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COVID-19 vaccination intention among people who use drugs in France in 2021: results from the international community-based research program EPIC

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Abstract

Background COVID-19 vaccination is crucial to reduce the incidence of severe forms of the disease in the population. However, people who use drugs (PWUD) face structural and individual barriers to vaccination, and little is known about vaccination intention and factors associated with that intention among PWUD. This study aimed to estimate vaccination intention in PWUD and associated factors in the early stage of vaccination campaigns.

Methods We conducted cross-sectional study in France among PWUD, as part of the international EPIC program, a community-based research study coordinated by Coalition PLUS. It included 166 unvaccinated PWUD attending harm reduction centers. A questionnaire collected data on sociodemographic characteristics, COVID-19 related difficulties, and mental health, among other things. Multivariate logistic regression was used to identify factors associated with low vaccination intention.

Results Only 19% of participants reported strong intention to get vaccinated against COVID-19. Factors independently associated with low vaccination intention were younger age (aOR = 0.90, 95%CI = 0.85–0.95), lower education level (aOR = 2.67, 95% CI = 0.95–7.55), and unstable housing (aOR = 6.44, 95% CI = 1.59–40.34). The most-cited reasons for low intention were mistrust in COVID-19 vaccines (66.1%), fear of side effects (48.7%), and non-belief in vaccinations in general (25.2%).

Conclusions This study highlights the need for targeted COVID-19 information and interventions to increase vaccine uptake in PWUD, especially those living in precarity. Community-based interventions and targeted government assistance could play a crucial role in addressing vaccine hesitancy in this population, not only for COVID-19 but for future epidemics.

Keywords Vaccination intention, COVID-19, People who use drugs, Community-based research

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Background

At the end of 2019, the SarS-Cov2 virus, which causes the infectious respiratory disease COVID-19, first appeared in China and spread rapidly around the world to become a pandemic. The most frequent symptoms of COVID-19 are coughing, fever, loss of smell or taste, and fatigue. Symptoms can last long after infection ("Long COVID") [1] and severe COVID-19 can lead to hospitalization and death, especially in older people and persons with comorbidities such as hypertension, diabetes, and chronic disease [2].

At the pandemic spread, the international scientific community and pharmaceutical companies worked exhaustively to develop vaccines as quickly as possible. In Europe, the first vaccine to obtain marketing authorization was Comirnarty (Pfizer & BioNTech) in December 2020 followed by Jcovden (Janssen), Spikevax (Moderna), and others [3–5]. The vaccination campaign in France began on 27 December 2020. Following recommendations by the National Authority for Health, vaccination was first made available to those most at risk of developing severe COVID-19. By May 2021, it was available to the entire population.

People who use drugs (PWUD) are particularly marginalized and therefore constitute a vulnerable population. In France, some PWUD have precarious living conditions including unstable housing (10% are temporarily housed and almost a quarter are homeless), and low or no income; these factors can lead to difficulties with food provision, hygiene, and health, as well as the threat of violence [6, 7]. In addition, repressive Government policies and prejudice about PWUD foster stigmatization by healthcare providers and society in general, which in turn can lead to PWUD distancing themselves from the healthcare system. Moreover, risky drug use practices can expose PWUD to viruses such as Hepatitis B, Hepatitis C and HIV [8, 9].

In France, harm reduction centers support PWUD using a strategy of unconditional acceptance and by providing several services including injection equipment, advice about safer drug use, blood borne infection rapid testing, primary healthcare, food and assistance for social-welfare needs. This centers often implement new actions reflecting current events (e.g., new harm reduction tools, information on trending drugs, information on health issues such as Monkeypox) and the real needs of PWUD and other vulnerable groups. This is reflected in how these centers have adapted the way services are provided (e.g., click-and-collect systems for injection equipment, maximum number of persons that can be received at any one time, modified opening hours).

As for other vulnerable groups, the COVID-19 pandemic had a greater impact on PWUD than on the general population [10]. One US study showed that people with substance use disorder were at greater risk of being infected by the disease and of having a severe form [11]. Significant events (e.g., financial or environmental crises, wars) can increase violence and drug use frequency in PWUD, and can affect their health and quality of life [12]. Moreover, such events can lead to higher prices for the substances they use [12]. During the COVID-19 pandemic, higher prices and consumption were observed, as was a perception by PWUD that drug supply decreased [13, 14]. Moreover, financial difficulties and precariousness increased [14]. In terms of health, social distancing was difficult to respect, exposing this population to sanitary risks. PWUD mental health was also very affected, with increased levels of anxiety and depression [14–16].

Given their vulnerability, it was particularly important that PWUD be vaccinated against COVID-19, to lower their risk of infection and of developing a severe form of the disease. However, structural barriers (poor access to health, stigmatization and negative previous experiences with health professionals) and individual barriers (personal beliefs, lack of confidence in vaccination, risk perception, mental health) hinder vaccination acceptability in general in this population [17]. For example, a previous study showed that PWUD were reluctant about vaccination against seasonal influenza for personal reasons, including the belief that it was not useful and the perception that the vaccine makes people ill [18]. During the COVID-19 pandemic, social media also influenced public opinion, diffusing conspiracy theories and misinformation, which led to increased vaccination hesitation [19, 20].

Studies have shown that, worldwide, hesitancy about COVID vaccines during the pandemic may have been greater than for other vaccines, as they were developed and approved for market in record time [21]. This is particularly true in France, a country where vaccine hesitancy is relatively high by international standards [22]. Hesitancy was compounded by the French government's initial management of the crisis. According to the final report of the National Independent Mission on the Evaluation of the Management of the COVID-19 crisis and on Pandemic risk Anticipation (*Mission indépendante nationale sur l'évaluation de la gestion de la crise COVID-19 et sur l'anticipation des risques pandémiques*) [23], published in March 2021, the government did not adequately anticipate that the health crisis would have come to France, and that this oversight led to several structural failures including a shortage of masks, a slow build-up of testing capacity, and non-optimal data capture (especially for screening) in national medico-administrative information systems. Furthermore, with regard to vaccination, given the relatively high level of vaccine hesitancy in the country, public and political authorities initially adopted a policy of not incentivizing vaccination for fear that such

a stance would have the opposite public reaction. Finally, misinformation was ubiquitous in the French media, fostering anti-vaccination attitudes reflected in the 'anti-vax' movement [23].

This study was part of EPIC (*Enquêtespour évaluer l'impact de la crise sanitaire Covid-19 en milieuCommunautaire, which stands for Surveys to Assess the Impact of the COVID-19 Health Crisis in the Community Setting in English*), an international community-based research program coordinated by Coalition PLUS, which is an international network of sixteen community-based non-governmental organizations (NGO) and over one hundred partner organizations involved in the fight against HIV. The program aimed to document the impact of the COVID-19 crisis on people living with, or exposed to HIV or HCV (hereafter 'key populations') [24, 25]. As a community-based research program, concerned populations were involved in all the steps of the program. Organizations participating in EPIC were responsible for adapting the program's general protocol to develop their own implementation protocol based on their research objectives.

Given this context, the present study, which presents the French implementation of EPIC, aimed to estimate vaccination intention in PWUD in France and to identify factors associated with low vaccination intention in this population.

Methods

EPIC program in France

The French component of the EPIC program comprised a quantitative cross-sectional study which focused specifically on PWUD attending harm reduction centers managed by the community-based organization Aides (hereafter AHRC for AIDES Harm Reduction Centers, that all provide same services). Established in 1984, Aides is an NGO working throughout France with people living with HIV and populations most exposed to HIV and hepatitis, including PWUD.

Our quantitative cross-sectional study was implemented in 28 AHRC in 28 cities throughout France, between May and October 2021. At that time, everyone in France was entitled to be vaccinated against COVID-19. A paper-based questionnaire was used. Participants could respond to the questionnaire alone or be helped by AHRC teams if needed.

Study eligibility criteria were as follows: 18 years or older and having consumed psychoactive substances in the previous 12 months. During the data collection period, all eligible PWUD visiting the relevant AHRC were invited to participate. Participants who were already vaccinated were excluded.

Data collection

Participants were provided with the study questionnaire and information on how to complete it (i.e., whether alone or with the help of AHRC teams).

To describe the participants, data on sociodemographic characteristics were collected: age, gender, education level ('lower education level' was defined as high-school certificate or less), living area (rural or urban), and unstable housing (defined as living on the street or in a squat). Data related to the COVID-19 crisis were also collected: food provision, as well as deterioration in financial situation and in quality of life since the pandemic. Furthermore, anxiety was evaluated using the General Anxiety Disorder-7 (GAD-7) assessment (mild, moderate or severe anxiety) [26], and depression using the Patient Health Questionnaire-9 (minimal or none, mild, moderate, moderately severe or severe depression) [27]. The respective scores for depression and anxiety were calculated, and categorical variables created according to score interpretation and cut-offs recommendations. For PHQ-9: 0–4 is no symptoms; 5–9: Mild symptoms; 10–14: Moderate symptoms; 15–19 is moderately severe symptoms and 20–27 is sever symptoms. Concerning the GAD-7, 0–4 is no symptoms; 5–9: mild symptoms; 10–14: moderate symptoms and 15–21 is severe symptoms Then, some categories were grouped due to small sample size: mild and moderate anxiety, mild and moderate depression, moderately severe and severe depression. Data on drug use characteristics were also collected as follows: recent drug injection (in the previous 12 months), uptake of medication for opioid use disorder (MOUD)(methadone, buprenorphine or morphine) before the COVID-19 crisis, substance use since the beginning of the crisis, and sexualized drug use before and during the crisis.

The outcome was addressed with the questionnaire item: "Do you intend to get vaccinated now that several vaccines which are effective and recommended by the health authorities are available in France?". PWUD who answered "Yes, absolutely" were categorized as having 'strong intention' to get vaccinated, while those who responded "Yes, probably", "Maybe", "No, probably not" and "No, absolutely not" were all categorized as having 'low intention'. Isolating the "yes, absolutely" modality from the others was done to emphasize the strong willingness to be vaccinated. In this sense, the "maybe" and "yes, probably" modalities were too hesitant to be placed alongside a categorical yes.

Statistical analysis

Socio-demographic characteristics, mental health, and data related to both the COVID-19 crisis and to drug use were described. Continuous variables were reported as

medians with IQR and categorical variables as frequencies and percentages.

The proportions of the variables in the two groups were compared using Chi-squared and Fisher tests. Logistic regression models using Firth's method (for rare events) [21, 22] were used to identify factors associated with low intention to get vaccinated.

Variables with a p-value < 0.20 in the univariate analysis were considered eligible to enter the multivariate model. Variables strongly correlated with low intention were excluded from the analysis according to the Variance Inflation Factor (VIF > 10). In the multivariate analysis, a backward procedure based on the Akaiké Information Criteria (AIC) was performed. The final model was adjusted for the mode of questionnaire completion (i.e., self-administered vs. being helped by an AHRC team member).

Analyses were performed using R software Version 4.0.5.

Results

Comparison of characteristics between PWUD with 'low intention' and PWUD with 'strong intention' in terms of vaccination against COVID-19 (table 1)

Of the 166 unvaccinated PWUD that completed the questionnaire, 138 were men (83%) and median age was 40 [IQR: 34–47]. Education level was low for 124 (80%) of them and the great majority (n=143, 90%) lived in an urban area. A majority of them had an unstable housing (n=118, 74%) and participants reported financial (n=64, 40%), housing (n=32, 21%), food (n=55, 34%) and health (n=61, 39%) difficulties. Deterioration in quality of life since the beginning of the COVID-19 crisis was real for 68 (43%) participants. Moreover, half of participants reported mild or moderate anxiety (n=76, 48%) and mild or moderate depression (n=81, 51%), according to the GAD-7 and PHQ-9 scores.

Among participants, 134 (80.7%) were classified as having low intention to get vaccinated against COVID-19 (Table 1). Compared to their 'strong intention' counterparts, they were significantly younger (median age: 38[IQR: 32–45] vs. 48[IQR: 40–51], p<0.001), more likely to have a lower education level (82.9% vs. 68.8%, p=0.074), and to have unstable housing (30.8% vs. 6.7%, p=0.007). Moreover, they were more likely to report financial difficulties (44.1% vs. 25.0%, p=0.049) and housing difficulties (24.0% vs. 9.4%, p=0.071) since the beginning of the crisis. Finally, they were less likely to have requested help to complete the questionnaire (18.5% vs. 32.2%, p=0.091). No difference was observed between the two groups in terms of gender, living area, food insecurity, quality of life, or mental health.

Drug use practices of 'low intention' and 'strong intention' PWUD (Table 2)

Of the 166 unvaccinated respondents, 82 (50.9%) had injected drugs in the previous 12 months; no difference in the proportions of respondents was observed between the two intention groups. Neither was any difference observed for MOUD uptake (48.5%). Some substance use had increased since the beginning of the COVID-19 crisis: alcohol use (28%), cannabis use (22%), cocaine use (19.6%), crack use (16.3%) and opioid use (15.4%), with no difference between the two groups (Table 2).

Reasons for low intention to get vaccinated against COVID-19

The most frequent reasons (multiple answers possible) mentioned for not wanting to get vaccinated against COVID-19 (i.e., responding "No, probably not" or "No, absolutely not" to the relevant question) were: "You don't trust COVID-19 vaccines" (66.1%), "You fear the side effects of the vaccine" (48.7%), and "You don't believe in vaccination in general" (25.2%).

Factors independently associated with low intention to get vaccinated against COVID-19 (Table 3)

After adjustment for the mode of questionnaire completion, younger age (aOR[95% CI] = 0.90[0.85;0.95], p<0.001), having a lower education level (2.67[0.95;7.55], p=0.061), and having unstable housing (6.44[1.59;40.34], p=0.007) were all independently associated with low intention to get vaccinated against COVID-19 in the final multivariate model (Table 3).

Discussion

Overall, this analysis of PWUD conducted between May and October 2021 in 28 AHRC throughout France as part of the EPIC program, highlighted low COVID-19 vaccination intention among the 166 unvaccinated PWUD who completed the survey questionnaire. This is despite the fact that vaccination was available at that time for everyone in the country. Specifically, only 19% (N=32) of our study population answered 'Absolutely yes' when asked about their intention to get vaccinated against the disease. In a different study among the French general population in early July 2021 80% answered 'yes' (vs. 'no') to the question 'Do you plan to get vaccinated against COVID-19?' [28].

In our study, PWUD who had low intention to get vaccinated mentioned their mistrust of COVID-19 vaccines, their fear of side effects, and the fact they did not believe in vaccination in general. These barriers to vaccination were correlated with age, social precarity and education; specifically, being younger, having a lower education level, and unstable housing were all independently associated with having low vaccination intention.

Table 1 Comparison of characteristics between PWUD with 'low intention' and 'strong intention' to get vaccinated against COVID-19

Variables	Overall *N* = 166	Strong vaccination intention *N* = 32	Low vaccination intention *N* = 134	*p*-value
Gender				
Man	138 (83.1)	28 (87.5)	110 (82.1)	
Woman	26 (15.7)	4 (12.5)	22 (16.4)	0.642
Other	2 (1.2)	0 (0.0)	2 (1.5)	NA
Age median [IQR] (per one year older)	40 [34–47]	48 [40–51]	38 [32–45]	**< 0.001**
Education level				
Lower (i.e., high school certificate or lower)	124 (80.0)	22 (68.8)	102 (82.9)	
Higher (tertiary education)	31 (20.0)	10 (31.2)	21 (17.1)	**0.078**
Living area				
Rural area	15 (9.5)	1 (3.2)	14 (11.0)	
Urban area	143 (90.5)	30 (96.8)	113 (89.0)	0.226
Unstable housing				
No	118 (73.8)	28 (93.3)	90 (69.2)	
Yes	42 (26.2)	2 (6.7)	40 (30.8)	**0.004**
Financial difficulties[1]				
No	95 (59.7)	24 (75.0)	71 (55.9)	
Yes	64 (40.3)	8 (25.0)	56 (44.1)	**0.050**
Housing difficulties[1]				
No	121 (79.1)	29 (90.6)	92 (76.0)	
Yes	32 (20.9)	3 (9.4)	29 (24.0)	**0.073**
Food insecurity[1]				
No	106 (65.8)	24 (75.0)	82 (63.6)	
Yes	55 (34.2)	8 (25.0)	47 (36.4)	0.236
Health difficulties[1]				
No	96 (61.1)	19 (61.3)	77 (61.1)	
Yes	61 (38.9)	12 (38.7)	49 (38.9)	0.993
Deterioration in quality of life[1]				
No	90 (57.0)	19 (59.4)	71 (56.3)	
Yes	68 (43.0)	13 (40.6)	55 (43.7)	0.773
Perception of French government's response to COVID-19				
Adapted to PWUD	56 (47.5)	15 (55.6)	41 (45.1)	
Not adapted to PWUD	62 (52.5)	12 (44.4)	50 (54.9)	0.998
Perception of community-based NGO response to COVID-19				
Adapted to PWUD	31 (25.6)	6 (25.0)	25 (25.8)	
Not adapted to PWUD	90 (74.4)	18 (75.0)	72 (74.2)	0.342
Anxiety (GAD-7)				
No anxiety	61 (38.9)	15 (50.0)	46 (36.2)	
Mild or moderate anxiety	76 (48.4)	12 (40.0)	64 (50.4)	0.201
Severe anxiety	20 (12.7)	3 (10.0)	17 (13.4)	0.421
Depression (PHQ-9)				
Minimal	52 (32.5)	13 (40.6)	39 (30.5)	
Mild/Moderate	81 (50.6)	15 (46.9)	66 (51.6)	0.367
Moderately severe/Severe	27 (16.9)	4 (12.5)	23 (17.9)	0.324
Self-administration of questionnaire				
No	34 (21.1)	10 (32.2)	24 (18.5)	
Yes	127 (78.9)	21 (67.8)	106 (81.5)	0.093

[1]: since the beginning of COVID-19 crisis; in bold: p-value<0.20

NGO: non-governmental organizations

Table 2 Comparison of drug use behaviors between PWUD with 'low intention' and 'strong intention' PWUD to get vaccinated against COVID-19; *N* = 166

Variables	Overall *N* = 166	Strong vaccination intention *N* = 32	Low vaccination intention *N* = 134	*p*-value[1]
	n (%)	*n* (%)	*n* (%)	
Injection drug use in the previous 12 months				0.364
No	79 (49.1)	18 (56.2)	61 (47.3)	
Yes	82 (50.9)	14 (43.8)	68 (52.7)	
Sexualized drug use				0.116
No	111 (72.5)	19 (61.3)	92 (75.4)	
Yes	42 (27.5)	12 (38.7)	30 (24.6)	
MOUD uptake				0.551
No	85 (51.5)	18 (56.2)	67 (50.4)	
Yes	80 (48.5)	14 (43.8)	66 (49.6)	
Cannabis use[2]				0.267
No use	35 (21.3)	10 (31.3)	25 (18.9)	
Same or less than before	93 (56.7)	17 (53.1)	76 (57.6)	
More than before	36 (22.0)	5 (15.6)	31 (23.5)	
Cocaine use[2]				0.116
No use	45 (27.6)	13 (40.6)	32 (24.4)	
Same or less than before	86 (52.8)	12 (37.5)	74 (56.5)	
More than before	32 (19.6)	7 (21.9)	25 (19.1)	
Alcohol use[2]				0.893
No use	47 (28.7)	10 (31.2)	37 (28.0)	
Same or less than before	71 (43.3)	14 (43.8)	57 (43.2)	
More than before	46 (28.0)	8 (25.0)	38 (28.8)	
Crack use[2]				0.164
No use	65 (40.9)	17 (53.1)	48 (37.8)	
Same or less than before	68 (42.8)	9 (28.1)	59 (46.5)	
More than before	26 (16.3)	6 (18.8)	20 (15.7)	
Opioid use[2]				0.154
No use	71 (43.8)	19 (59.4)	52 (40.0)	
Same or less than before	66 (40.8)	9 (28.1)	57 (43.8)	
More than before	25 (15.4)	4 (12.5)	21 (16.2)	

[1]: chi-squared test of independence

[2]: compared to before the COVID-19 crisis

MOUD: medication for opioid use disorder

Table 3 Factors independently associated with low intention to vaccinate against COVID-19, *N* = 145

Factor	Multivariate analysis		
	aOR	95% CI	*p*-value
Age (per one year older)	0.90	0.85–0.95	**< 0.001**
Education level			
Higher (Tertiary studies)	1.00		
Lower (High school certificate or lower)	2.67	0.95–7.55	0.061
Unstable housing			
No	1.00		
Yes	6.44	1.59–40.34	**0.007**
Self-administration of questionnaire			
No	1.00		
Yes	3.20	1.10–9.47	**0.033**

aOR: adjusted Odds Ratio; CI: confidence interval

Several studies worldwide on COVID-19 vaccination intention among PWUD have also reported low intention. In Australia, 48% of unvaccinated participants answered 'probably not' (13%), 'not sure yet' (13%) or 'absolutely no' (22%) when asked 'Do you intend to get vaccinated for COVID-19?' [29]. In Oregon, USA, vaccine acceptability was measured among PWUD who injected drugs with the question 'How likely are you to get an approved COVID-19 vaccine when it becomes available?'. Less than half (40%) indicated that they were 'very likely' or 'fairly likely' to do so [30]. Similar results were found in a study in Baltimore, USA [31] and in the USA-Mexico border area [32].

Research teams also studied sociodemographic factors associated with low vaccination intention among PWUD. Findings highlighted that lower income [33], younger age [32], being a woman [34], and being misinformed [32,

35] were all independently associated with low intention to vaccinate against COVID-19. In the general French population, extreme political ideologies [28], a lower education level [22] and being a woman [36] were all associated with low intention to get vaccinated. These various results strengthen ours regarding age and education level.

Moreover, previous studies have highlighted other factors, similar to our findings, for low intention to vaccinate. For example, an Australian study among vaccine-hesitant PWUD who injected drugs showed that perceived vaccine safety (i.e., 'the vaccine has not been tested enough') and vaccine side effects were the most-cited barriers to vaccination (41% and 35% of those who replied 'definitely not' and 'probably not', respectively, to the related question) [37]. A study in the USA showed that among vaccine-hesitant PWUD who injected drugs, the most-cited reasons were side effects (36%), not being concerned about getting really ill from COVID-19 (30%), and not knowing enough about how the vaccine worked (28%) [30]. Another study in the USA focused on the reasons for COVID-19 vaccine hesitancy among people with substance use disorder. The three most-cited reasons were that the development process for the vaccine was 'rushed', adverse effects, and the perception that they were not at high risk of acquiring the disease [38].

Our study results reinforce the literature on low COVID-19 vaccination intention among PWUD in Europe. A previous French study which estimated COVID-19 vaccine uptake among migrants, homeless people, and persons with precarious housing highlighted that vaccination uptake (i.e., at least one dose) was lowest in homeless people. Instead, older people, migrants, and persons needing a vaccine certificate for work or for other reasons were more likely to get vaccinated [39]. That study also highlighted that low vaccination intention/uptake was associated with a younger and more socially precarious population. One possible explanation for the latter finding is that persons living in precarity have complicated lives and have to manage to get by on a day-to-day basis; their health priorities are different from those of the general population.

Low COVID-19 vaccination intention among PWUD, in particular those living in precarity, show that specific disease prevention strategies to advocate vaccination are required for this population. Prevention communication actions about COVID-19 and other diseases must be accompanied by specific and adapted messages for PWUD, something that should have been done, but was not, during the French government's COVID-19 vaccination campaign [40].

Community-based approaches and peer-support are needed to improve intention to vaccinate and vaccination uptake in general among key populations, especially given the mistrust of the government by many PWUD in France. This mistrust is due, at least in part, to stigmatization of PWUD and the continued "war-on-drugs" policy by successive French governments [41]. A qualitative study in the USA showed the need to implement several actions in minority populations who hesitated to get vaccinated against COVID-19 for several reasons (distrust of vaccines in general, fear of side effects, cultural barriers, etc.). Specifically, the authors suggested (i) educating PWUD on vaccination even before vaccine availability, (ii) having open and honest conversations about ongoing stigmatization on PWUD in medical staff, (iii) improving care providers' listening skills in terms of PWUD experiences, (iv) discussing how vaccines are made and how they work, and (v) taking social, cultural and generational differences into account when having those conversations [42]. Community-based organizations have a role to play in the implementation of specific actions to reduce vaccine hesitation among PWUD. For example, information may be better understood and accepted by PWUD who frequent community centers that provide unconditional care and trust. Vaccine delivery in such settings could be an opportunity to lower the barriers to vaccination among this population [43].

This study has limitations. First, it is cross-sectional in design; accordingly, we were not able to establish whether there was a causal link in our results. Neither were we able to study the temporal evolution of vaccination intention in participating PWUD. The latter limitation is especially important since opinions on vaccines can vary over time and are often influenced both by the evolution of an epidemic and by acceptability at the population level. Second, as an exploratory study in emergency context, we did not do an a priori power analysis and so we did not calculate the sample size needed for the study. Also, the sample size was quite small; however, this was considered in the statistical analysis by using Firth's method. Third, self-reporting may lead to recall bias; this was minimized by using variables referring to "before the beginning of the pandemic". Fourth, self-reported information may also have been influenced by social desirability, in a context where participants were questioned about the consumption of psychoactive substances, some of which were illicit. However, the study's interviewers were trained and experienced in interaction with PWUD, and most were peers. Furthermore, literature shows that self-reported data collected from PWUD are valid and reliable [44]. Fifth, the study population is not representative of PWUD in France, as only PWUD who came to an AHRC were recruited. Having said that, PWUD who frequent these centers often live in social precarity and are not reached by traditional health services. Accordingly, it is extremely important to identify and address barriers to vaccination among this sub-population.

Conclusions

This study shows the need for specific interventions to increase COVID-19 vaccine intention in PWUD, through community-based and peer-support approaches, as well as government assistance and support. The SARS-CoV-2 virus continues to circulate with new mutations. Vaccination and booster doses are key elements to prevention strategies and must be made available for everyone. Furthermore, accurate information must be provided to gain the trust of more reluctant people, such as PWUD, especially because they are at greater risk of severe forms of COVID-19. The negative impact of the COVID-19 pandemic on PWUD, and the low vaccination intention observed in this and other vulnerable populations, especially persons living in social precarity, highlights the need to rapidly prepare comprehensive community-based solutions for future pandemics (COVID-19 or other).

Abbreviations

PWUD	People who use drugs
AHRC	AIDES harm reduction center
MOUD	Medication for Opioid Use Disorder
NGO	Non-governmental organization
HIV	Human immunodeficiency virus
HCV	Hepatitis C virus

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Author contributions

DRC, RMD, VV and LR represent the EPIC Study group, who conceived and designed the study protocol and the data collection instruments. RD, LR and NL were specifically in charge of coordination between global EPIC program and French EPIC study. Data collection was piloted by CL with the help of all AIDES harm reduction centers member, including SC and SED. Data coding and data analysis was made by CL with the help of VV. CL draft the article. All authors were involved in reviewing and finalizing the manuscript.

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Data availability

The dataset analyzed during the study is not publicly available. Individual privacy could be compromised.

Declarations

Ethics approval and consent to participate

Ethical approval was obtained from the Institutional Review Board (IRB0000388) of the French Institute of Health and Medical Research under the number n°20–712 issued on 9 March 2021. Oral consent has been obtained for each participant.

Consent for publication

Consent for publication was collected from the participants as part of the informed consent procedure.

Competing interests

The authors declare no competing interests.

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