15th International Conference on
HIV TREATMENT AND
PREVENTION ADHERENCE

Mark van den Elshout, MD

Public Health Service of Amsterdam

Predictors of PrEP adherence among men who have sex with men in Amsterdam, the Netherlands

Background

- PrEP prevents HIV
- Adherence → effectiveness
- RCT mobile application: AMPrEP app
- Aim: improve adherence by giving feedback on self-reported PrEP use & sexual behaviour

GGD Amsterdam

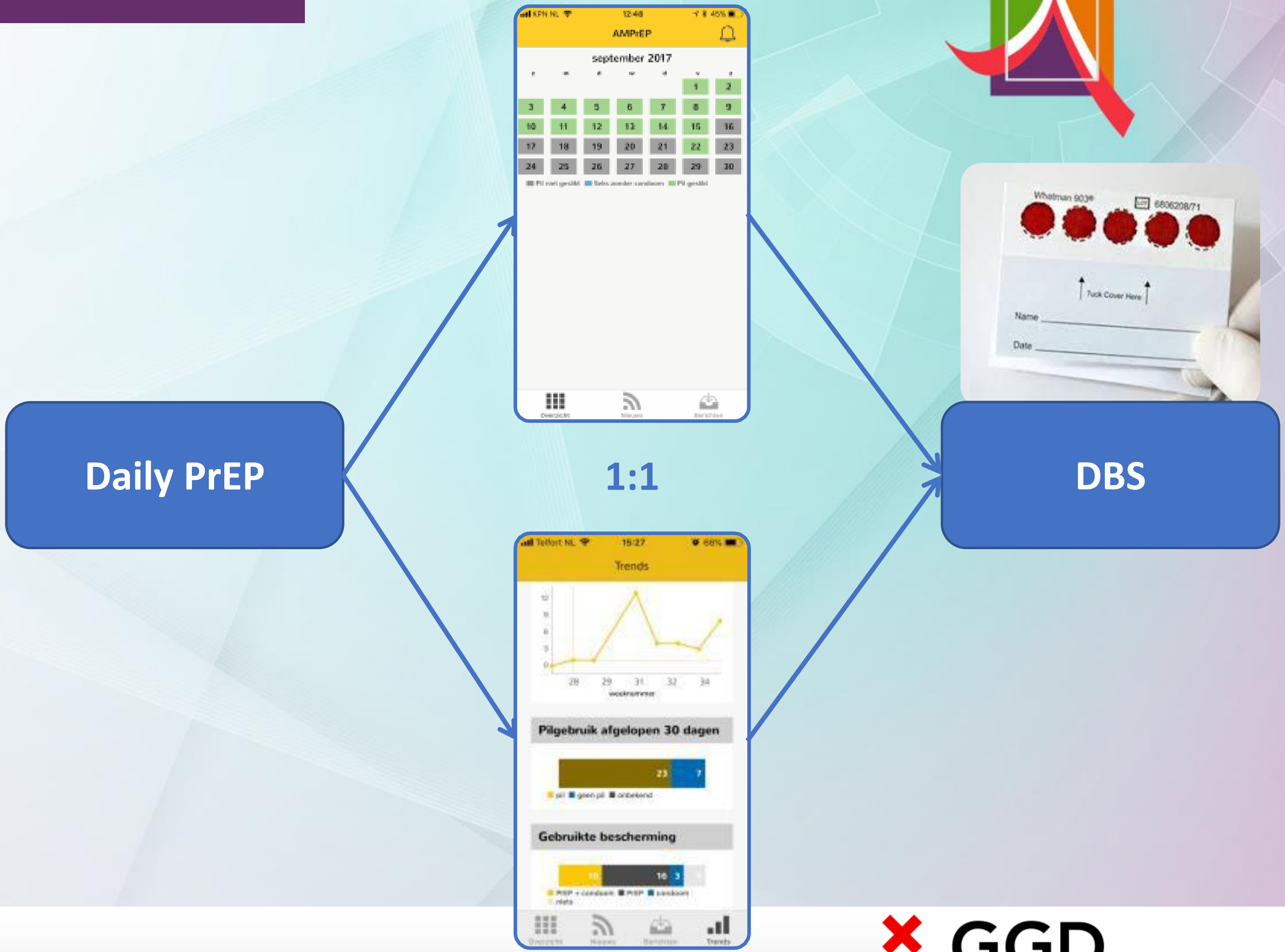
Methods

- RCT nested within AMPrEP cohort (2015 - ongoing)
- Eligibility:
  – Daily PrEP use
  – Able to use app
  – Willing to provide Dried Blood Spots (DBS)

Methods

- Randomisation 1:1
  - Basic app
  - Extended app

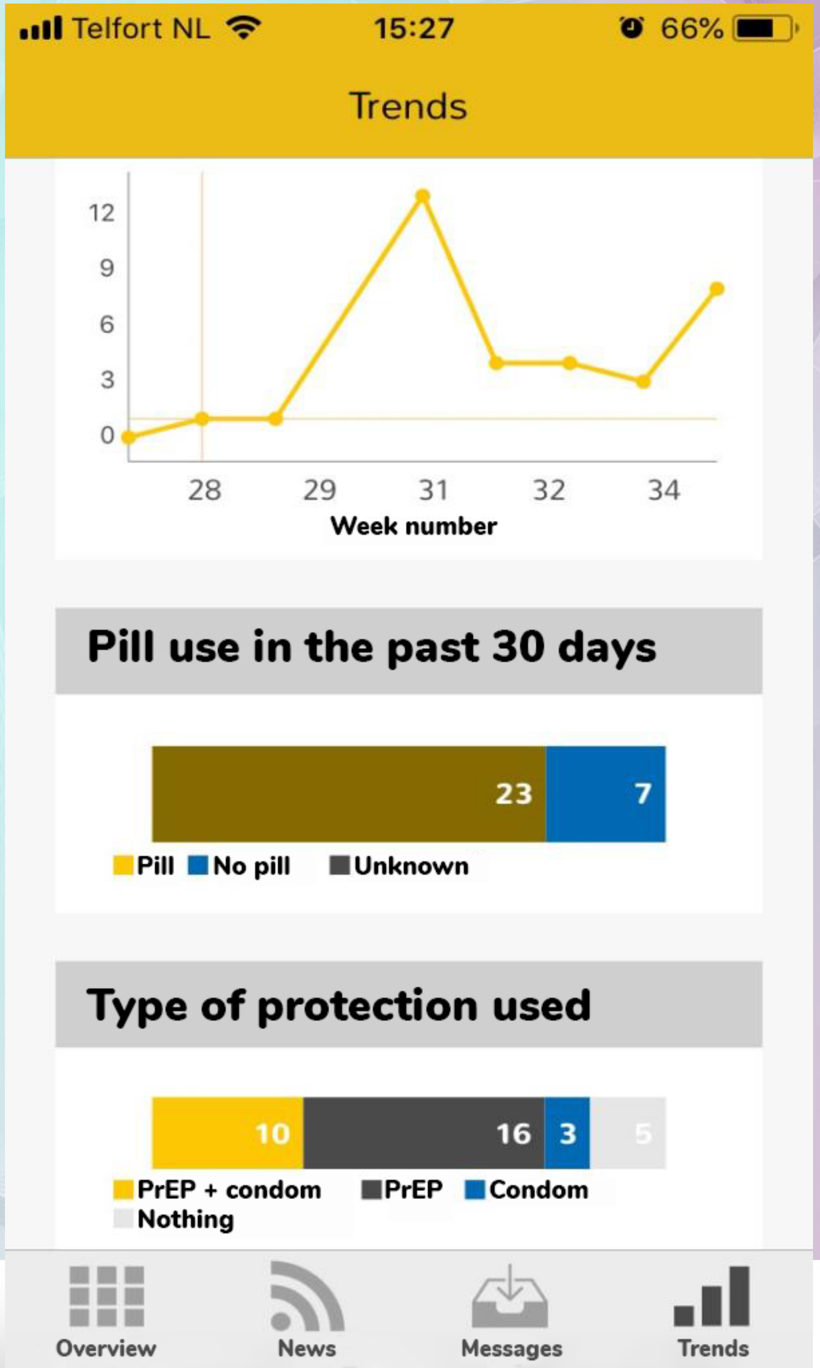
- Inclusion at:
  - 3 / 6 / 9 month study visit



GGD Amsterdam

Methods

- Intervention
  - Extended app
  - Visual feedback on PrEP use & sexual behaviour
    - Trends in pill use and sex partners
    - Covered sex acts
  - Advanced alarm clock



Amsterdam

Methods

- Dried Blood Spots (DBS) collected at
  - 12 months
  - 24 months
  - (48 months)

  after PrEP initiation

- Tenofovir diphosphate concentrations [TFV-DP][1,2]

Adherence level	[TFV-DP]	Equivalent to # tablets taken
"Good"	700 - 1249 fmol/punch	4 - 6 / week
"Excellent"	≥ 1250 fmol/punch	(≥) 7 / week

1 Anderson PL, Glidden DV, Liu A, Buchbinder S, Lama JR, Guanira JV, et al. Emtricitabine-tenofovir concentrations and pre-exposure prophylaxis efficacy in men who have sex with men. Science translational medicine. 2012;4(151):151ra25-ra25.

2 Grant RM, Anderson PL, McMahan V, Liu A, Amico KR, Mehrotra M, et al. Uptake of pre-exposure prophylaxis, sexual practices, and HIV incidence in men and transgender women who have sex with men: a cohort study. Lancet Infect Dis. 2014;14(

GGD Amsterdam

Methods

- Primary outcome
  – Good adherence at 12 *and* 24 months

- Secondary outcomes
  – Excellent adherence at 12 *and* 24 months
  – Overall [TFV-DP]

- Factors associated with adherence

GGD Amsterdam

Results

Initiated AMPrEP (n=376)

- Early loss to follow-up (n=9)

Any follow-up (n=367)

- Stopped participation (n=2)
- Lost to follow-up (n=3)
- Not invited to participate (n=11)

Assessed for eligibility (n=351)

Excluded (n=122)

- Not meeting inclusion criteria (n=100)
  - edPrEP at inclusion (n=89)
  - no/old phone (n=8)
  - does not use app (n=2)
  - language barrier (n=1)
- Declined to participate (n=22)

Randomised (n=229)

Randomised (n=229)

Regular app

Extended app

Received allocated intervention (n=111)

- Excluded (n=28)
  - Switched to edPrEP (n=15)
  - Did not complete study visits (n=9)
  - On HCV treatment (n=4)

Per protocol (n=83)

Intention to treat (n=111)

Received allocated intervention (n=118)

- Excluded (n=35)
  - Switched to edPrEP (n=11)
  - Did not complete study visits (n=17)
  - On HCV treatment (n=3)
  - Withdrew informed consent (n=2)
  - Included at 12mo (n=2)

Per protocol (n=83)

Intention to treat (n=116)

Analysis

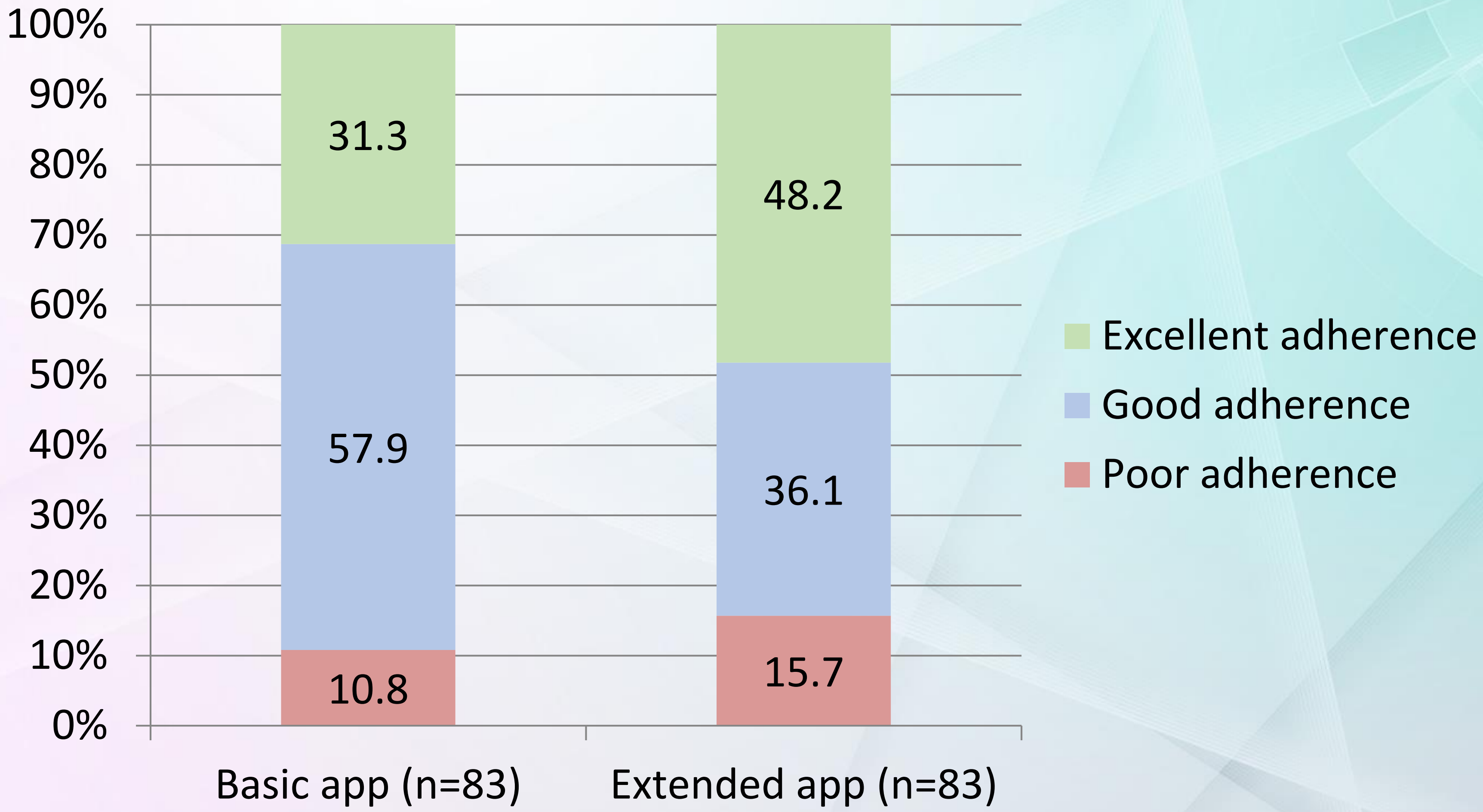
App use & acceptability (n=166)

App use	12 months	24 months
Never	6.6%	13.3%
≥ once weekly	73.5%	64.5%
≥ 5 days/week	47.7%	41.0%

App acceptability*	24 months
Useful	5 [4-6]
Pleasant to use	5 [4-6]
Ease of use	6 [4-7]

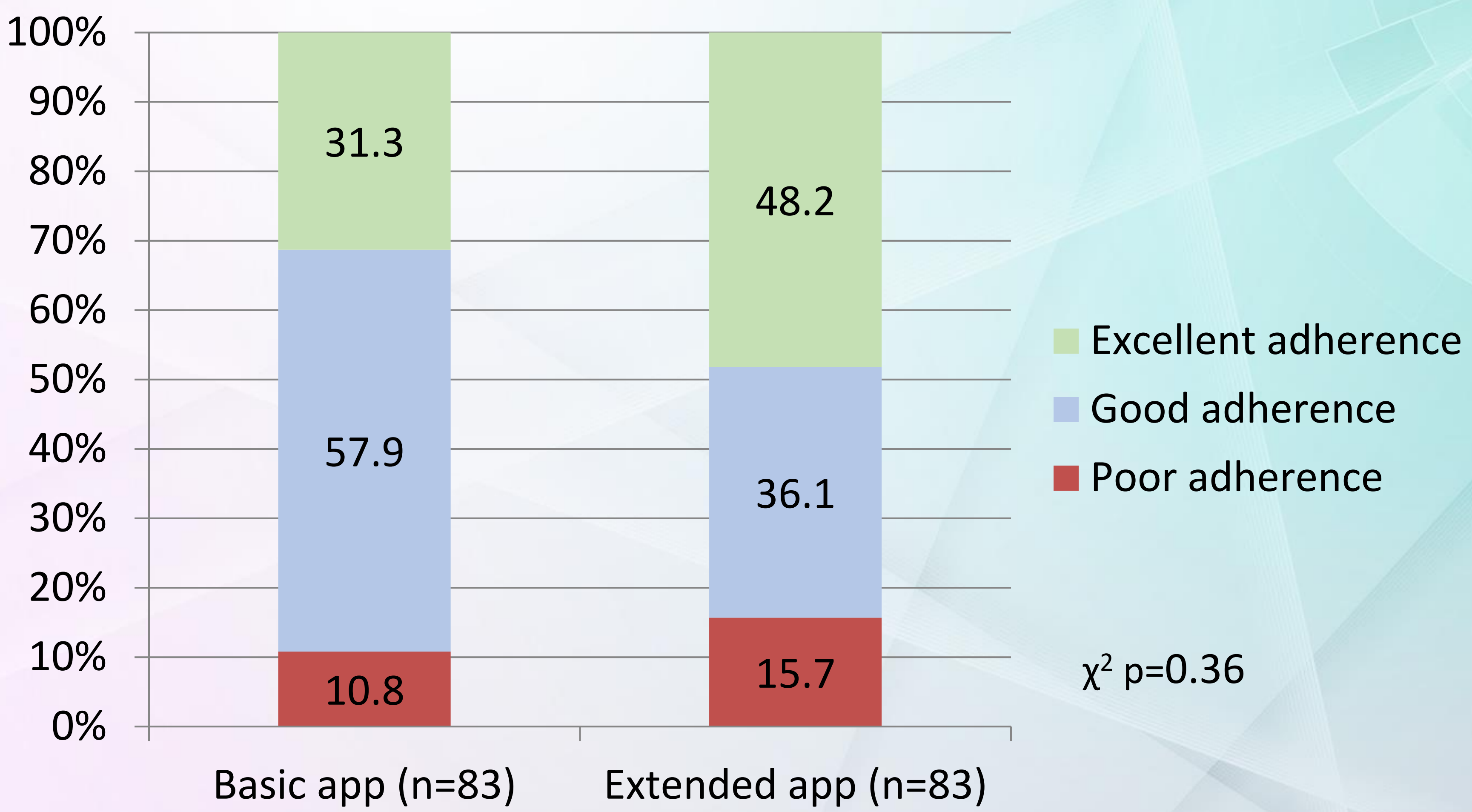
*Median and [IQR], 7-point Likert scale

Adherence at 12 & 24mo by study arm



GGD Amsterdam

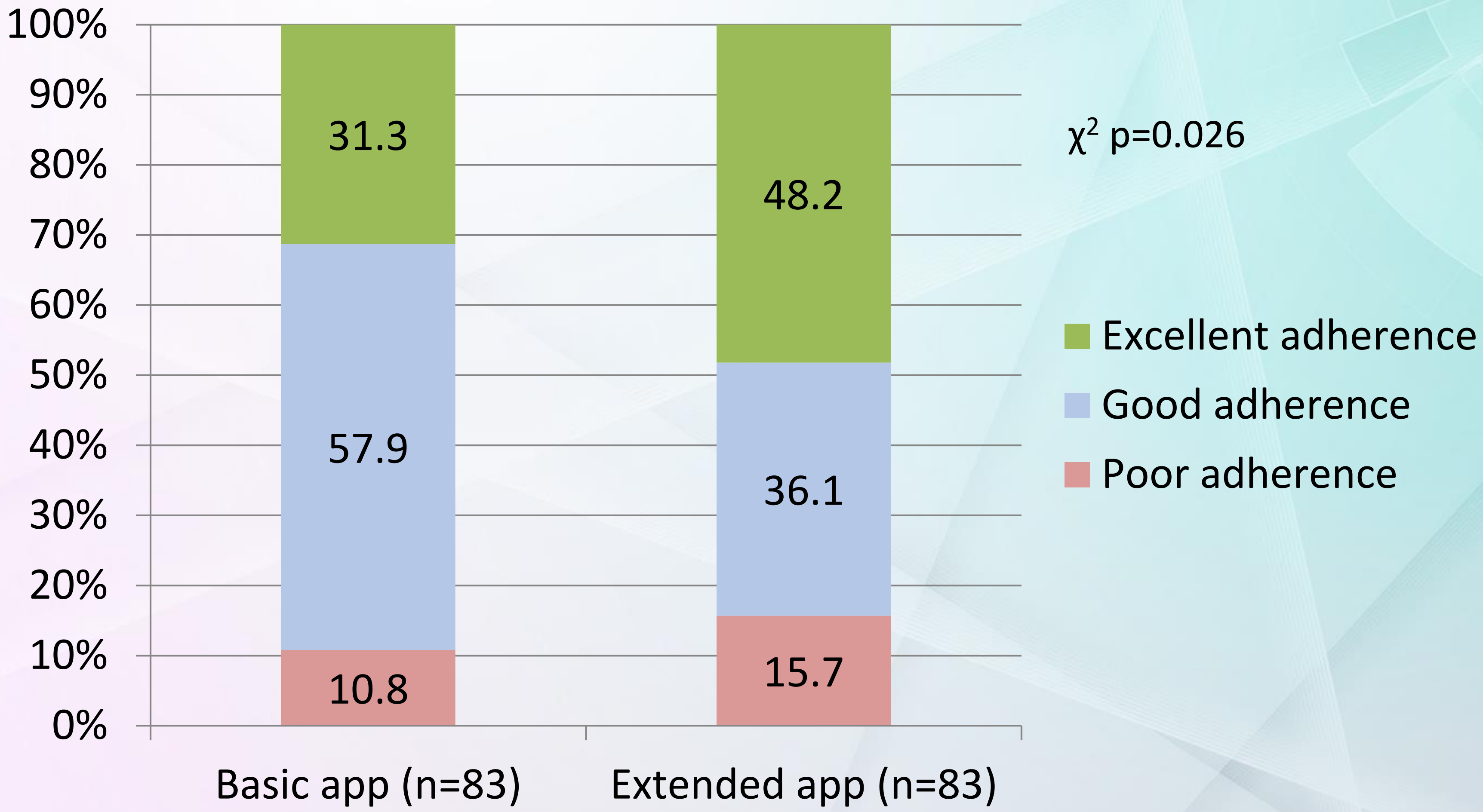
Good adherence at 12 & 24mo



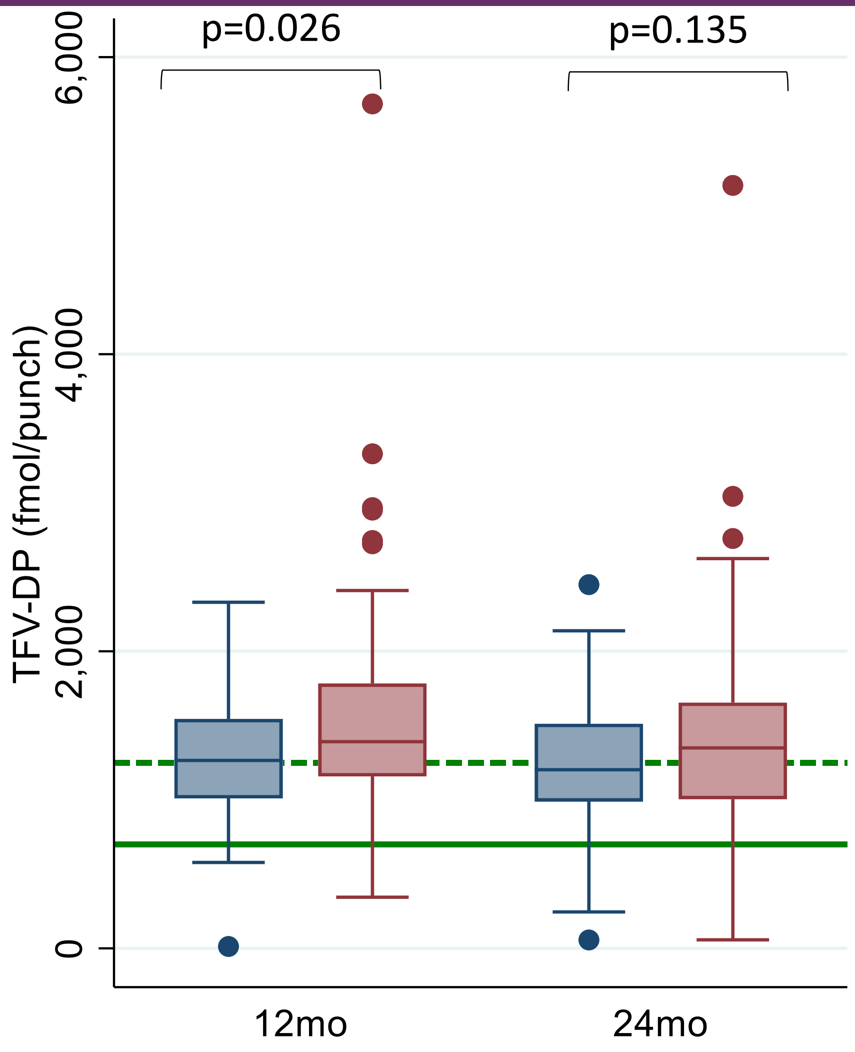
χ^2 p=0.36

GGD Amsterdam

Excellent adherence at 12 & 24mo



[TFV-DP] in fmol/punch per arm per visit



ranksum test

Standard app (n=83)
Extended app (n=83)

Dashed line: excellent adherence cut-off (1250 fmol/punch)

Solid line: good adherence cut-off (700 fmol/punch)

GGD Amsterdam

Multivariable linear regression

Factors associated with higher [TFV-DP]

	Coefficient	95% CI	p-value	Effect size (%)
Study arm Extended vs. basic app	0.131	0.011 - 0.251	0.032	11
Age Per decade older	0.057	0.006 - 0.109	0.029	7.3
Sexual preference Not exclusively homosexual vs. exclusively homosexual	0.137	0.017 - 0.258	0.026	17
HIV concern High/medium concern vs. low concern	0.242	0.457 - 0.027	0.027	31

GGD Amsterdam

Multivariable logistic regression

Factors associated with poor adherence

	aOR	95% CI	p-value
Signs of depression / anxiety	4.4	1.4 - 14	0.012
Low concern for acquiring HIV	5.8	2.0 - 17	0.001

Multivariable logistic regression

Factors associated with *less than* excellent adherence

	aOR	95% CI	p-value
Engaging in chemsex	2.2	1.2 - 4.3	0.019

Conclusions

- AMPrEP participants are highly adherent in general
- Visual feedback did not increase the proportion of participants with good adherence…
- … but it did increase the proportion with excellent adherence
- … and yielded higher [TFV-DP]

Conclusions

- Characteristics associated with higher adherence:
  - Older age
  - Not exclusively homosexual preference
  - Higher concern for acquiring HIV

Conclusions

- Possible barriers for adherence:
  - Signs of depression / anxiety
  - Low concern for acquiring HIV
  - Engaging in chemsex

Discussion

Opportunities for preventing ongoing HIV transmission

- Extra attention to potential poor adhering PrEP users
  - Targeted adherence counselling during PrEP consultations
  - Referral to specialist
    - Depression / anxiety disorder
    - Problematic engagement in chemsex

- Future research: populations with lower baseline adherence levels

Acknowledgements

All AMPrEP study participants

Co-authors

Elske Hoornenborg, Roel C.A. Achterbergh, Liza Coyer, Peter Anderson, Udi Davidovich, Henry J.C. de Vries, Maria Prins and Maarten F. Schim van der Loeff

Ilya Peters, Princella Felipa, Myra van Leeuwen, Kees de Jong, Merel Goos, Marieke Berghuis, Kenneth Yap, Jason Schouten, Amy Matser, Yvonne van Duijnhoven, Lia Abma, Anne-Wiek Ferweda, Dieke Martini, Antoinette van Roosmalen, Nuria Heis, Titia Heijman, Adriaan Tempert, Kim Visser, Roelien Prins, Marjo Broeren, Dominique Loomans, Ertan Ersan

ZonMw grant nr 522002003
aidsfonds, grant nr 2013169

Streeklab
Paul Oostvogel
Sylvia Bruisten
Ineke Linde
Adriaan Swaen
Dewi Usmany
Homeyra Amir Khosravi Agchay
All analists

Sanquin
Thijs van de Laar

RIVM
Ardine de Wit
Maria Xiridou
Silke David