approaches enabled a more nuanced analysis than traditional unidimensional tools.[7] SEM applied across multiply imputed datasets, supported rigorous testing of direct, indirect and total effects, strengthening internal validity and interpretive depth of the findings.

However, the study has limitations. All outcomes were self-reported and may be subject to recall or social desirability bias.[7] While several key covariates were included, unmeasured confounding remains possible. The cross-sectional design precludes causal inference. GetCheckedOnline use was assessed retrospectively, and prior use may therefore have influenced participants' digital health literacy responses, raising the possibility of reverse causation. Longitudinal research is needed to understand how DHL develops and shapes STBBI testing over time. Although the sample was diverse, some groups, like non-English speakers or people with limited literacy, may have been excluded. Our use of non-probability sampling limits the generalisability of findings to the broader population of sexual health service users. However, combining online and offline recruitment strategies and adjusting for recruitment channels in the models may have mitigated some bias.[13 34] Finally, while our sensitivity analyses supported the robustness of findings about associations between Information Navigation and awareness, results were less consistent for the influence of other DHL dimensions on awareness and use. Further research is needed to clarify how DHL affects use once users access the website.

CONCLUSION

This study demonstrates that DHL plays a nuanced and multifaceted role in shaping access to digital STBBI testing. Information Navigation and Confidence in Use were positively associated with awareness and use of GetCheckedOnline, while higher Resource Appraisal was linked to lower awareness and use, possibly reflecting concerns about privacy, trust or perceived misalignment with broader health needs. These findings suggest that DHL can both facilitate and inhibit access, depending on users' contexts, values and lived experiences. As digital sexual health services continue to scale, especially in underserved communities, it is critical to design interventions that build user confidence, support intuitive navigation and address structural barriers. Future research should examine how stigma, marginalisation and concerns about digital surveillance influence trust in digital STBBI testing services and evaluate equity-focused strategies, including community partnerships, multiple testing options and supportive digital policy, to ensure digital sexual health services are inclusive, accessible and trustworthy.

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