



Pharmacokinetic and clinical observations in people over 50

# Investigating the intersection of substance use and high risk sexual behaviours, and their associations with mental health, in people living with HIV

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## Background and aims

- A high prevalence of smoking, alcohol and recreational drug use is reported in people living with HIV (PLWH)<sup>1</sup>, in addition to riskier sexual behaviour<sup>2</sup>
- Whilst there is also a high prevalence of mental health conditions among PLWH<sup>3</sup>, the relationship between these risk behaviours and mental health conditions is unknown in this population

### STUDY AIMS

- To investigate the patterns and frequency of multiple risk behaviours (alcohol, drugs, smoking, higher risk sexual activity) among PLWH participating in the Pharmacokinetic and Clinical Observations in People over Fifty (POPPY) study so as to identify a phenotype that might indicate 'high-risk'
- To investigate if PLWH reporting a high number of risk behaviours (3 or 4) have a higher prevalence of mental health problems than those reporting none or few (1 or 2) risk behaviours

## Methods

- Cross-sectional analysis of baseline data from HIV-positive POPPY participants with linked data from the UK Collaborative HIV Cohort (UK CHIC) and the UCD ID Cohort was used; four risk behaviours were identified: current smoking, recreational drug use in the past 6 months, alcohol consumption >21 units/week (all from patient questionnaire) and an STD in the past year (as a surrogate for high-risk sexual behaviour)
- A 'risky phenotype' was defined as exhibiting three or four of the risk behaviours
- Mental health outcomes were assessed through:
  - Patient reported history of mental health conditions
  - Current depressive symptoms (Patient Health Questionnaire [PHQ-9] ≥5)
  - Current significant depressive symptoms (Center for Epidemiologic Studies Depression [CES-D] ≥16)
- Univariate/multivariable logistic regression (backwards stepwise selection) was used to investigate associations between participant characteristics and the risky phenotype, and between this and mental health outcomes
- As the majority (95%) of participants exhibiting the risky phenotype were men who have sex with men (MSM), analysis into mental health outcomes was undertaken in the subgroup of MSM only
- All analyses were conducted in Stata (version 14)

## Results

### PARTICIPANTS

- 1072 HIV-positive POPPY participants were included

Variables:	Frequency	Percentage
<b>Gender</b>		
Female	158	14.7
Male	914	85.3
<b>Age (years)</b>		
Median (range)	52 (20 - 82)	
<b>Mode of infection</b>		
Heterosexual	253	23.6
MSM	819	76.4
<b>Race</b>		
White	902	84.1
Black	170	15.9
<b>Country of birth</b>		
UK	667	62.2
Rest of world	405	37.8
<b>Duration of ART (years)</b>		
Median (range)	9.5 (0 to 28.2)	
<b>Total</b>	<b>1072</b>	

Table 1. Characteristics of HIV-positive POPPY participants, included in the present study

### RISK BEHAVIOURS

- 25% were current smokers and 14% reported drinking >21 units alcohol/week
- 29% reported recent (<6 months) drug use; the most frequently reported recent drug use was for marijuana (13.8%, 148/1072)
- 13.2% (141/1072) of participants reported use of chemsex drugs (any of GBL/GHB, crystal methamphetamine or mephedrone)
- 62% reported a recent (<12 months) STD with 42.5% (456/1072) reporting gonorrhoea and 30.4% (326/1072) syphilis

### PATTERNS OF BEHAVIOURS

(Figure 1)

- In those reporting multiple risk behaviours the most frequent risk interactions were
  - STDs and drugs: 61 (5.7%)
  - STDs and tobacco: 116 (10.8%)
  - STD and alcohol: 52 (4.9%)
  - STD, tobacco and drugs: 87 (8.1%)
- These trends may be due in part by the high number of reported STDs in this cohort
- Overall, 152 (14.2%) reported ≥3 of the risk behaviours and were defined as exhibiting the risky phenotype; of those with the risky phenotype, almost all (141/152, 92.8%) reported an STD in the last 12 months

### RISKY PHENOTYPE

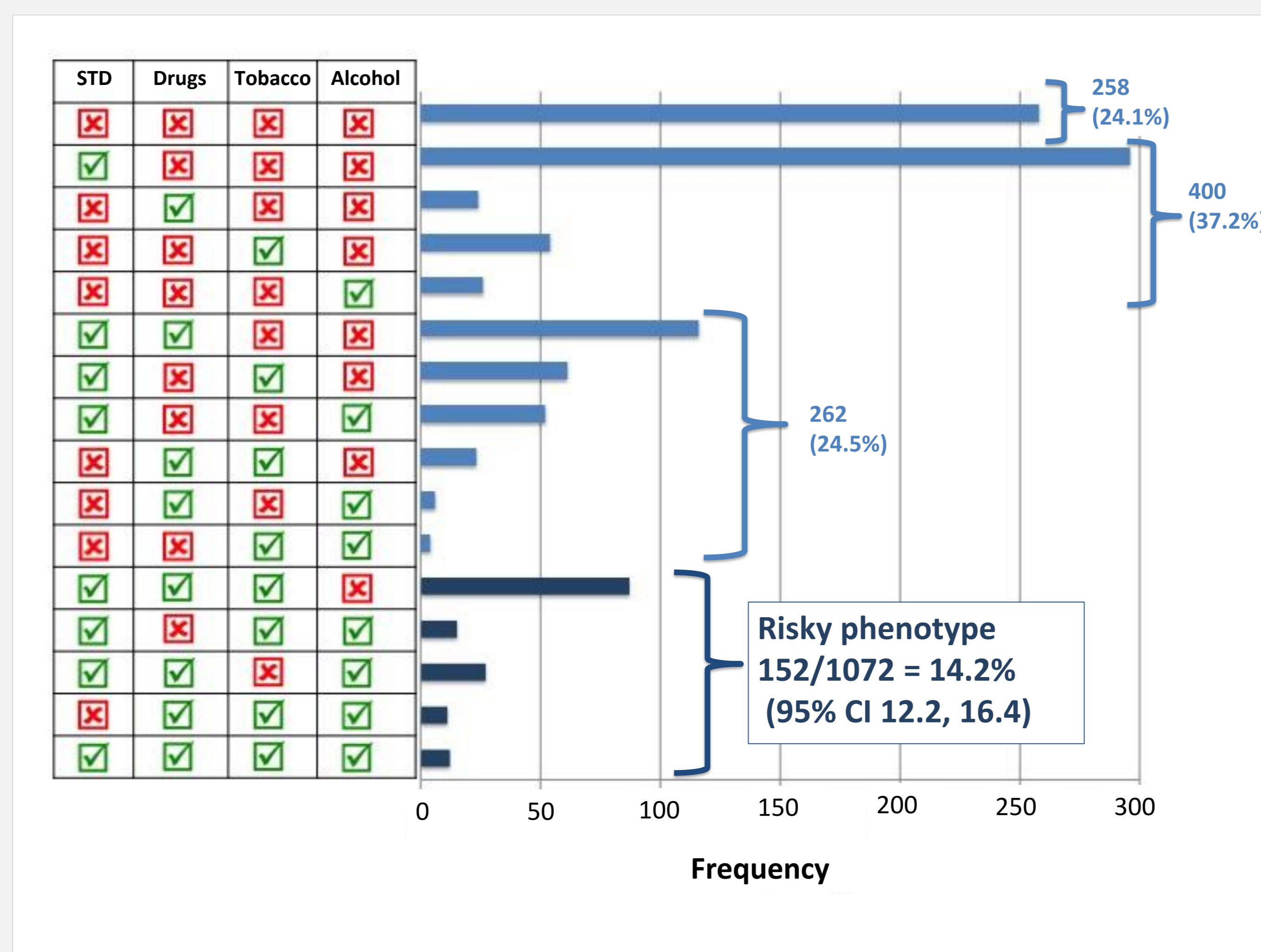


Figure 1. Patterns of risk behaviours exhibited by HIV-positive participants in the POPPY study

### ASSOCIATIONS WITH THE RISKY PHENOTYPE

- Although there was a decline in the prevalence as age increased (Figure 2, odds ratio (OR)/10 years older 0.73 [95%CI 0.61 - 0.96], p<0.001), the risky phenotype was seen in all age groups
- Of those with the risky phenotype, 144/152 (94.7%) were MSM
- After adjustment for age, MSM were 7.1 times more likely to report the risky phenotype than heterosexuals (OR 7.1 [3.44-14.81], p<0.001)
- No other independent associations with risky phenotype were seen.

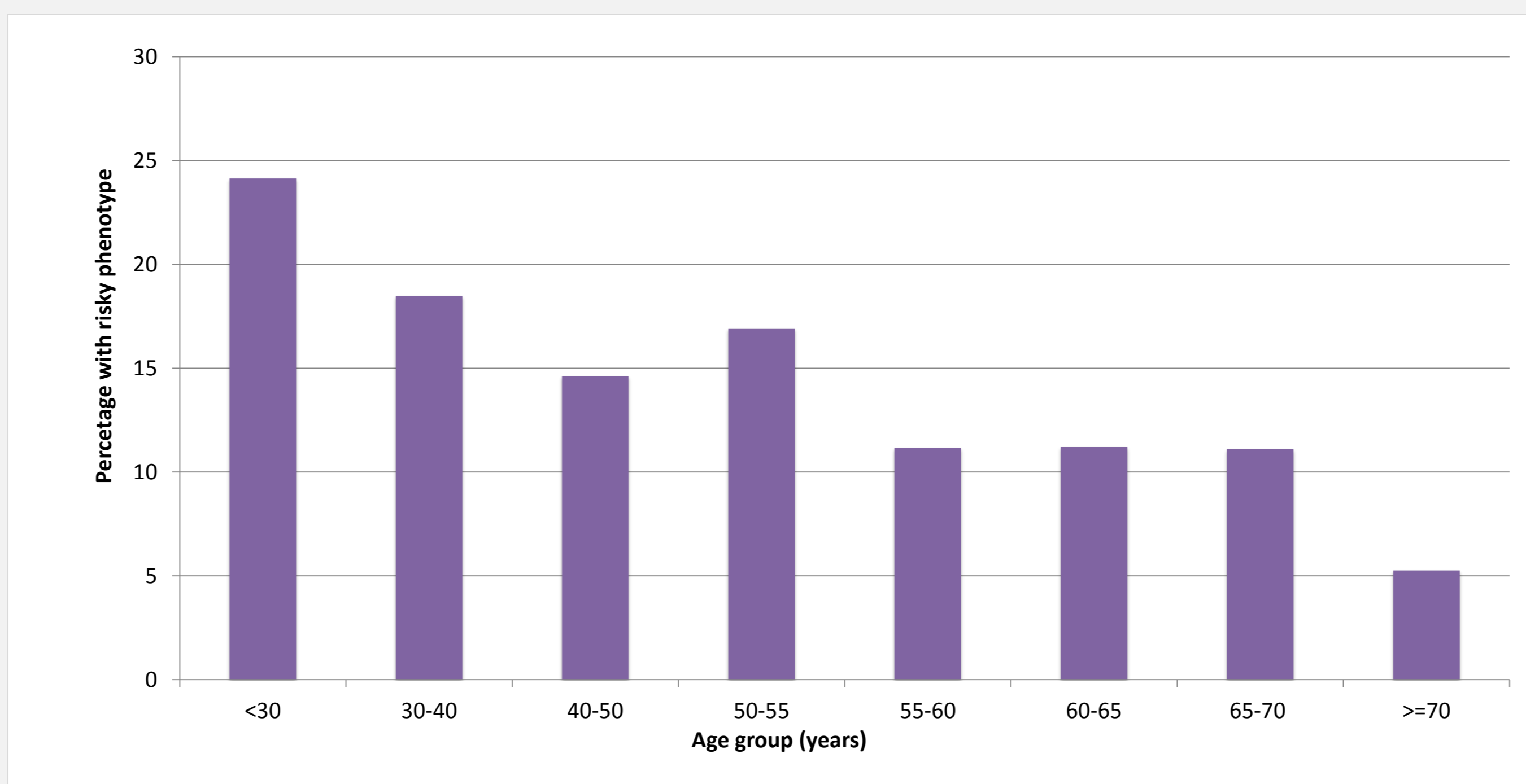


Figure 2. Distribution of the risky phenotype with age

### ASSOCIATIONS WITH MENTAL HEALTH

- Among MSM, the prevalence of mental health outcomes was as follows:
  - History of a mental health condition: 320 (39.1%)
  - Depressive symptoms PHQ-9 ≥5: 320 (39.1%)
  - Significant depressive symptoms CES-D ≥16: 233 (34.0%)
- In this group, clinical depression accounted for the vast majority of reported mental health conditions with 297/819 participants (36.3%) reporting this diagnosis
- 43 participants (5.3%) reported anxiety or panic attacks; other conditions, including schizophrenia, bipolar disorder and other psychosis, were less common, with <2% of participants reporting these conditions
- Of those with current depressive symptoms according to a PHQ-9 ≥5, 142/320 (44.4%) did not have a history of any diagnosed mental health condition
- Similarly, of those with a CES-D ≥16: 84/233 (36.1%) did not have a history of any diagnosed mental health condition
- MSM reporting a high-risk phenotype had an increased risk of all three measures of mental health status in adjusted analysis (Table 2)

Group:	Mental health condition Frequency (%)	PHQ-9 ≥5 Frequency (%)	CES-D≥16 Frequency (%)
<b>Risky phenotype</b>	64/144 (44.4%)	70/144 (48.6%)	54/144 (37.5%)
<b>Not risky phenotype</b>	256/675 (37.9%)	250/675 (37.0%)	179/675 (26.5%)
<b>Total</b>	320/819 (39.1%)	320/819 (39.1%)	233/819 (28.4%)
Group:	Mental health condition OR (95% CI) p-value	PHQ-9 ≥5 OR (95% CI) p-value	CES-D≥16 OR (95% CI) p-value
<b>Risky phenotype (unadjusted)</b>	1.31 (0.91, 1.88) p=0.14	1.50 (1.02, 2.21) p=0.04	1.61 (1.08, 2.39) p=0.018
<b>Risky phenotype (adjusted for age)</b>	1.30 (0.90, 1.87) p=0.16	1.49 (1.01, 2.20) p=0.05	1.66 (1.11, 2.47) p=0.014

Table 2. Associations between the risky phenotype and mental health outcomes amongst HIV positive MSM

## SUMMARY

- 14% of HIV-positive POPPY participants exhibited the risky phenotype; ≥3 of current smoking, excess alcohol, recreational drug use and STDs
- Almost all participants reporting the risky phenotype were male, and although the prevalence decreased with increasing age, the risky phenotype was seen in all age groups
- In MSM, the risky phenotype was associated with past mental health conditions and current symptoms of depression

## STRENGTHS AND LIMITATIONS

- Whilst our study benefits from a large sample size and standardised measurement of mental health conditions, the small numbers of participants in some sub-groups may have resulted in lack of power in sub-group analysis. As STDs were self-reported, prevalence may have been over- or under-estimated
- As this study is cross sectional, no causal relationships can be identified due to the lack of temporal data and it is also not possible to establish the direction of the relationship between the risky phenotype and mental health conditions, we suggest it may be bidirectional

## DISCUSSION

- Potential mechanisms for this relationship include that those people with mental health conditions may use substances to cope with their mental health symptoms, or that the substance use itself may predispose users to an increased risk of mental health problems
- The relationship between substance use, risky sex and depression had previously been studied in NATSAL3, although the populations studied differ. NATSAL3 is a household survey of the general population and in the risk sub-study only people aged 16 – 24 years were included<sup>4</sup>
- Whilst both studies found an association between risky behaviours and current symptoms of depression, the definition of risk differed (in NATSAL3, 'risky people' were defined as those reporting substance use and condomless sex with a new partner in the last 12 months<sup>4</sup>)
- Our study provides new evidence of the risky phenotype in the population of PLWH and identification of the risky phenotype in older age and in MSMs populations

### Future research

- Use longitudinal data to establish causality and direction of the relationships
- Investigating the impact of the risky phenotype on HIV outcomes and ART adherence

References: 1. Benard A, et al. *AIDS Patient Care and STDs* 2007; 21(7):458-68. 2. Elford J, et al. *AIDS*. 2007 Jan;21 Suppl 1:S63-70. 3. Schade A, et al. *BMC Psychiatry* 2013; 13:35. 4. Khadr SN, et al. 2016. *BMJ Open*. 6(6):e011961.

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