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Preference-Based Assessments

Health-Related Quality of Life of People Who Inject Drugs: The Enhancing Treatment of Hepatitis C in Opioid Substitution Settings Engage Study

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ABSTRACT

Objectives: There is limited research on health-related quality of life (HRQoL) among people who inject drugs (PWID). We evaluated the HRQoL and associated factors among a cohort of PWID in Australia.

Methods: Participants were enrolled in an observational cohort study (the Enhancing Treatment of Hepatitis C in Opioid Substitution Settings Engage Study) from May 2018 to September 2019 (wave 1) and November 2019 to June 2021 (wave 2). Participants completed the EQ-5D-5L survey at enrolment. Two-part models were used to assess the association of clinical and socioeconomic characteristics with EQ-5D-5L scores.

Results: Among 2395 participants (median age, 43 years; 66% male), 65% reported injecting drug use in the past month, 20% had current hepatitis C virus (HCV) infection, and 68% had no/mild liver fibrosis (F0/F1). Overall, the mean EQ-5D-5L and EQ-visual analog scale scores were 0.78 and 57, respectively. In adjusted analysis, factors associated with significantly lower EQ-5D-5L scores include older ages, female (marginal effect = −0.03, $P = .014$), being homeless (marginal effect = −0.04, $P = .040$), and polysubstance use (marginal effect = −0.05, $P < .001$). Factors associated with significantly higher EQ-5D-5L scores were being Aboriginal/Torres Strait Islander (marginal effect = 0.03, $P = .021$) and recent injecting drug use in the past 12 months. Current HCV infection and liver fibrosis stage were not associated with reduced HRQoL among the study participants.

Conclusions: PWID experienced a lower HRQoL compared with the general population. Further research is needed to understand HRQoL in this population to facilitate the development of multifaceted care models for PWID beyond HCV cure and inform health economic analyses for identifying optimal health strategies for PWID.

Keywords: EQ-5D-5L, health-related quality of life, hepatitis C, people who inject drugs.

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Introduction

People who inject drugs (PWIDs) are at a higher risk of developing health problems and complications, including hepatitis C virus (HCV)[1] and bacterial and fungal infections.[2] In addition to the physical health consequences, PWID may also face social and economic challenges, such as stigma and discrimination,[3-5] poverty,[6] and unstable housing.[7-9] All these factors could contribute to a lower quality of life (QoL) among PWID.[10,11]

Health-related QoL (HRQoL) can be defined as the way health is empirically estimated to affect QoL.[12] HRQoL questionnaires such as 36-Item Short Form Survey, EQ-5D-3L, and EQ-5D-5L have been applied to measure HRQoL among PWID in the literature.[13-18] These HRQoL instruments are designed to describe a person's health status with a finite number of multi-attribute health states. The health status information can be converted to a single health utility score anchored by 0 (corresponding to death) and 1 (corresponding to full health). The health utility scores reflect general public's perspectives toward the value or utility of the health status and are widely used in economic evaluation studies for calculation of quality-adjusted life-years. Several economic evaluation studies have been conducted to assess the cost-effectiveness of screening and treating HCV infection in PWID,[19-22] but these studies are limited by the use of health utility scores for HCV infection status and liver disease stages derived from non-PWID population. Although a few studies have reported health utility scores for PWID,[14-18] their usefulness to economic evaluation studies may be limited. First of all, there lacks health utility information stratified by important subgroups, such as liver disease staging,[14-17] which are key parameters in modeling the health impact of HCV infection progression. Second, counterintuitive results have been found where PWID with cirrhosis (F4) reported higher health utility scores than those with moderate fibrosis (F2/3),[18] which could be caused by the small sample size of

subgroup population and the lack of sensitivity of EQ-5D-3L to detect smaller changes in health in PWID.[23]

In a world where cost-effectiveness evidence becomes more involved in healthcare decision making, it is important that the health utility scores of PWID are accurately measured and can be used to evaluate interventions to improve the health of PWID. It is also important to understand how HRQoL among PWID may be affected by demographic and behavioral factors, which may help develop tailored interventions to improve HRQoL among PWID. This study aimed to assess HRQoL among PWID in Australia using an updated version of EQ-5D instrument, EQ-5D-5L. This study determined HRQoL among PWID, including key subpopulations, such as people with recent injecting drug use, people receiving opioid agonist therapy (OAT), and people with advanced liver disease, and identified factors associated with lower HRQoL among PWID.

Methods

Study Design and Participants

The Enhancing Treatment of Hepatitis C in Opioid Substitution Settings (ETHOS) Engage is an observational cohort study.[1,24] Participants were enrolled from drug treatment clinics and needle and syringe programs over 2 periods, May 2018 to September 2019 (wave 1, 25 sites) and November 2019 to June 2021 (wave 2, 21 sites). Recruitment sites were located across 4 Australian states: New South Wales (wave 1: n = 17; wave 2: n = 15), Queensland (wave 1: n = 4; wave 2: n = 2), South Australia (wave 1: n = 2; wave 2: n = 2), and Western Australia (wave 1: n = 2; wave 2: n = 2). Inclusion criteria were informed consent, age 18 years or older, history of injecting drug use, and either injecting drug use in the previous 6 months or currently receiving OAT. In wave 1, pregnant women were excluded given that FibroScan (Echosens, Paris, France) was contraindicated at the time of study protocol approval. In wave 2, pregnant women were included but did not receive FibroScan. The study protocol was approved by the Human Research Ethics Committees at St Vincent's Hospital, Sydney, and the Aboriginal Health and Medical Research Council (HREC Ref: HREC/17/ SVH/113).

Procedures

At enrolment, participants completed a computer tablet-based questionnaire collecting information on demographics (age, gender, Aboriginal and Torres Strait Islander identity, employment status, education level, and housing status), drug use history, incarceration history, self-reported HCV status, self-reported OAT status, and alcohol consumption. Participants were asked if they had injected drugs in the past 6 months, and if they had, they were asked if they injected drugs in the past month. Homelessness was defined as having no usual place of residence for the majority of nights in the previous 6 months. Polysubstance use was defined as injecting or noninjecting use of 2 or more drugs in the past 6 months. Hazardous alcohol use was assessed using the Alcohol Use Disorders Identification Test, a 3-item alcohol screen that can help to detect persons who are high-risk alcohol drinkers or who have active alcohol use disorders.[25]

HRQoL data were collected at enrolment using the EQ-5D-5L questionnaire that consists of 2 items: (1) the EQ-5D descriptive system and (2) the EQ visual analog scale (EQ-VAS). The descriptive system measures current health on 5 domains: mobility, self-care, usual activities, pain/discomfort, and anxiety/depression. Each domain has 5 levels indicating no, slight, moderate, severe, and extreme problems. EQ-5D-5L health utility scores were estimated using the updated Australian valuation algorithm, which was developed based on the preferences of a large representative sample of Australians and used discrete choice experiment as the preference elicitation method.[26] The updated Australian value sets range between −0.301 and 1, in which negative utility scores indicate that current health state is considered worse than death. The EQ-VAS recorded the patient's self-rated health on the day of the study on a scale of 0 to 100, where 100 refers to "The best health you can imagine" and 0 refers to "The worst health you can imagine."

Statistical Analyses

Within each recruitment wave, the first record of enrolment was used for each participant. Among those who participated in both wave 1 and wave 2, the first enrolment was used for the analyses. Baseline characteristics of participants across 2 study waves were summarized. The mean and median EQ-5D-5L and EQ-VAS scores were calculated by key variables hypothesized to affect HRQoL including age, gender, employment status, housing status, recent injecting frequency, polysubstance use, incarceration history, alcohol consumption, OAT status, HCV infection status, fibrosis stages, and recruitment wave. Mann-Whitney U tests and Kruskal-Wallis tests were used for assessing differences by subgroup. The response distribution for each domain of EQ-5D-5L were tabulated with fibrosis stages to understand how the severity of liver disease may affect different aspects of health. The EQ-5D-5L scores were calculated by HCV infection status, fibrosis stages, and OAT status to provide health utility scores for different statuses among people with and without recent injecting drug use.

Several regression modeling techniques have been applied to deal with the censored nature or the ceiling effect of EQ-5D data, including Tobit, 2-part models and mixture models.[27-29] Given that the typical nature of EQ-5D-3L data (large upper gap and clustering) was not observed in EQ-5D-5L data,[30,31] less complex models might suffice. To account for the potential ceiling effect presented in the EQ-5D-5L utility data, a 2-part model was used to assess factors associated with EQ-5D-5L utility scores among unique ETHOS Engage participants. In the first part of the model, a logistic regression model was used to predict the likelihood that participants reported full health. In the second part of the model, a generalized linear model with the log link and gamma distribution was used to fit EQ-5D-5L utility scores smaller than one to assess which factors would influence the EQ-5D-5L utility scores among PWID. Marginal effects were then generated from the combined model. Negative marginal effect indicated poorer HRQoL, whereas positive marginal effect indicated better HRQoL. The 2-part modeling was done using the Stata twopm command.[32] Association between demographic and behavioral factors and health utility scores were analyzed in unadjusted analyses first. Variables which had significance <0.20 in the unadjusted analysis or known clinical significance were included in the adjusted models. All analyses were performed using Stata v15.0.[33]

Results

Overall, 2395 unique individuals were enrolled into the ETHOS Engage study: 1443 participants enrolled in 2018 to 2019 (wave 1), 1211 enrolled in 2019 to 2021 (wave 2), including 259 who participated in both waves (Table 1, Appendix Table 1 in Supplemental Materials found at https://doi.org/10.1016/j.jval.2023.10.013). Among individuals enrolled (N = 2395), the median age of the overall population was 43 years (IQR: 37-50), 66% were male, 23% were Aboriginal or Torres Strait Islander, 72% were

Table 1. Characteristics of people enrolled in ETHOS Engage.

Total		2395
Median age (IQR)		43 (37-50)
Gender	Male	1591 (66)
	Female	786 (33)
	Other	18 (1)
Aboriginal or Torres Strait Islander	No	1791 (75)
	Yes	555 (23)
	Unknown	49 (2)
Homeless	No	2134 (89)
	Yes	261 (11)
Employment	Unemployed	38 (2)
	Employed	174 (7)
	Government assistance	2111 (88)
	Other	72 (3)
OAT status	Never	371 (15)
	Past	305 (13)
	Current	1719 (72)
Incarceration history	Never	771 (32)
	History only	1181 (49)
	Recent	443 (19)
Recency of injecting	>12 months	334 (14)
	Within 1-12 months	506 (21)
	Within last month, <daily	822 (34)
	Within last month, ≥daily	733 (31)
OAT/recent injecting status	No current OAT, no recent injecting past month	78 (3)
	No current OAT, recent injecting past month	598 (25)
	Current OAT, no recent injecting past month	488 (20)
	Current OAT, recent injecting past month	1231 (51)
Main drug type injected in last month	None	840 (35)
	Heroin	535 (22)
	Other opioids	201 (8)
	Methamphetamine	780 (33)
	Other	39 (2)
Injected heroin in last month	Yes	593 (25)
	No	1802 (75)
Injected stimulants (amphetamines or cocaine) in last month	Yes	897 (37)
	No	1498 (63)
Injected fentanyl last month	Yes	92 (4)
	No	2303 (96)
Injected other opioids (morphine or buprenorphine or other opioids) last month	Yes	314 (13)
	No	2081 (87)
Polysubstance use in past 6 months	Yes	1406 (59)
	No	989 (41)
Hazardous alcohol use	Yes	864 (36)
	No	1513 (64)
HCV RNA test result	HCV RNA not detectable	1818 (76)
	HCV RNA detectable	487 (20)
	Missing	90 (4)
Current or previous chronic HCV	No	1145 (48)
	Yes	1259 (52)
HCV infection status	Never infected	695 (29)
	Spontaneous clearance	393 (16)
	Treatment-induced clearance	730 (30)
	Current infection	487 (20)
	Missing	90 (4)
Self-reported HCV status	Never tested	332 (14)
	Tested, unknown status	266 (11)
	Not infected	1453 (61)
	Infected	344 (14)

Note. All values are n (%) unless otherwise specified.
HCV indicates hepatitis C virus; IQR, interquartile range; OAT, opioid agonist therapy.

currently receiving OAT, and 65% reported injecting drug use in the last month. The prevalence of current HCV infection (HCV RNA detectable) between 2018 and 2019 and 2019 and 2021 declined from 23% to 15%.

Among the 2395 enrolled participants, 18% reported perfect health. The majority of participants had no problems with personal care (84%), whereas 35% reported issues with mobility, 36% reported problems with usual activities, 58% were living with pain/discomfort, and 71% reported being anxious or depressed (Table 2). As liver disease stage advanced, the proportion of people experiencing problems with mobility, personal care, usual activities, and pain/discomfort increased (Appendix Table 2 in Supplemental Materials found at https://doi.org/10.1016/j.jval.2023.10.013). However, this was not the case with anxiety/depression domain in which the proportion of participants reporting problems decreased with more advanced liver disease stage.

The mean EQ-5D-5L health utility scores and EQ-VAS scores by baseline characteristics are presented in Table 3. Median EQ-5D-5L and EQ-VAS scores are summarized in Appendix Table 3 in Supplemental Materials found at https://doi.org/10.1016/j.jval.2023.10.013. The mean EQ-5D-5L utility scores for the overall population were 0.78. There were no significant differences between wave 1 and wave 2 (mean 0.78 vs 0.79, $P = .113$). There were significant differences in EQ-5D-5L utility scores among people with and without stable housing (mean 0.79 vs 0.75, $P = .018$), people with and without polysubstance use (mean 0.77 vs 0.81, $P < .001$) and people with and without hazardous alcohol use (mean 0.77 vs 0.79, $P < .001$). The EQ-5D-5L utility scores were also significantly different by age groups, gender, ethnicity, source of income, incarceration history, and OAT status. People without injecting drug use in the past month and not currently receiving OAT reported slightly lower mean EQ-5D-5L utility score (0.77)

Table 2. Distribution of EQ-5D-5L responses by health domains among unique ETHOS Engage participants (N = 2395).

EQ-5D-5L	n (%)
Mobility	
I have no problems in walking about	1558 (65)
I have slight problems in walking about	406 (17)
I have moderate problems in walking about	252 (11)
I have severe problems in walking about	149 (6)
I am unable to walk about	30 (1)
Personal care	
I have no problems washing or dressing myself	2007 (84)
I have slight problems washing or dressing myself	227 (9)
I have moderate problems washing or dressing myself	98 (4)
I have severe problems washing or dressing myself	36 (2)
I am unable to wash or dress myself	27 (1)
Usual activities	
I have no problems doing my usual activities	1532 (64)
I have slight problems doing my usual activities	488 (20)
I have moderate problems doing my usual activities	245 (10)
I have severe problems doing my usual activities	100 (4)
I am unable to do my usual activities	30 (1)
Pain/discomfort	
I have no pain or discomfort	1006 (42)
I have slight pain or discomfort	606 (25)
I have moderate pain or discomfort	421 (18)
I have severe pain or discomfort	282 (12)
I have extreme pain or discomfort	80 (3)
Anxiety/depression	
I am not anxious or depressed	703 (29)
I am slightly anxious or depressed	612 (26)
I am moderately anxious or depressed	584 (24)
I am severely anxious or depressed	317 (13)
I am extremely anxious or depressed	179 (7)

ETHOS indicates Enhancing Treatment of Hepatitis C in Opioid Substitution Settings.

compared with other OAT/recent injecting groups. In this group (n = 144), the proportion of people having an EQ-5D-5L utility score below 0.5 was larger than that in the rest population (17% vs 13%, P = .175; Appendix Figure 1 in Supplemental Materials found at https://doi.org/10.1016/j.jval.2023.10.013).

No significant differences in EQ-5D-5L utility scores were observed among participants with detectable HCV RNA, those with undetectable HCV RNA and those with missing test results. But those who were never infected with HCV reported significantly higher EQ-5D-5L utility score (mean 0.81) than those with spontaneous clearance (mean 0.78), those with treatment-induced HCV clearance (mean 0.78), and those with current HCV infection (mean 0.77). Also, people who self-reported never being tested for HCV had higher mean (0.80) EQ-5D-5L utility scores than other subgroups. The EQ-5D-5L utility scores by OAT status and HCV infection status among people with and without recent injecting drug use are presented in Appendix Table 4 in Supplemental Materials found at https://doi.org/10.1016/j.jval.2023.10.013. People who were never HCV infected had highest health utility regardless of the recency of injecting drug use.

The mean EQ-VAS score for the overall population was 57. When asked to self-rate their overall health, participants enrolled in wave 1 reported significantly higher EQ-VAS scores (mean 60 vs 54, $P < .001$). Those who were males, employed, with stable housing, not injecting drug recently, did not use polysubstance, did not have hazardous alcohol use, and self-reported no HCV infection had significantly higher EQ-VAS scores. No significant differences in EQ-5D-5L and EQ-VAS scores were observed among participants with different stages of liver diseases.

Table 4 presents the relationship between baseline characteristics and EQ-5D-5L scores using the unadjusted and adjusted 2-part model. Factors significantly associated with lower EQ-5D-5L scores included older age (vs <36 years, 36-50 years: marginal effect = −0.03, P =. 011; ≥50 years: marginal effect = −0.06, P <.001), polysubstance use (marginal effect = −0.04, $P < .001$), treatment-induced HCV clearance (marginal effect = −0.03, P = .015), current HCV infection (marginal effect = −0.04, P = .009), and missing FibroScan scores (marginal effect = −0.04, P = .038). Being Aboriginal/Torres Strait Islander was associated with significantly higher EQ-5D-5L scores (marginal effect = 0.03, P = .012).

In the adjusted analysis, factors associated with significantly lower EQ-5D-5L scores include older age (vs <36 years; 36-50 years: marginal effect = −0.04, P = .002; ≥50 years: marginal effect = −0.06, $P < .001$), female (marginal effect = −0.03, P = .014), being homeless (marginal effect = −0.04, P = .040), polysubstance use (marginal effect = −0.05, $P < .001$). Being Aboriginal/Torres Strait Islander was associated with significantly higher EQ-5D-5L scores (marginal effect = 0.03, P = .021). Recent injecting drug use in the past 12 months was associated with significantly higher EQ-5D-5L scores compared with those without injecting in the past 12 months.

Discussion

This study assessed HRQoL and associated factors among a cohort of PWID recruited from drug treatment clinics and needle and syringe programs in Australia. Most study participants had no problems with mobility, personal care, and usual activities, but more than half of the study population were living with pain/discomfort and experiencing anxiety/depression. Older age, being female and polysubstance use were associated with significantly lower EQ-5D-5L scores. HCV RNA test results, self-reported HCV infection, liver fibrosis disease stages, current OAT, and hazardous alcohol use had little impact on the health utility scores among this population. However, being Aboriginal/Torres Strait Islander and recent injecting drug use were associated with significantly higher EQ-5D-5L scores. This study has added to the literature with regard to the HRQoL of PWID, which can inform future health policies and economic evaluation studies of broader interventions to improve health outcomes in PWID.

The mean EQ-5D-5L (0.78) and EQ-VAS scores (57) derived in this study were lower than the values elicited from the general population in Australia (0.91 and 79, respectively).[34] This further confirms the impaired HRQoL often observed among PWID.[10,11,13,15,16,35] The overall mean EQ-5D-5L score (0.78) in our cohort was particularly higher than the value of 0.51 reported by McDonald et al[16] that also used EQ-5D-5L to measure HRQoL among PWID in community settings and the value of 0.66 reported by Gormley et al[15] that used EQ-5D-3L to elicit health utilities in PWID who achieved sustained virologic response. This is probably because of different demographics of study

Table 3. Mean health-related quality-of-life scores by baseline characteristics among unique ETHOS Engage participants.

Characteristic	*n*	Mean EQ-5D-5L (SD)	*P* value	Mean VAS (SD)	*P* value
Overall	2395	0.78 (0.25)		57 (29)	
Recruitment wave			.113		.001
wave 1	1443	0.78 (0.25)		60 (27)	
wave 2	952	0.79 (0.26)		54 (31)	
Age groups (in years)			.001		.085
18-35	494	0.82 (0.24)		55 (31)	
36-50	1354	0.78 (0.25)		57 (29)	
≥51	547	0.76 (0.26)		60 (27)	
Gender			.031		.001
Male	1591	0.79 (0.25)		58 (28)	
Female	786	0.77 (0.26)		55 (29)	
Other	18	0.73 (0.28)		48 (30)	
Aboriginal/Torres Strait Islander identity			.001		.526
No	1791	0.78 (0.25)		57 (28)	
Yes	555	0.81 (0.25)		56 (31)	
Other	49	0.75 (0.31)		62 (25)	
Main source of income			.001		.020
No income	38	0.83 (0.21)		49 (34)	
Full-time/part-time/casual employment	174	0.85 (0.19)		63 (27)	
Government assistance	2111	0.78 (0.26)		57 (29)	
Other	72	0.76 (0.27)		55 (31)	
Homeless			.018		.015
No	2134	0.79 (0.25)		58 (29)	
Yes	261	0.75 (0.26)		53 (29)	
Incarceration history			.046		.726
Never	771	0.78 (0.25)		58 (28)	
History only	1181	0.78 (0.25)		58 (29)	
Recent	443	0.80 (0.25)		56 (31)	
Recency of drug injecting			.666		.014
>12 months	334	0.76 (0.28)		59 (28)	
Within 1-12 months	506	0.79 (0.24)		59 (28)	
Within last month, <daily	822	0.79 (0.24)		58 (28)	
Within last month, ≥daily	733	0.78 (0.25)		54 (30)	
OAT			.016		.407
Never	371	0.80 (0.27)		58 (30)	
Past	305	0.78 (0.25)		58 (29)	
Current	1719	0.78 (0.25)		57 (29)	
OAT and recent injecting status			.583		.022
No current OAT, no recent injecting past month	144	0.77 (0.27)		62 (28)	
No current OAT, recent injecting past month	532	0.79 (0.25)		57 (30)	
Current OAT, no recent injecting past month	696	0.78 (0.26)		59 (28)	
Current OAT, recent injecting past month	1023	0.78 (0.24)		56 (29)	
Polysubstance use in past 6 month			.001		.001
No	989	0.81 (0.24)		59 (29)	
Yes	1406	0.77 (0.26)		56 (28)	
Hazardous alcohol use			.001		.015
No	1513	0.79 (0.25)		58 (29)	
Yes	864	0.77 (0.25)		56 (28)	
HCV RNA test result			.182		.051
HCV RNA not detectable	1818	0.79 (0.25)		58 (29)	
HCV RNA detectable	487	0.77 (0.26)		55 (28)	
Missing	90	0.77 (0.26)		61 (26)	
HCV infection status			.001		.156
Never infected	695	0.81 (0.25)		58 (30)	
Spontaneous clearance	393	0.78 (0.25)		57 (29)	
Treatment-induced clearance	730	0.78 (0.24)		58 (27)	
Current infection	487	0.77 (0.26)		55 (28)	
Missing	90	0.77 (0.26)		61 (26)	
Self-reported HCV status			.037		.006
Never tested	332	0.80 (0.26)		56 (31)	
Tested, unknown status	266	0.76 (0.25)		57 (27)	

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Table 3. Continued

Characteristic	*n*	Mean EQ-5D-5L (SD)	*P* value	Mean VAS (SD)	*P* value
Not infected	1453	0.79 (0.25)		59 (28)	
Infected	344	0.78 (0.25)		53 (29)	
FibroScan® liver disease staging			.141		.643
F0/F1 – No/mild fibrosis	1627	0.79 (0.25)		57 (29)	
F2	263	0.78 (0.24)		57 (27)	
F3	116	0.77 (0.26)		57 (28)	
F4 – Cirrhosis	137	0.75 (0.29)		59 (28)	
Missing	252	0.75 (0.27)		54 (30)	

Note. Comparisons of the EQ-5D-5L sum score distributions by baseline characteristics were analyzed using the Mann-Whitney *U* test and Kruskal-Wallis test. ETHOS indicates Enhancing Treatment of Hepatitis C in Opioid Substitution Settings; HCV, hepatitis C virus; OAT, opioid agonist therapy.

populations. In the study by McDonald et al,[16] 57% reported long-term disabilities and 23% had a history of being homeless, whereas only 11% reported being homeless in this study. In the study by Gormley et al,[15] 28% of participants had cirrhosis compared with 6% in this study. Moreover, the cohort in this study was recruited from drug treatment clinics and needle and syringe programs and more engaged in care, which could also lead to a better HRQoL. In one study with similar study settings,[17] the baseline EQ-5D-3L utility scores among PWID (0.72) were similar to our estimate.

Although awareness of HCV infection has been identified by earlier studies as a factor associated with significantly lower HRQoL,[13,14] one recent study suggested that awareness of infection had only a small detrimental impact upon EQ-5D-5L scores,[16] which coincides with our findings. In our study, those who self-reported HCV infection had similar mean EQ-5D-5L scores (0.78) to those who believe they were not infected (0.79). However, in terms of self-reported health, participants who self-reported HCV infection reported significantly lower EQ-VAS scores (53) than those who believed they were not infected (59). This indicates that the awareness of HCV might influence aspects of health other than the 5 domains in the EQ-5D-5L.

In the current study, some inconsistency was observed between EQ-5D-5L and EQ-VAS in distinguishing HRQoL among PWID subgroups. For example, the EQ-5D-5L scores were significantly different by age groups, ethnicity, incarceration history, OAT, but these differences were not captured by the EQ-VAS. In contrast, the EQ-VAS scores were significantly different by enrolment waves and recency of drug injecting, whereas EQ-5D-5L scores did not distinguish these features. This is probably because EQ-5D-5L estimates a respondent's health from the perspective of the general public, whereas EQ-VAS takes the perspective of the respondent. Although EQ-5D-5L and EQ-VAS may measure different health constructs, neither of these 2 measures could significantly discriminate PWID with different clinical features, namely, HCV infection status and liver diseases stage. Current HCV infection and severe liver diseases (≥F2) were also not significantly associated with EQ-5D-5L scores. This is consistent with the study by McDonald et al[16] in which the authors found that successful viral clearance after treatment did not lead to a durable improvement in the EQ-5D-5L scores and there was no impact of current infection on HRQoL. These findings suggest that the presence of HCV and liver disease may have limited impact on the HRQoL among PWID, or EQ-5D-5L is not sensitive enough to capture the differences in health-related QoL associated with HCV treatment.

In this study, recent injecting drug use was associated with significantly higher EQ-5D-5L scores. This is unexpected as previous studies either reported that active injecting was associated with reduced HRQoL[14] or found that injecting patterns had no impact on the HRQoL.[11,16] An analysis of baseline characteristics showed that people without recent injecting in the past month and currently not receiving OAT had better employment status, lower incarceration rates, and lower HCV infection rates compared with the rest population (Appendix Table 5 in Supplemental Materials found at https://doi.org/10.1016/j.jval.2023.10.013). However, the proportion of people reporting an EQ-5D-5L score smaller than 0.5 was also higher in this group (Appendix Figure 1 in Supplemental Materials found at https://doi.org/10.1016/j.jval.2023.10.013), resulting in a lower mean EQ-5D-5L score in those with recent injecting use. It is possible that the 5 domains of health in EQ-5D-5L might have been affected by characteristics other than those collected by the ETHOS Engage study.

This study has contributed to the broader literature on the HRQoL among PWID and addressed the evidence gap by describing health utility information stratified by important subgroups, including HCV infection, recent injecting drug use and liver disease stages. This study has used the recently available Australian valuation algorithm to estimate the EQ-5D-5L health utility scores, which reflect the preferences of the Australian general population and are more suitable to use in future cost-effectiveness analyses to evaluate interventions that enhance HCV testing and treatment among PWID in Australia. The data from this study will inform future cost-effectiveness analyses that can assist policy makers to select optimal interventions to integrate into service delivery and into national and jurisdictional strategies.

A limitation of this study is that most participants were recruited from drug treatment clinics and needle and syringe programs; therefore, it likely represents a population engaged in health services and may not be representative of the broader population of PWID. Thus, the health utility estimates may be an overestimate of the HRQoL experienced among people who have recently injected drugs but do not attend health services. Second, the ETHOS Engage study did not collect data on mental health comorbidities that have been shown to be associated with impaired HRQoL.[36,37] Given that 71% of the study participants in this study reported issues with anxiety/depression, future studies investigating factors associated with lower HRQoL among PWID may consider collecting data on mental health comorbidities, or using other quality-of-life assessment instruments that are more sensitive to mental wellbeing (eg, Assessment of Quality of Life 8 Dimensions).[38] Finally, we have not been able to find a test to examine the overall model fit for the 2-part model. Cautious interpretation is needed on the factors associated with EQ-5D-5L scores.

In conclusion, PWID enrolled in the ETHOS Engage study experienced a lower HRQoL compared with the general population. Age, gender, and polysubstance use were found to significantly influence EQ-5D-5L scores among PWID. However, EQ-5D-5L and EQ-VAS could not discriminate between participants with different

Table 4. Two-part model analysis of factors associated with EQ-5D-5L scores among unique ETHOS Engage participants.

Variable	Unadjusted model			Adjusted model		
	Marginal effect	95% CI	*P* value	Marginal effect	95% CI	*P* value
Recruitment wave						
wave 1	Ref					
wave 2	0.01	−0.016 to 0.025	.653			
Age groups (in years)						
18-35	Ref			Ref		
36-50	−0.03	−0.055 to −0.007	.011	−0.04	−0.062 to −0.013	.002
≥51	−0.06	−0.086 to −0.026	<.001	−0.06	−0.089 to −0.027	<.001
Gender						
Male	Ref			Ref		
Female	−0.02	−0.042 to 0.001	.064	−0.03	−0.050 to −0.006	.014
Other	−0.06	−0.201 to 0.085	.426			
Aboriginal/Torres Strait Islander ethnicity						
No	Ref			Ref		
Yes	0.03	0.007-0.053	.012	0.03	0.004-0.052	.021
Other	−0.03	−0.114 to 0.051	.455	−0.03	−0.118 to 0.059	.514
Main source of income						
No income	Ref					
Full-time/part-time/casual employment	0.02	−0.053 to 0.086	.637			
Government assistance	−0.06	−0.120 to 0.009	.094			
Other	−0.07	−0.161 to 0.017	.112			
Homeless						
No	Ref			Ref		
Yes	−0.04	−0.071 to 0.001	.054	−0.04	−0.078 to −0.002	.040
Incarceration history						
Never	Ref					
History only	0.00	−0.020 to 0.025	.820			
Recent	0.02	−0.012 to 0.046	.252			
Recency of drug injecting						
>12 months	Ref			Ref		
Within 1-12 months	0.03	−0.003 to 0.071	.074	0.04	0.003-0.085	.035
Within last month, <daily	0.03	−0.003 to 0.066	.075	0.06	0.016-0.094	.006
Within last month, ≥daily	0.03	−0.011 to 0.061	.172	0.05	0.006-0.088	.025
OAT						
Never	Ref			Ref		
Past	−0.02	−0.062 to 0.014	.221	−0.01	−0.049 to 0.032	.692
Current	−0.02	−0.043 to 0.013	.290	0.01	−0.026 to 0.039	.700
OAT and recent injecting status						
No current OAT, no recent injecting past month	Ref					
No current OAT, recent injecting past month	0.026	−0.024 to 0.076	.311			
Current OAT, no recent injecting past month	0.015	−0.035 to 0.064	.564			
Current OAT, recent injecting past month	0.017	−0.031 to 0.065	.490			
Polysubstance use in past 6 month						
No	Ref			Ref		
Yes	−0.04	−0.063 to −0.023	<.001	−0.05	−0.070 to −0.026	<.001
Hazardous alcohol use						
No	Ref			Ref		
Yes	−0.02	−0.041 to 0.001	.068	−0.02	−0.039 to 0.004	.117
HCV RNA test result						
HCV RNA not detectable	Ref			Ref		
HCV RNA detectable	−0.02	−0.047 to 0.006	.126	−0.02	−0.048 to 0.012	.233
Missing	−0.02	−0.079 to 0.040	.512	−0.02	−0.077 to 0.042	.557

continued on next page

Table 4. Continued

Variable	Unadjusted model			Adjusted model		
	Marginal effect	95% CI	*P* value	Marginal effect	95% CI	*P* value
HCV infection status						
Never infected	Ref					
Spontaneous clearance	−0.03	−0.058 to 0.004	.086			
Treatment-induced clearance	−0.03	−0.057 to −0.006	.015			
Current infection	−0.04	−0.068 to −0.010	.009			
Missing	−0.04	−0.099 to 0.023	.218			
Self-reported HCV status						
Never tested	Ref			Ref		
Tested, unknown status	−0.04	−0.080 to 0.004	.077	−0.03	−0.072 to 0.016	.216
Not infected	−0.01	−0.043 to 0.016	.379	−0.01	−0.040 to 0.024	.639
Infected	−0.02	−0.054 to 0.021	.383	0.00	−0.039 to 0.042	.936
FibroScan liver disease staging						
F0/F1 – no/mild fibrosis	Ref			Ref		
F2	−0.01	−0.044 to 0.023	.540	0.00	−0.028 to 0.037	.793
F3	−0.03	−0.077 to 0.026	.337	−0.01	−0.064 to 0.038	.615
F4 – cirrhosis	−0.04	−0.089 to 0.009	.110	−0.03	−0.077 to 0.021	.261
Missing	−0.04	−0.076 to −0.002	.038	−0.03	−0.070 to 0.004	.081

ETHOS indicates Enhancing Treatment of Hepatitis C in Opioid Substitution Settings; HCV, hepatitis C virus; OAT, opioid agonist therapy; Ref, reference.

HCV infection statuses nor different stages of liver disease. Further research is needed to validate the use of EQ-5D-5L among PWID and understand factors associated with lower HRQoL. This will not only facilitate the development of multifaceted care models for PWID beyond HCV cure but also provide reliable utility scores for health economic analyses for identifying optimal health strategies to enhance HCV elimination and improve health outcomes among this population.

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Links to the individual disclosure forms provided by the authors are available here.

Supplemental Material

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