WAVE Workshop, Barcelona 2015

Gender, socio-economic status, and HIV-treatment outcomes

Fiona Lampe

Research Department of Infection and Population Health,

University College London

Background

- Women account for about half of those living with HIV globally; a third in Europe and the UK
- Results from HIV RCTs and observational studies often predominately relate to men
- Studies from US/Europe inconsistent regarding whether virological outcomes of ART differ between women and men[1,2] but evidence of poorer virological responses for women and heterosexual men (MSW), compared to MSM[3-6]
- Socio-economic factors (e.g. poverty, housing, social support) may be particularly relevant among women with HIV
- Socio-economic disadvantage may be linked to depression and difficulties with ART adherence

[1]Castiho 2014; [2]Soon 2012; [3]Fardet 2006; [4]Lampe 2006; [5]Saunders 2015; [6]Robertson 2015

Aim

- Assess effects of gender and socio-economic status on virological outcomes of ART in UK ASTRA Study (Antiretrovirals, Sexual Transmission Risk and Attitudes), a multicentre questionnaire study of people living with HIV in the UK in 2011/12
- Setting – universal free access to health care

Questions

Among people with HIV in the UK:

1. How do socio-economic characteristics, ART non-adherence, and VL non-suppression on ART, differ between women MSM, and MSW?

2. Are socio-economic factors & depression associated with ART non-adherence and VL non-suppression among women? (cross-sectional)

3. Are the associations similar among MSM, MSW?

4. Are socio-economic factors & depression predictive of VL rebound? (longitudinal)

5. How much do socio-economic factors & depression 'explain' gender variation in ART non-adherence, VL non-suppression, and VL rebound?

ASTRA study

- ASTRA questionnaire study of HIV-outpatients from 8 UK centres (Royal Free, Mortimer Market, Homerton, Newham, Whipps Cross, North Manchester, Brighton, Eastbourne) in 2011/12
- N=3258 (64% response rate)
  637 women
  373 MSW (heterosexual men)
  2248 MSM (gay/bisexual men)
- Self-completed, confidential questionnaire: demographic, socio-economic, lifestyle, health, HIV and ART-related factors
- Clinic VL and CD4 (latest at questionnaire) recorded
- Linkage with additional clinic data for consenting participants (N=2983 (92%) consented; data available for 6 clinics, N=2575)

Questionnaire-assessed factors (ASTRA)

- *Demographic factors* [gender/sexuality, age, ethnicity, stable partner, children, identifies with a religion]
- *Socio-economic factors* [UK birth/English fluency, financial status, employment, housing status, education, supportive network (modified Duke FSS questionnaire)]
- *Current depression symptoms* (PHQ-9)
- *HIV-related and other health-related factors* [time since HIV diagnosis, ART use, disclosure of HIV status, currently pregnant, IDU transmission route]
- *Lifestyle factors* [smoking, possible alcohol dependency (CAGE questionnaire), recreational drug use]

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Demographic, HIV & lifestyle factors by gender/sexuality

N=3258	Women N=637	MSW N=373	MSM N=2248
Age<40 years	38%	20%	28%
White	19%	32%	88%
Black African	64%	49%	1%
Other/missing	17%	19%	11%
Stable partner	55%	68%	54%
Children	75%	69%	7%
Currently pregnant	2%		
Identifies with a religion	89%	79%	43%
Not disclosed HIV-status	16%	17%	5%
Current smoker	11%	32%	37%
Possible alcohol dependency[$]	11%	19%	20%
Recreational drugs past 3m	7%	17%	51%
IDU likely transmission risk	3%	6%	1%

p<0.001 for comparison across gender/sexuality groups, all factors

[$]CAGE questionnaire, score ≥2

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Not enough money	25%	20%	8%
Employed	45%	45%	61%
Homeowner	15%	22%	41%
Renting	68%	59%	51%
Unstable housing / other~	18%	19%	8%
University education	31%	35%	44%
Lower supportive network#	24%	22%	22%
Depression symptoms*	30%	28%	25%

p<0.001 for comparison across gender/sexuality groups, all factors apart from supportive network (p>0.1) and depression symptoms (p=0.02)

**PHQ-9 major & other depression; #Modified Duke Functional Social Support Questionnaire (FSSQ) score <16; ~Temporary accommodation, staying with family or friends, homeless, other*

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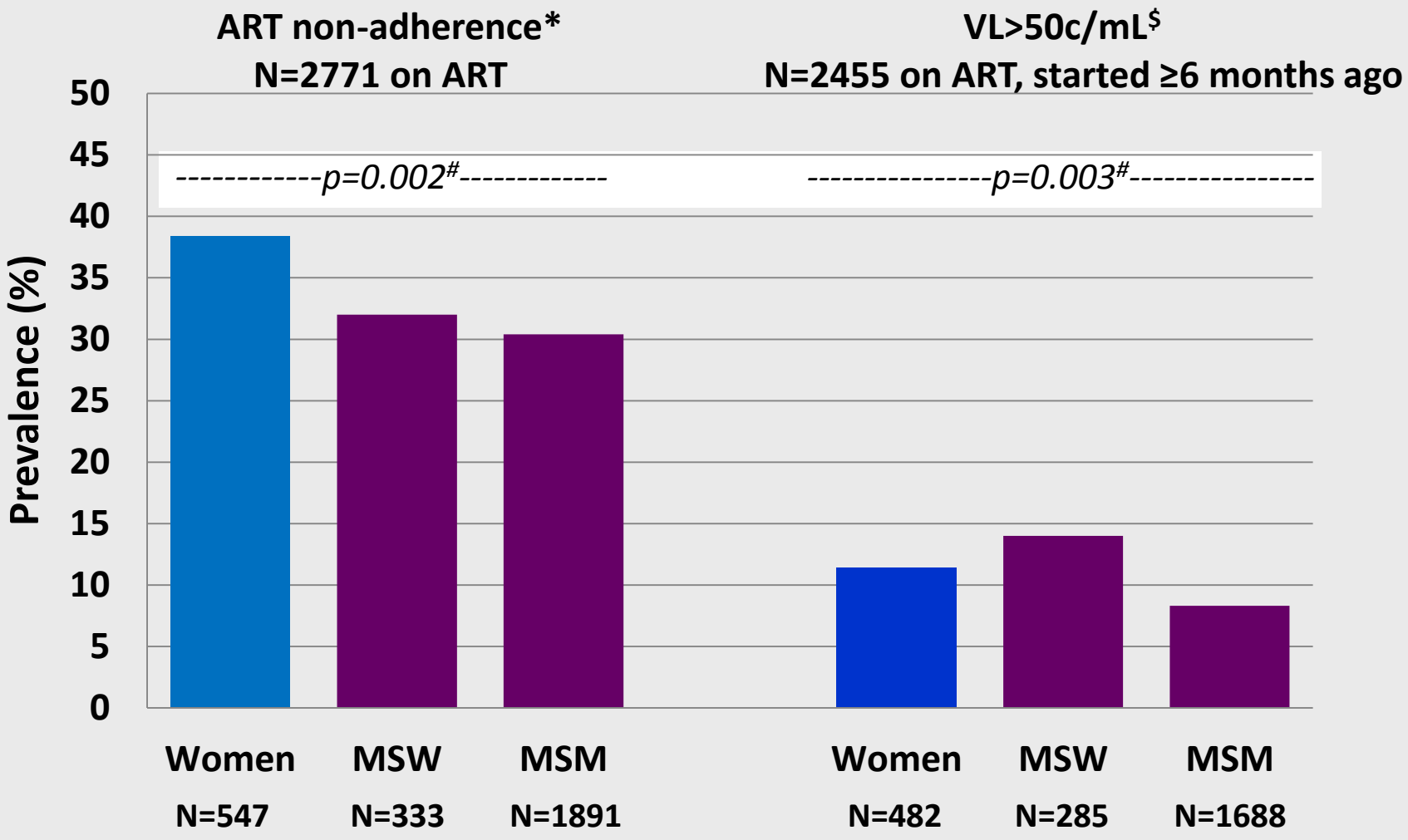
ART non-adherence and VL>50c/mL by gender/sexuality



*Missed ≥1 ART dose in past 2 weeks, or ≥2 consecutive days of ART in past 3 months (questionnaire)

$Using latest clinic VL at time of questionnaire

#Comparison across gender/sexuality groups, Chi-squared

Questions

Among people with HIV in the UK:

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2. Are socio-economic factors & depression associated with ART non-adherence and VL non-suppression among women? (cross-sectional)

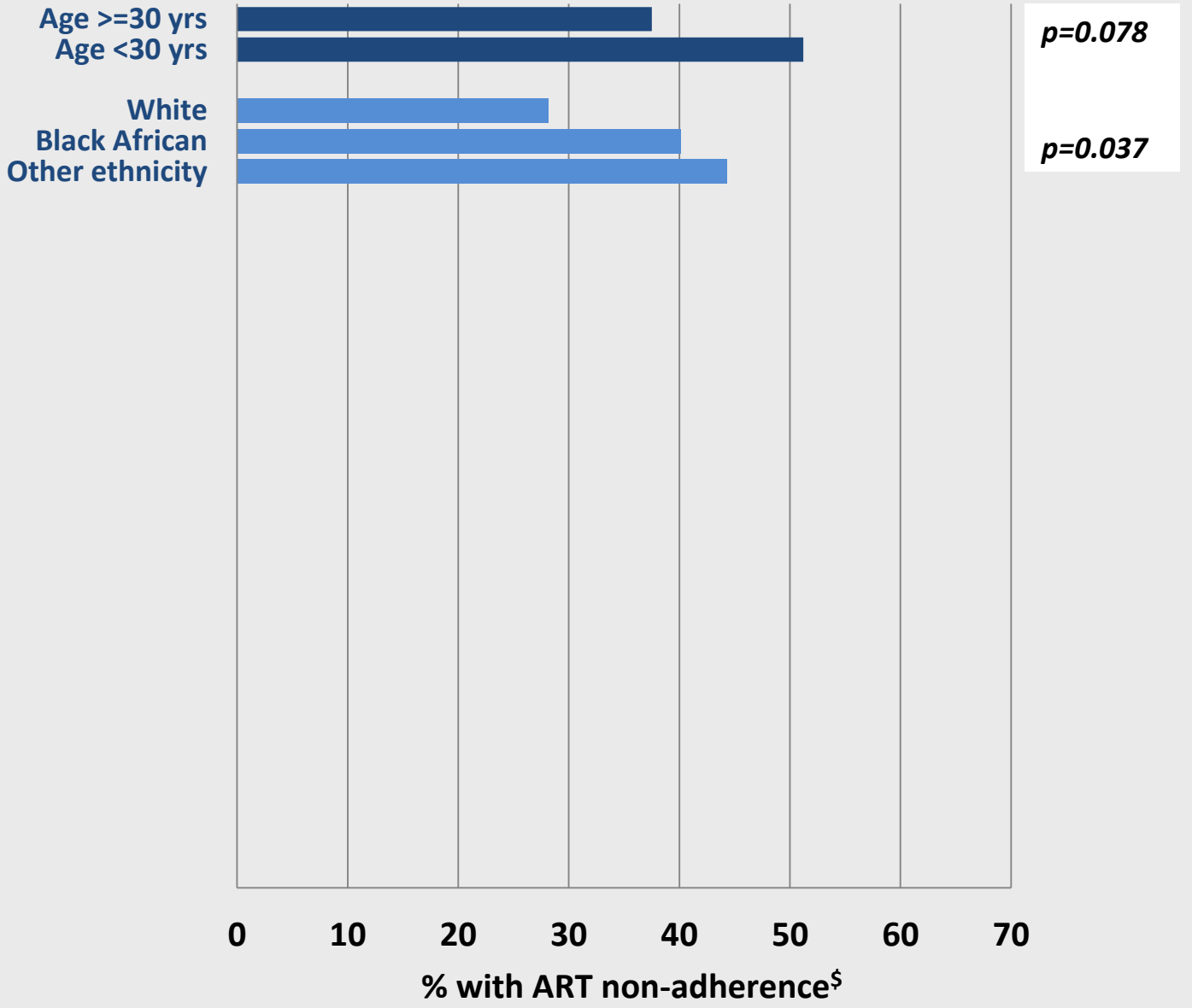
3. Are the associations similar among MSM, MSW?

4. Are socio-economic factors & depression predictive of VL rebound? (longitudinal)

5. How much do socio-economic factors & depression 'explain' gender variation in ART non-adherence, VL non-suppression, and VL rebound?

ART non-adherence among 547 women on ART

p values by Chi-squared test



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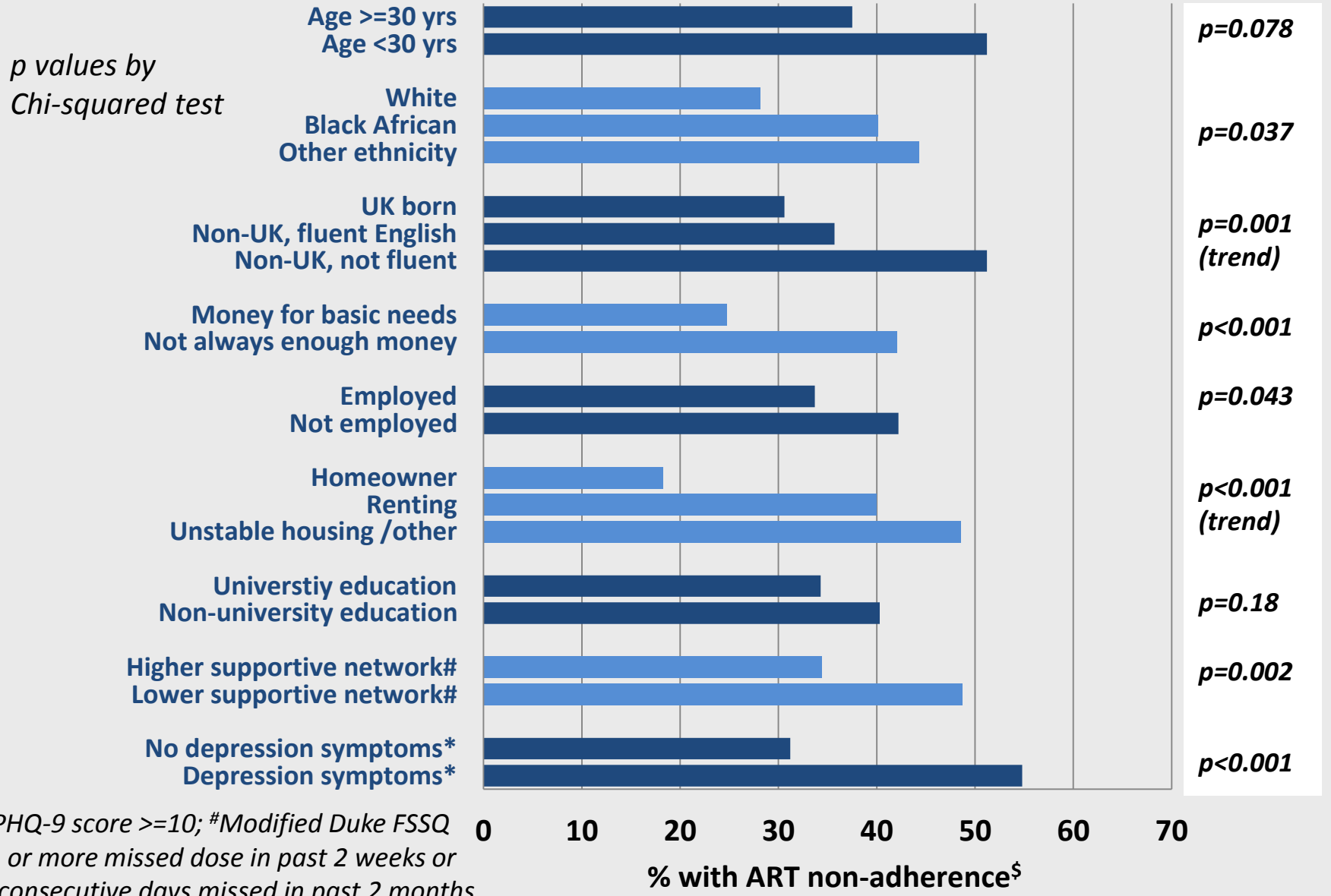
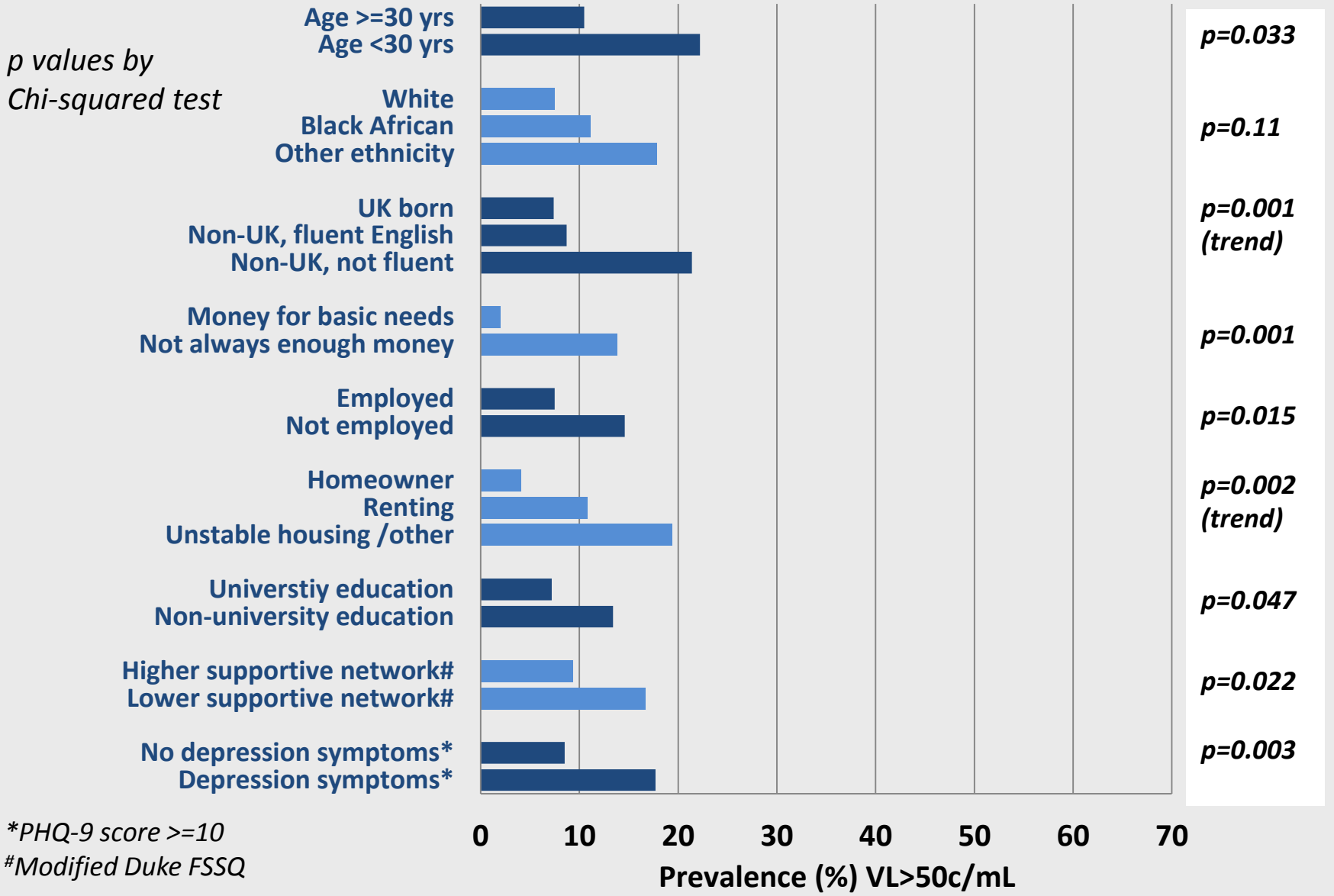


*PHQ-9 score >=10; #Modified Duke FSSQ
$1 or more missed dose in past 2 weeks or 2 consecutive days missed in past 2 months

VL>50c/mL among 482 women on ART, started ≥6m ago



Socio-economic factors & depression and VL>50c/mL: partially adjusted associations among women

N=482 women on ART ≥6m~	Adjusted* prevalence ratios (95% CI)	
UK born	1	
Non-UK, good English	1.0 (0.4, 2.4)	*p=0.010*
Non-UK, difficulty English	2.6 (1.1, 6.3)	*(trend)*
Money for basic needs	1	
Not always enough money	6.5 (1.5, 27.7)	*p<0.001*
Employed	1	
Not employed	1.8 (1.0, 3.2)	*p=0.035*
Homeowner	1	
Renting	2.5 (0.8, 8.1)	*p=0.014*
Unstable / other	3.9 (1.1, 14.1)	*(trend)*
University education	1	
Non-university education	1.7 (0.9, 3.3)	*p=0.072*
Higher supportive network	1	
Lower supportive network	1.8 (1.1, 3.1)	*p=0.044*
No depression symptoms	1	
Depression symptoms	2.0 (1.2, 3.3)	*p=0.015*

***Adjusted for age, ethnicity**

Modified Poisson regression

~On ART, started ≥6 months ago

ART non-adherence and VL>50c/mL according to other factors among women on ART

- Other demographic and HIV/health-related factors, were **not significantly** associated with ART non-adherence or VL>50c/mL among women on ART ($p \geq 0.1$ for each):
  - -Having a stable partner; Having children
  - -Identifying with a religion
  - -Time since HIV diagnosis; Time on ART; "Started because HIV making me ill"
  - -Non-disclosure of HIV status
  - -Current pregnancy; IDU transmission risk (small numbers)
- Lifestyle factors were **associated with ART non-adherence** ($p<0.05$) but not with VL>50c/mL
  - -Current smoking
  - -Possible alcohol dependency (CAGE questionnaire)
  - -Recreational drug use in past 3 months

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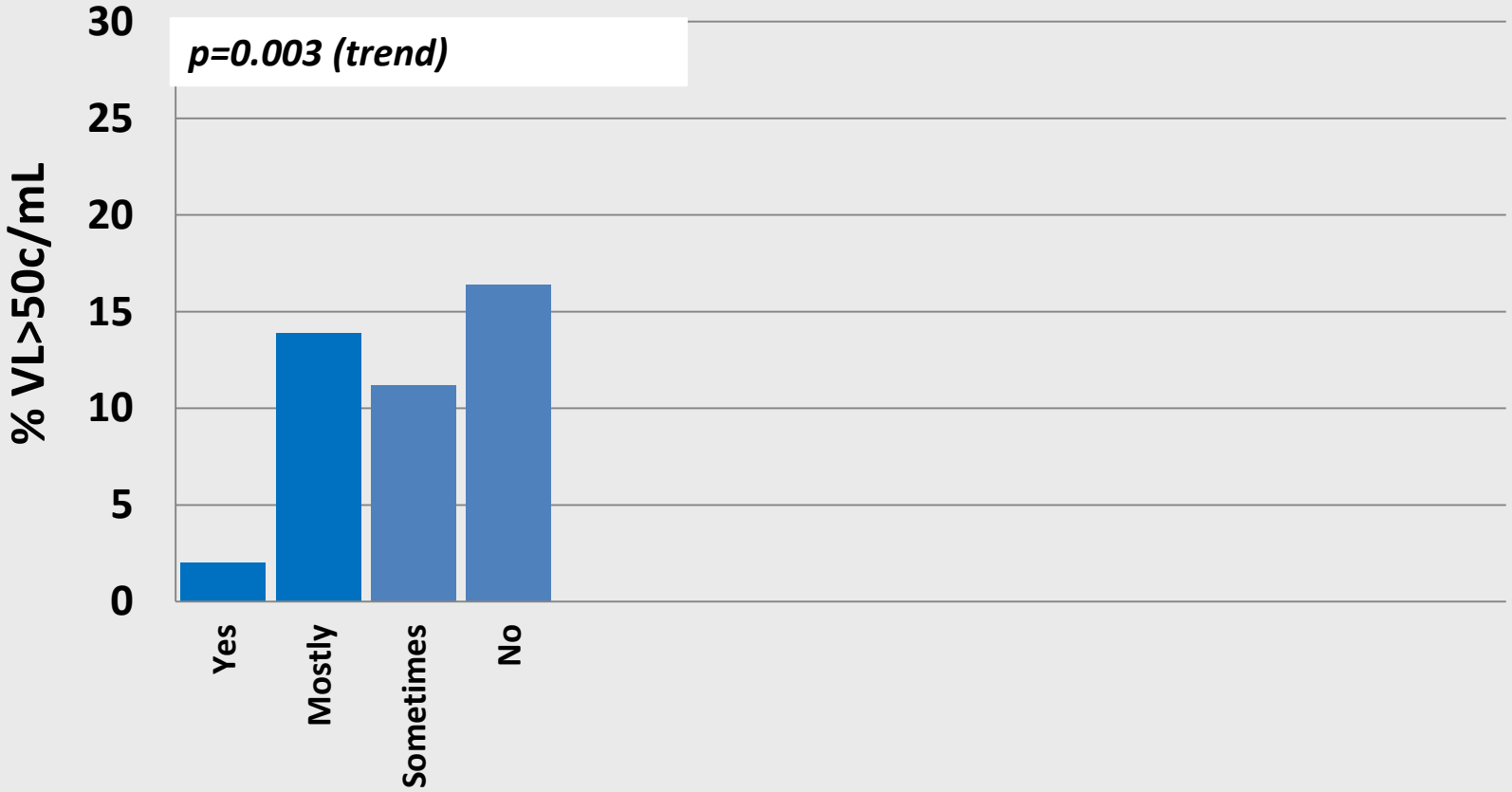
VL>50c/mL by financial status among: women, MSW, MSM, on ART started ≥6 months ago

'Enough money for basic needs, e.g. food, heating?'



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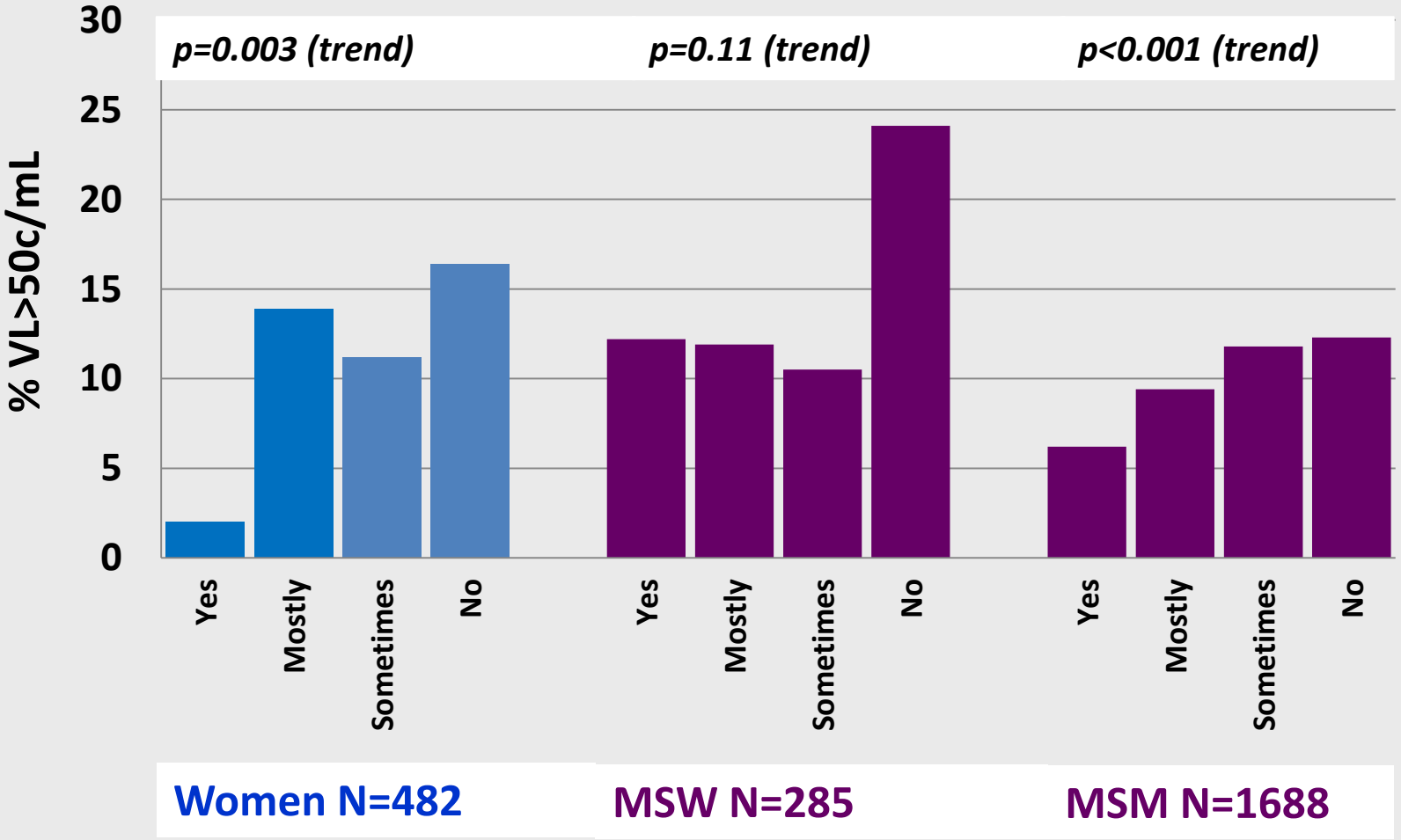
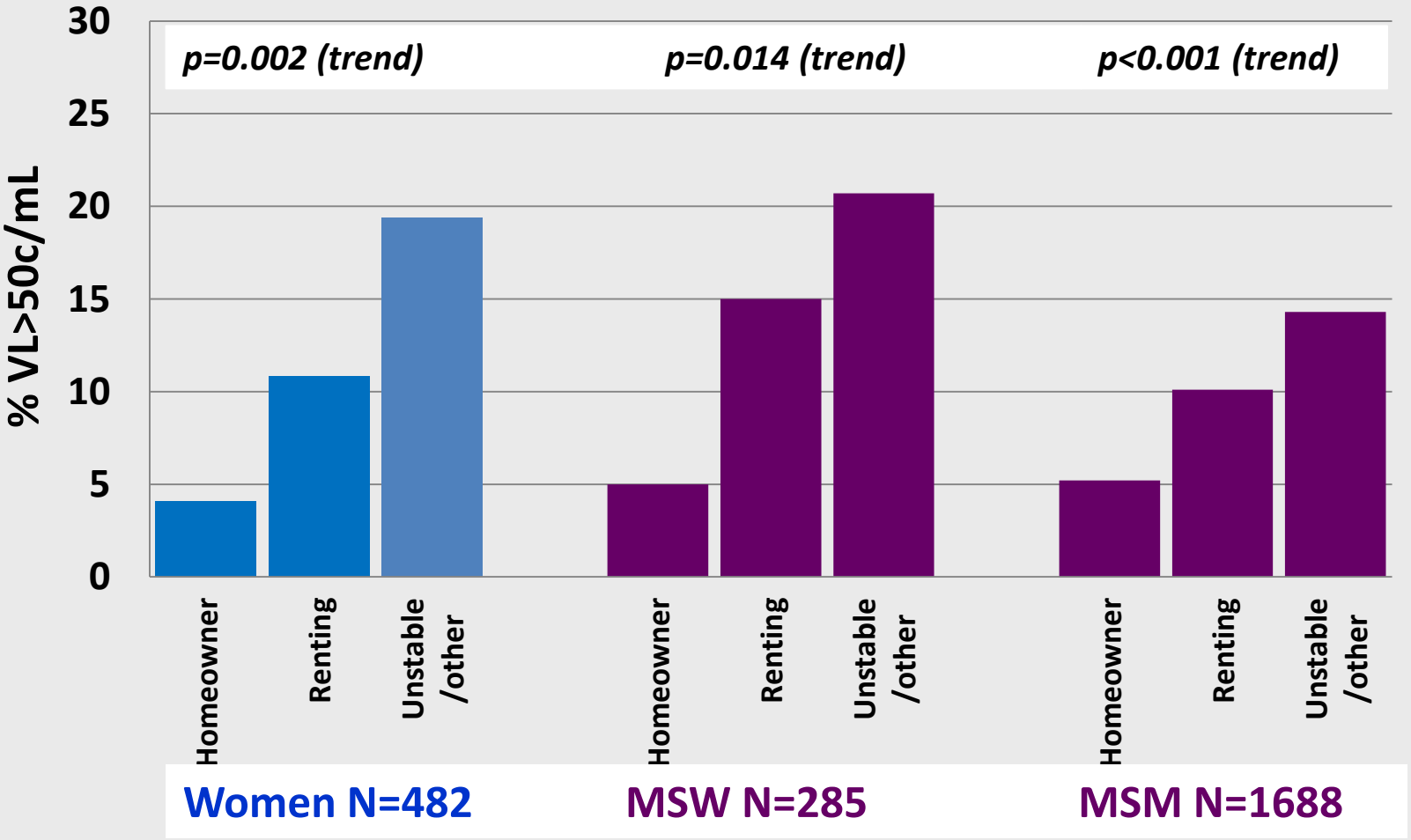
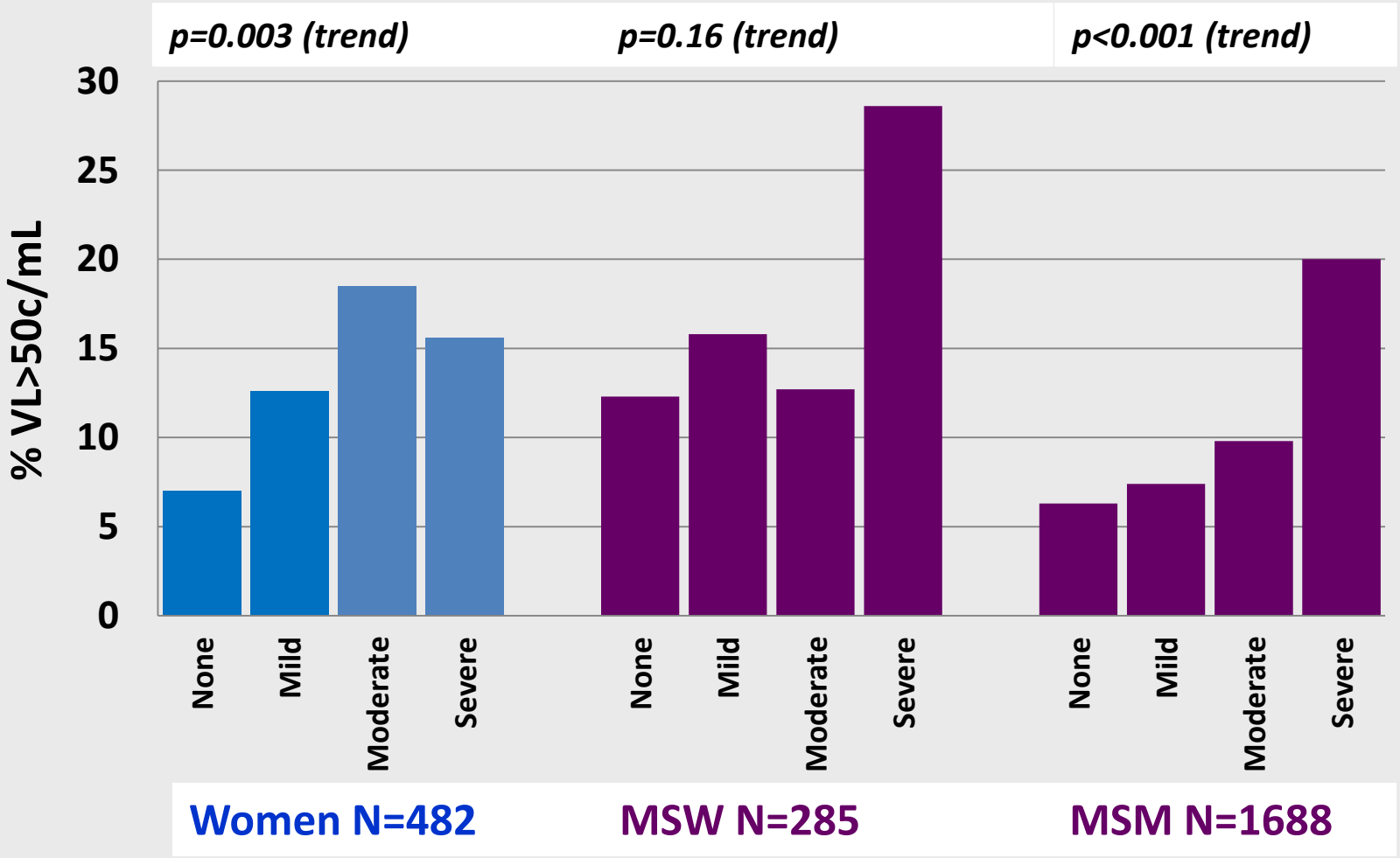


VL>50c/mL by housing status among: women, MSW, MSM, on ART started ≥6 months ago



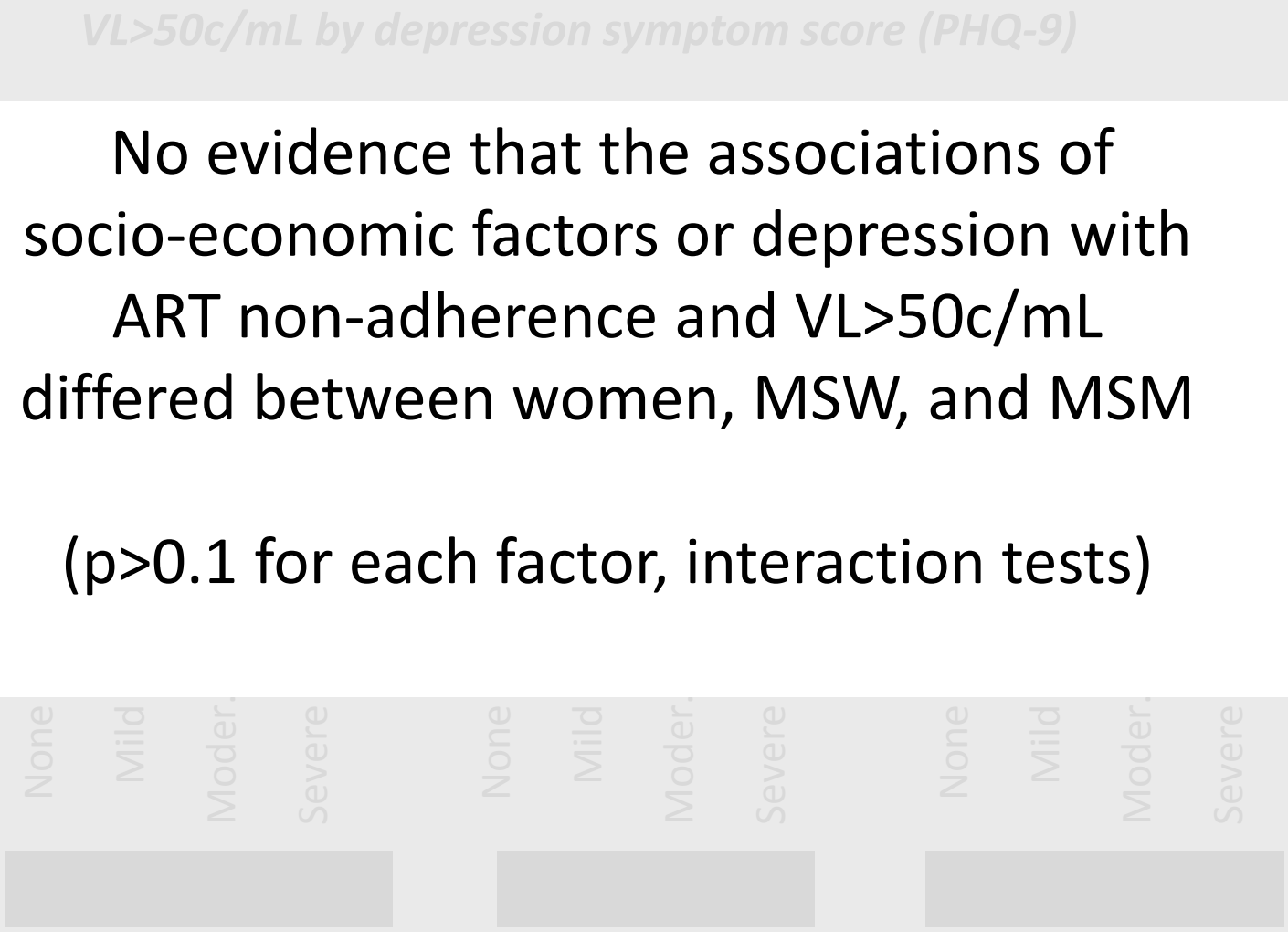
Renting=private rented, council or housing association
Unstable/other=temporary accommodation, staying with family or friends, homeless, other

VL>50c/mL by depression symptom severity among: women, MSW, MSM, on ART started ≥6 months ago



PHQ-9 score. None: 0-4; Mild: 5-9; Moderate: 10-19; Severe: >=20

VL>50c/mL by depression symptom severity among: women, MSW, MSM on ART >6 months



No evidence that the associations of socio-economic factors or depression with ART non-adherence and VL>50c/mL differed between women, MSW, and MSM

(p>0.1 for each factor, interaction tests)

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VL rebound (first VL >200c/mL) during follow-up by gender/sexuality

N=1586 with VL<50c/mL on ART, started ≥6 months ago[#]	Women N=271	MSW N=163	MSM N=1152
Number with VL>200c/mL during follow-up	24	19	43
Person-years at risk	406	241	1929
Rebound rate* /100 p-y [95% CI]	5.9 [3.7, 8.8]	7.9 [4.8, 12.3]	2.2 [1.6, 3.0]

p<0.001 for comparison across gender/sexuality groups

[*] First VL>200c/mL after questionnaire date.
Mean (range) follow-up from questionnaire 20 months (range 0.1 to 37 months)

[#]Includes only participants with linked clinic follow-up VL data

Socio-economic factors and VL rebound (>200c/mL)

Rate of VL rebound per 100 person-years	Women N=271	All participants N=1586 VL<50c/mL on ART		
	Rate (events)	Rate (events)	Adjusted HR* (95% CI)	
UK born	6.8 (5)	2.6 (39)	1	
Non-UK, good English	4.7 (12)	4.2 (36)	0.9 (0.5, 1.7)	*p=0.92*
Non-UK, difficulty English	8.8 (7)	4.9 (11)	1.0 (0.4, 2.2)	*(trend)*
Money for basic needs	1.9 (2)	1.9 (23)	1	
Not always enough money	7.3 (22)	4.6 (63)	1.9 (1.1, 3.1)	*p=0.016*
Employed	3.8 (7)	1.9 (28)	1	
Not employed	7.6 (17)	5.1 (58)	2.8 (1.8, 4.5)	*p<0.001*
Homeowner	3.2 (2)	1.1 (11)	1	
Renting	5.7 (16)	4.3 (59)	3.0 (1.5, 5.8)	*p=0.001*
Unstable / other	10.0 (6)	6.9 (16)	4.3 (1.9, 9.6)	*(trend)*
University education	5.3 (8)	2.3 (25)	1	
Non-university education	6.3 (16)	4.1 (61)	1.7 (1.0, 2.7)	*p=0.034*
Higher supportive network	4.1 (12)	2.5 (50)	1	
Lower supportive network	10.8 (12)	5.9 (36)	2.3 (1.5, 3.5)	*p<0.001*
No depression symptoms	2.9 (8)	2.0 (38)	1	
Depression symptoms	12.6 (16)	6.8 (48)	3.2 (2.1, 5.0)	*p<0.001*

***Adjusted for gender/sexuality, age, ethnicity** *Hazard ratios by Cox PH regression*

Socio-economic factors and VL rebound (>200c/mL)

Rate of VL rebound per 100 person-years	Women N=271	All participants N=1586 VL<50c/mL on ART		
	Rate (events)	Rate (events)	Adjusted HR* (95% CI)	
UK born	6.8 (5)	2.6 (39)	1	
Non-UK, good English	4.7 (12)	4.2 (36)	0.9 (0.5, 1.7)	*p=0.92*
Non-UK, difficulty English	8.8 (7)	4.9 (11)	1.0 (0.4, 2.2)	*(trend)*
Money for basic needs	1.9 (2)	1.9 (23)	1	
Not always enough money	7.3 (22)	4.6 (63)	1.9 (1.1, 3.1)	*p=0.016*
Employed	3.8 (7)	1.9 (28)	1	
Not employed	7.6 (17)	5.1 (58)	2.8 (1.8, 4.5)	*p<0.001*
Homeowner	3.2 (2)	1.1 (11)	1	
Renting	5.7 (16)	4.3 (59)	3.0 (1.5, 5.8)	*p=0.001*
Unstable / other	10.0 (6)	6.9 (16)	4.3 (1.9, 9.6)	*(trend)*
University education	5.3 (8)	2.3 (25)	1	
Non-university education	6.3 (16)	4.1 (61)	1.7 (1.0, 2.7)	*p=0.034*
Higher supportive network	4.1 (12)	2.5 (50)	1	
Lower supportive network	10.8 (12)	5.9 (36)	2.3 (1.5, 3.5)	*p<0.001*
No depression symptoms	2.9 (8)	2.0 (38)	1	
Depression symptoms	12.6 (16)	6.8 (48)	3.2 (2.1, 5.0)	*p<0.001*

***Adjusted for gender/sexuality, age, ethnicity** *Hazard ratios by Cox PH regression*

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Questions

Among people with HIV in the UK:

1. How do socio-economic characteristics, ART non-adherence, and VL non-suppression on ART, differ between women MSM, and MSW?

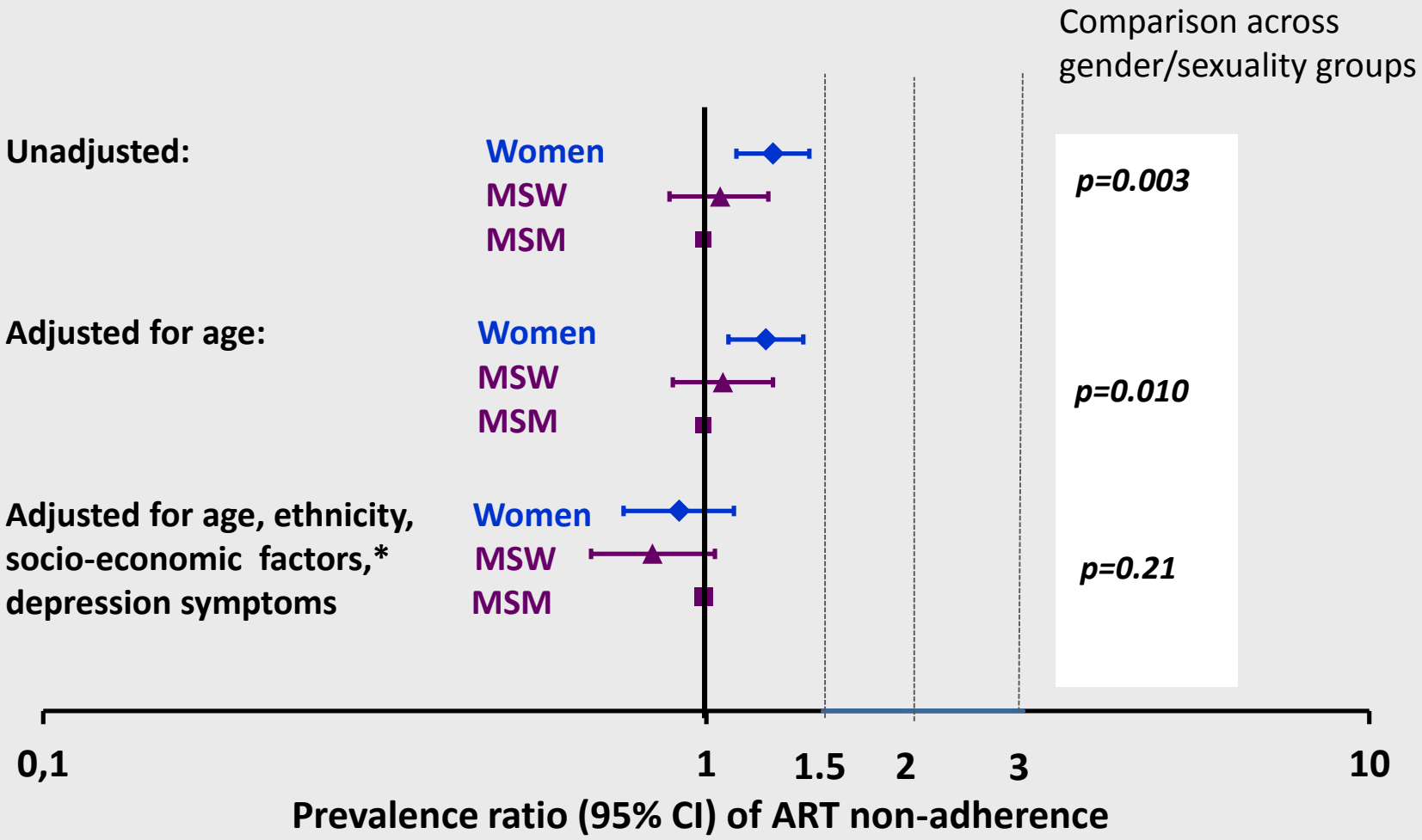
2. Are socio-economic factors & depression associated with ART non-adherence and VL non-suppression among women? (cross-sectional)

3. Are the associations similar among MSM, MSW?

4. Are socio-economic factors & depression predictive of VL rebound? (longitudinal)

5. How much do socio-economic factors & depression 'explain' gender variation in ART non-adherence, VL non-suppression, and VL rebound?

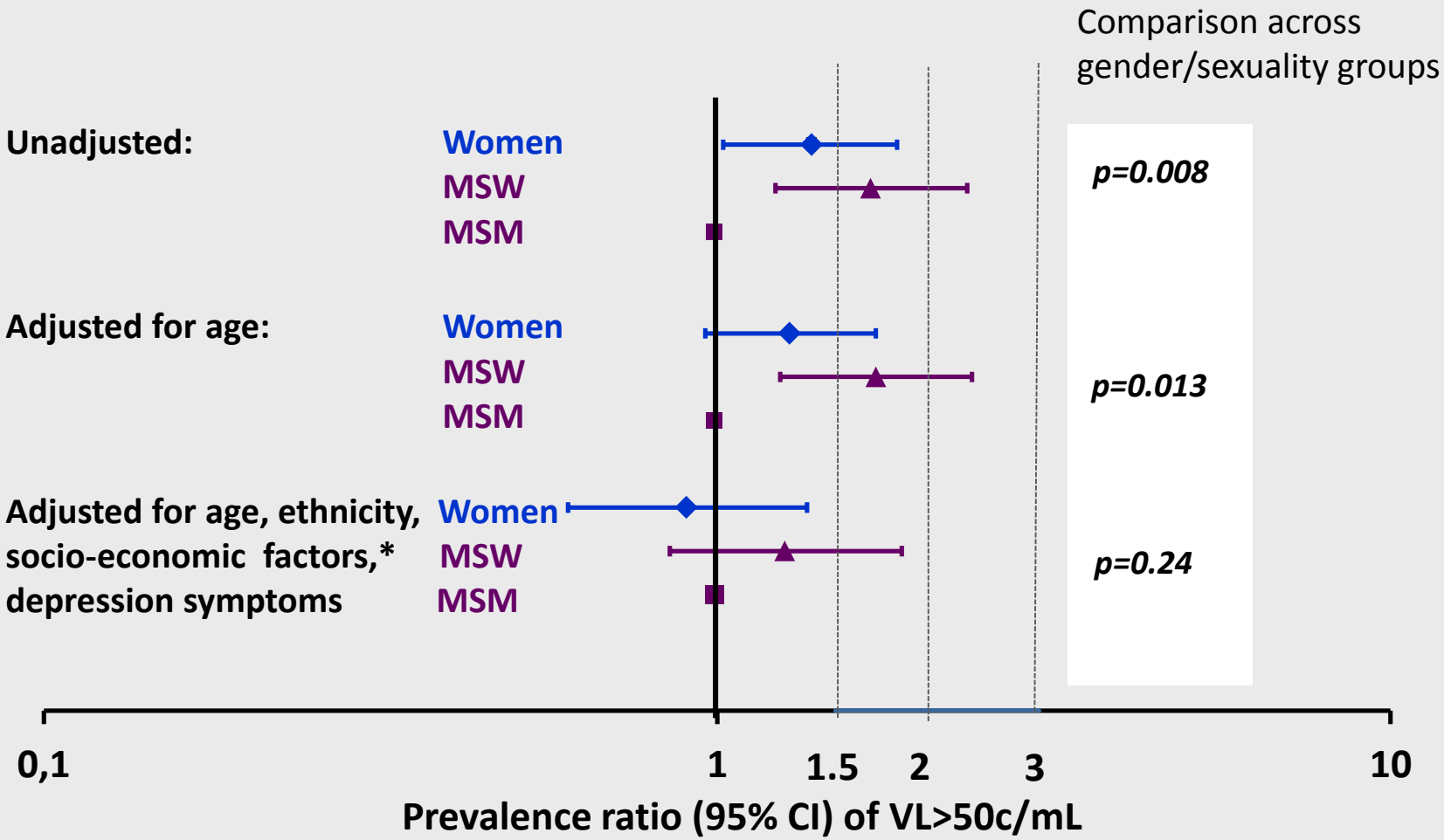
Gender/sexuality and ART non-adherence
N=2771 on ART



*UK birth/English fluency; financial status; housing; employment; education; supportive network

Prevalence ratios by modified Poisson regression

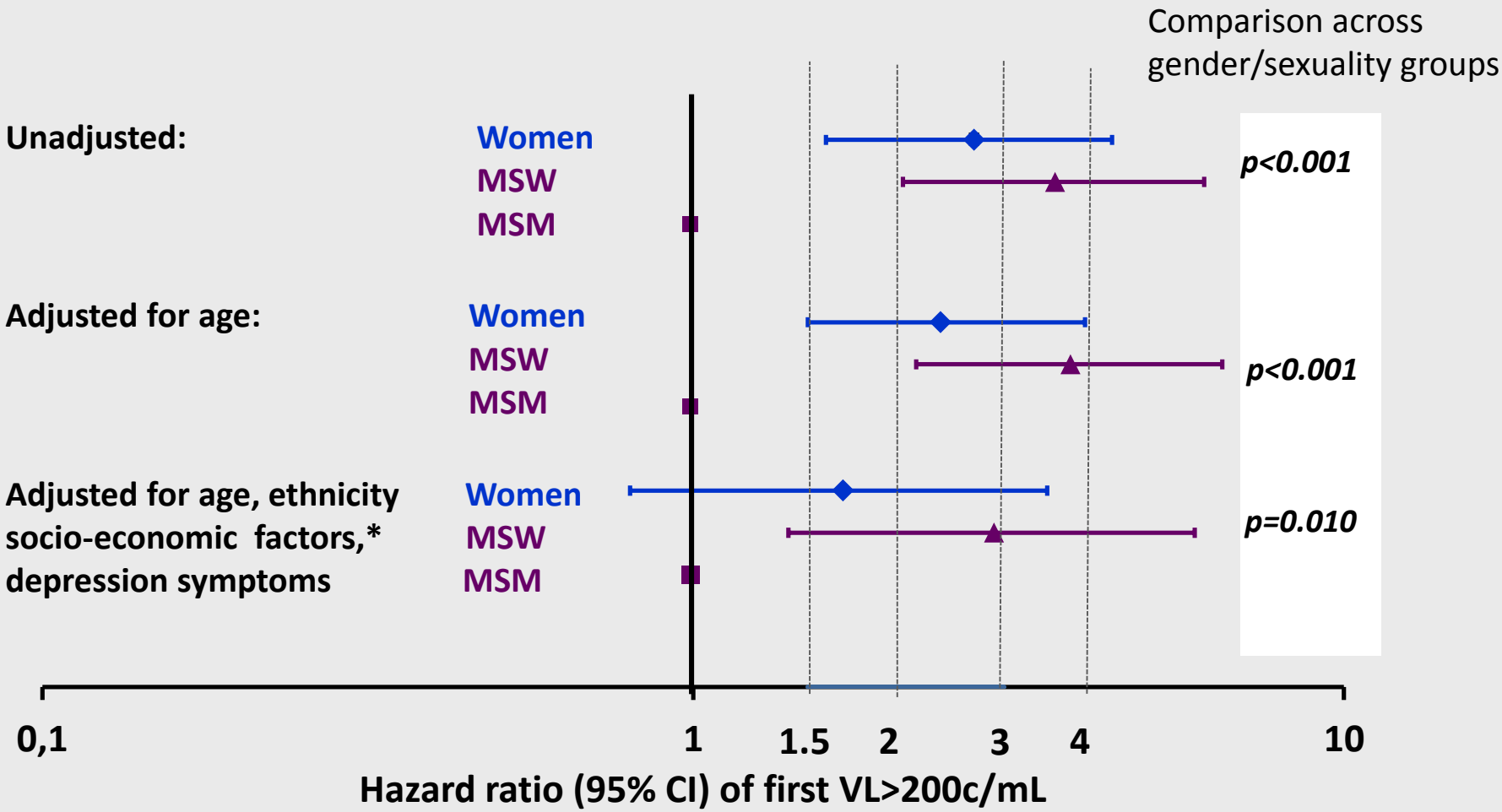
Gender/sexuality and VL>50c/mL
N=2445 on ART, started ≥6 months ago



*UK birth/English fluency; financial status; housing; employment; education; supportive network

Prevalence ratios by modified Poisson regression

Gender/sexuality and VL rebound (>200c/mL) N=1586 with VL<50c/mL on ART, started ≥6m ago



*UK birth/English fluency; financial status; housing; employment; education; supportive network

Hazard ratios by Cox proportional hazards regression

Gender/sexuality and VL rebound (>200c/mL) N=1586 on ART with VL<50c/mL at questionnaire

N=1586 participants started ART >6 months before questionnaire VL <50c/mL

Comparison across

EACS Abstract 361

R O'Connell

Do socio-economic factors explain gender differences in virological response to ART in the UK?

Parallel Session 6 (5), Thursday 22nd October 15:15pm

0,1 1 1.5 2 3 4 10

Hazard ratio (95% CI) of first VL>200c/mL

*UK birth/English fluency; financial status; housing; employment; education; supportive network

Prevalence ratios by modified Poisson regression

Summary of results from ASTRA

- Levels of socio-economic disadvantage among HIV-positive women and MSW in UK higher than for MSM
- Virological success of ART is high in all groups, but women and MSW have lower ART adherence and poorer VL outcomes than MSM
- Socio-economic disadvantage and symptoms of depression strongly associated with ART non-adherence and poorer VL outcomes among women (as for men)
- Socio-economic disadvantage among women appears to 'explain' much of the difference in ART non-adherence and VL outcomes compared to MSM

Interpretation

Socio-economic disadvantage and VL outcomes – mechanisms of effect?

- Difficulties with ART adherence due to higher stress; competing concerns, priorities & responsibilities; unsettled personal circumstances; migration issues; poor mental health; higher prevalence of comorbidities and concomitant treatments; stigma; knowledge & health beliefs
- Lower retention in care
- Differences in health care received, or experiences of care
- Later diagnosis of HIV, later initiation of ART

Results in context

- Socio-economic inequalities exist in prognosis of chronic diseases in Europe[1-3] (e.g. cancer, diabetes, CVD)
- Evidence from European studies (e.g. COHERE[4]; Swiss HIV Cohort Study[5]) that lower socioeconomic status linked to late diagnosis of HIV, late initiation of ART
- Markers of socio-economic disadvantage associated with ART non-adherence in several European studies[6-8]
- Lower education level associated with poorer VL response to ART in Swiss HIV Cohort Study[9] and CoRIS[10] (Spain) but not in Danish HIV Cohort Study[11,12]

[1]Woods 2006; [2]Manderbacka 2006; [3]Hawkins 2012; [4]COHERE group 2014; [5]Gueler 2015; [6]Pereti-Watel 2006; [7]Glass 2006; [8]Moralejo 2006; [9]Rosin 2014; [10]Sobrino-Vegas 2012; [11]Thorsteinsson; [12]Legarth 2014

Results in context

- Evidence of higher risk of modification, interruption, discontinuation of ART for women compared to MSW/MSM, possibly due to greater toxicity (UK CHIC[1], EuroSIDA[2], ICoNA[3,] Royal Free HIV Cohort Study[4] , Swiss HIV Cohort Study[5])
- Gender effect for virological outcomes of ART is not same for immunological outcomes or mortality risk[5-8] - women not at greater risk

[1]Barber 2011; [2]Gonzalez-Sema 2014; [3]Murri 2003; [4]Saunders 2014; [5]Rosin 2014; [5,6]ART-CC 2007, 2015; [7]Jarrin 2008

Results in context (unfinished..)

- Generalisability of results? ASTRA study participants in setting of free access to health care

EACS Abstract 274

L Burch

Is the gender difference in viral load response to ART narrowing over time?

Parallel Session 6 (3), Thursday 22nd October 14:45pm

- Gender effect for virological outcomes of ART is not apparent for immunological outcomes or mortality risk (refs art-cc etc)

Implications

- Success of HIV treatment dependent on social context – importance of holistic approach to care
- Adherence considerations/support for women and those at risk of poorer VL outcomes due to adverse personal/social circumstances
- Links to support services (benefits, housing, employment, family, mental health)
- Recognition and management of depression
- Wider context of socio-economic inequalities in health
- Importance of collection of data on socio-economic factors for routine clinical care and research

Acknowledgments

Lisa Burch, Colette Smith, Rebecca O'Connell
Andrew Phillips, Alison Rodger, Andrew Speakman
Margaret Johnson, Jane Anderson, Anna Maria Geretti
Lorraine Sherr, Jonathan Elford, Yusef Azad, Simon Collins,
Martin Fisher, Richard Gilson, Ed Wilkins, Monica Lascar,
Martin Jones

Acknowledgments

Thank you to all ASTRA study participants

ASTRA clinic teams
Royal Free Hospital: *Alison Rodger; Margaret Johnson; Jeff McDonnell; AdebiyiAderonke*
Mortimer Market Centre: *Richard Gilson; Simon Edwards; Lewis Haddow; Simon Gilson; Christina Broussard; Robert Pralat; SonaliWayal*
Brighton and Sussex University Hospital: *Martin Fisher; Nicky Perry; Alex Pollard; Serge Fedele; Louise Kerr; Lisa Heald; Wendy Hadley; Kerry Hobbs; Julia Williams; ElaneyYoussef; Celia Richardson; Sean Groth*
North Manchester General Hospital: *Ed Wilkins; Yvonne Clowes; Jennifer Cullie; Cynthia Murphy; Christina Martin; Valerie George; Andrew Thompson*
HomertonUniversity Hospital: *Jane Anderson; SifisoMguni; DamilolaAwosika; Rosalind Scourse*
East Sussex Sexual Health Clinic: *KazeemAderogba; Caron Osborne; Sue Cross; Jacqueline Whinney; Martin Jones*
Newham University Hospital: *Rebecca O'Connell; Cheryl Tawana*
Whipps Cross University Hospital: *Monica Lascar; ZandileMaseko; Gemma Townsend; Vera Theodore; Jas Sagoo*

ASTRA core team: *Fiona Lampe; Alison Rodger; Andrew Speakman; Andrew Phillips*
ASTRA data management: *Andrew Speakman; Marina Daskalopoulou; Fiona Lampe*
ASTRA advisory group: *Lorraine Sherr; Simon Collins; Jonathan Elford; Alec Miners; Anne Johnson; Graham Hart; Anna-Maria Geretti; Bill Burman*
CAPRA grant Advisory Board: *Nick Partridge; Kay Orton; Anthony Nardone; Ann Sullivan*

The ASTRA study presents independent research funded by the National Institute for Health Research (NIHR) under its Programme Grants for Applied Research funding scheme (RP-PG-0608-10142). The views expressed in this presentation are those of the authors and not necessarily those of the NHS, the NIHR or the Department of Health