Interventions to improve participation amongst underserved population groups in young person and adult national screening programmes in the UK: a systematic review

Appendix 7: Results plotted by underserved group

Contents

Abbreviations used in presentation of results

Screening programme

AAA	Abdominal Aortic Aneurysm
BCSP	Bowel Cancer Screening Programme
BSS	Bowel Scope Screening
BSP	Breast Screening Programme
CSP	Cervical Screening Programmes
DES	Diabetic Eye Screening

Basis of underserved group result

.w	whole trial population
.s	subgroup of whole trial population
.i	individual demographic
.a	area-based demographic

Underserved group

Category	Code	
Socioeconomic	**IMD20, SIMD20**	Most deprived quintile (English IMD or Scottish IMD)
	IMD40, SIMD40	Two most deprived quintiles (English IMD or Scottish IMD)
	IMD33	Most deprived tertile (English)
	SES33	Most deprived tertile (Townsend score or measure not reported)
	NoQual	No formal qualifications
	Unemp	Unemployed
	Tenant	Housing status (renting)
Ethnicity	**ETH**	Minority ethnicity
	ASIAN	Asian family origin
	PAK	Pakistani family origin
	BGD	Bangladeshi family origin
Age	**<65**	Under 65
	70+	Over 70
	50-54, 55-60	Age range as specified
Sex	**MEN**	Men
Screening history	**FTI**	First-time invitee
	pNON	Previous non-attender
	ltNON	Long-term non-attender
Current screening status	**rNON**	Recent non-attender (population recruited to trials of reminders)

Intervention description

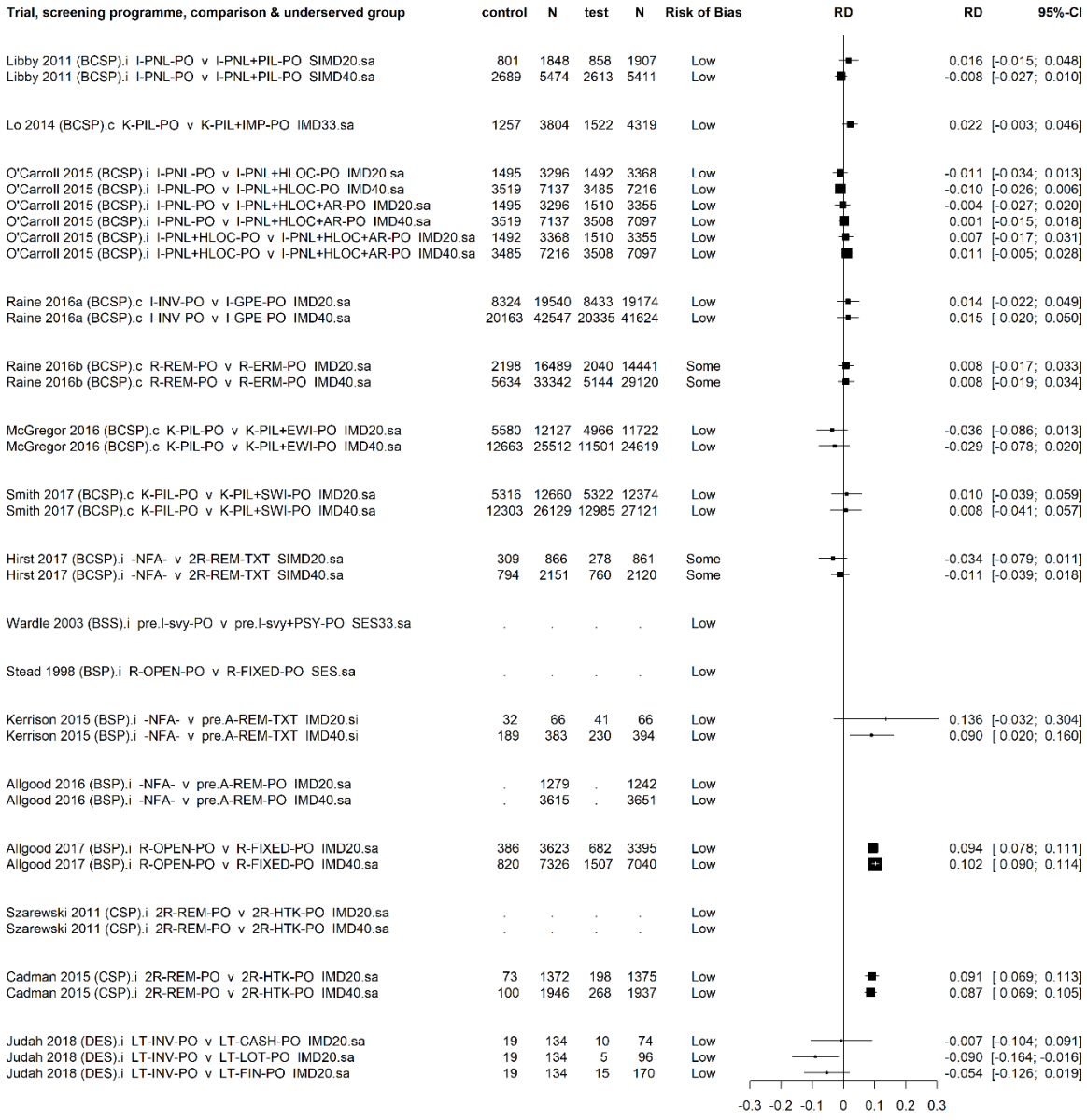
Event / stage of screening pathway		Type of intervention		Mode of intervention	
I	invitation	**NFA**	no further action	**PO**	post
A	appointment	**INV**	standard invite	**TEL**	telephone
K	home test kit	**PIL**	patient information leaflet	**TXT**	text message
R	reminder	**SWI**	simplified patient information	**F2F**	face-to-face
2R	second reminder	**EWI**	enhanced patient information	**GP**	general practice
LT	long-term non-responder	**PNL**	pre-notification letter		
		HCP	healthcare professional		
pre.	prefixes to modify the event	**PSY**	psychological/barriers		
post.	codes where needed	**AR**	anticipated regret		
		REM	(standard) reminder	**Other**	
		ERM	enhanced reminder	**ICC**	intra-cluster correlation coefficient
		Combi	combined invites or leaflets		
		GPE	GP endorsed		
		GPL	GP letter		
		HTK	home test kit		
		IMP	implementation intentions		
		INDIV	tailored to the individual		
		HLOC	health locus of control		
		svy	survey (not an intervention)		
		ann	annual (prefix)		

1 Forest plots for socioeconomically deprived groups

Three trials reported subgroups by qualifications, tenancy status and unemployment status but no numerical results were available for these groups and so all of these results relate to quintiles (or in some cases tertiles) defined by the Index of Multiple Deprivation or its Scottish equivalent (with Stead and Wardle using alternative area-based measures but not reporting any numerical results).

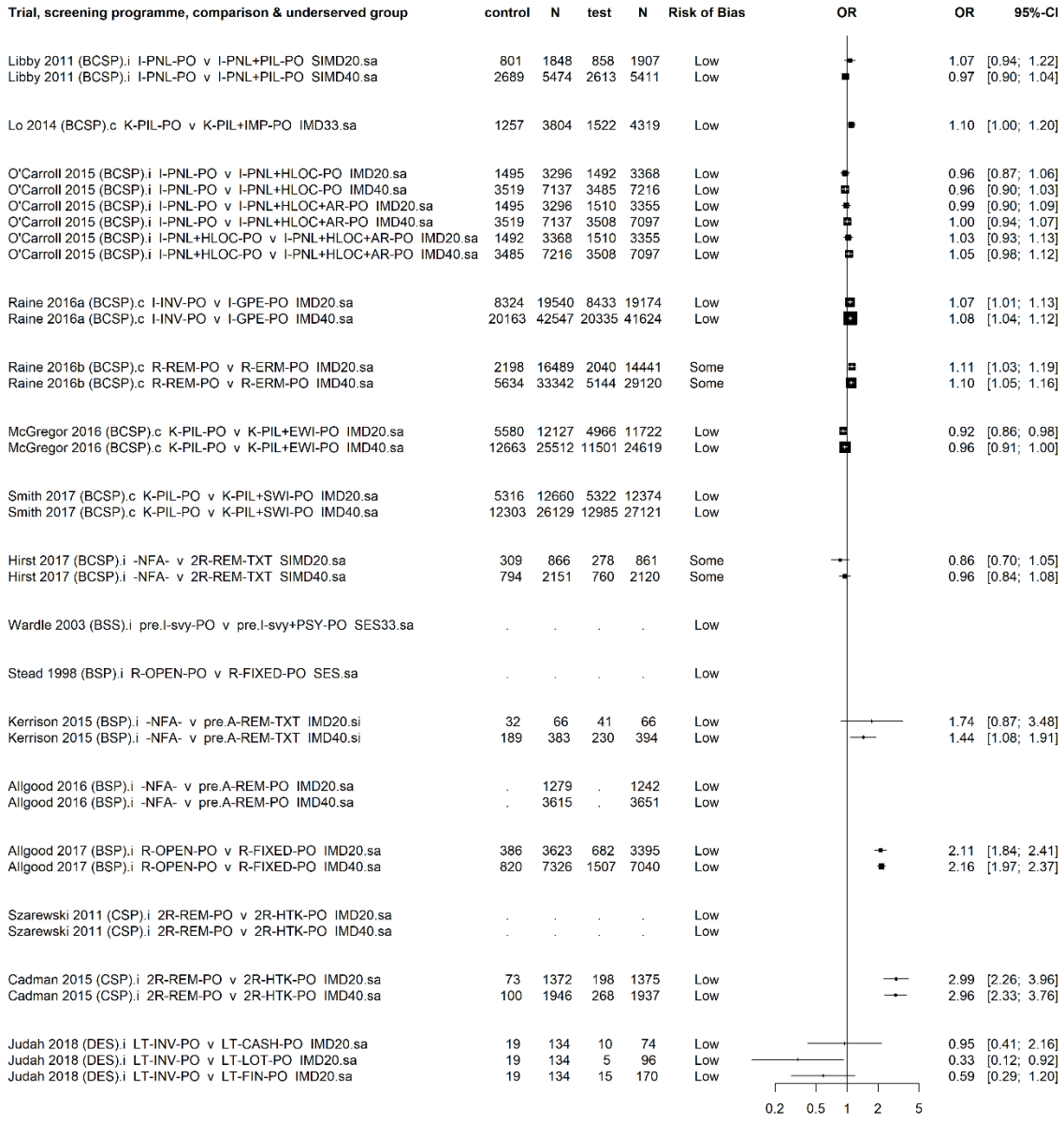
Note that the subgroup results for most deprived 40% in the plots below include the most deprived 20% and so these pairs of estimates are not independent of each other.

Figure 1 Risk difference (socioeconomic status, ordered by screening programme)



Assumes ICC of 0.03 for Raine 2016a, Raine 2016b, Smith 2017 and McGregor 2017 because ICC was not reported (estimate of 0.03 used, based on rounding up ICCs reported by other included cluster trials).

Figure 2 Odds ratio (socioeconomic status, ordered by screening programme)

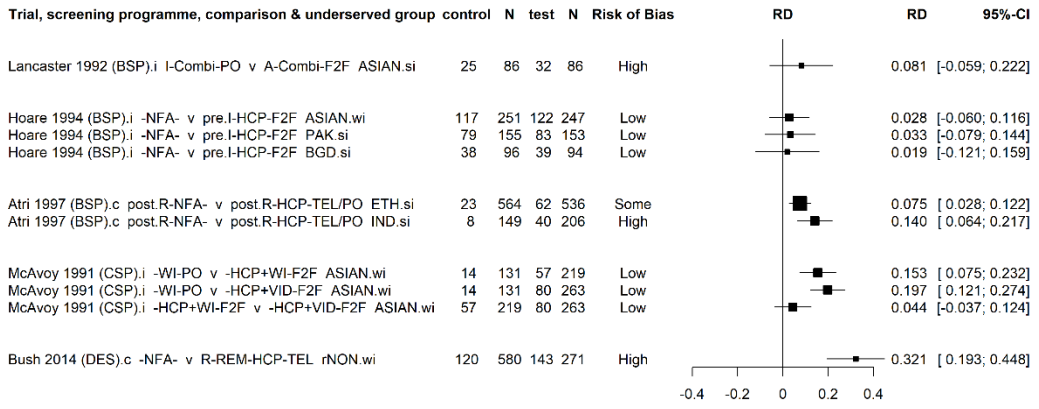


For Raine 2016a, Raine 2016b and McGregor 2017, adjusted ORs are reported.

2 Forest plots for minority ethnicity

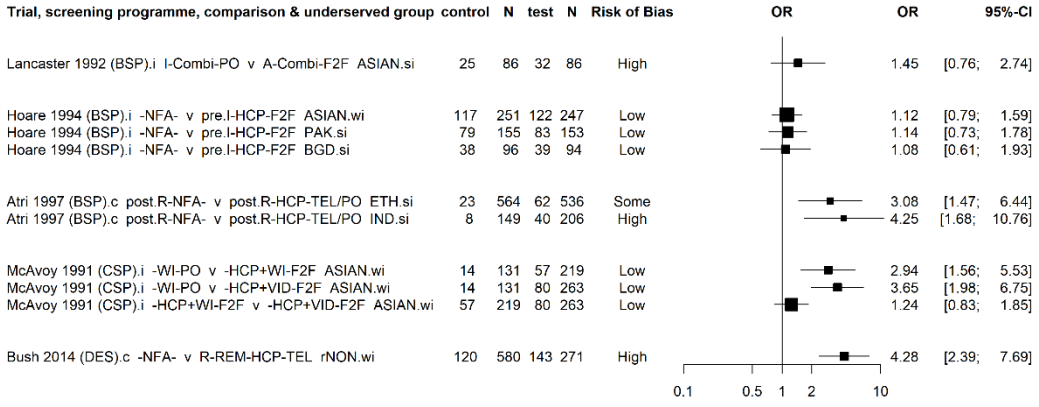
Three trials identified Asian women by picking out Asian-sounding names (McAvoy 1991, Lancaster 1992, Hoare 1994), a method which in practice classifies women by their father's or husband's assumed ethnicity. One of these trials (Hoare 1994) further classified names as originating from Pakistan or Bangladesh, an approach which may be particularly prone to error. Atri 1997 asked general practices to assess the ethnicity of their included patients. Bush 2014 cluster-randomised ten GP practices with a high proportion of Asian patients and so ethnicity is an area-based measure for this trial.

Figure 3 Risk difference (minority ethnicity, ordered by screening programme)



Assumes ICC of 0.03 for Atri 1997 and Bush 2014 because ICC was not reported.

Figure 4 Odds ratio (minority ethnicity, ordered by screening programme)

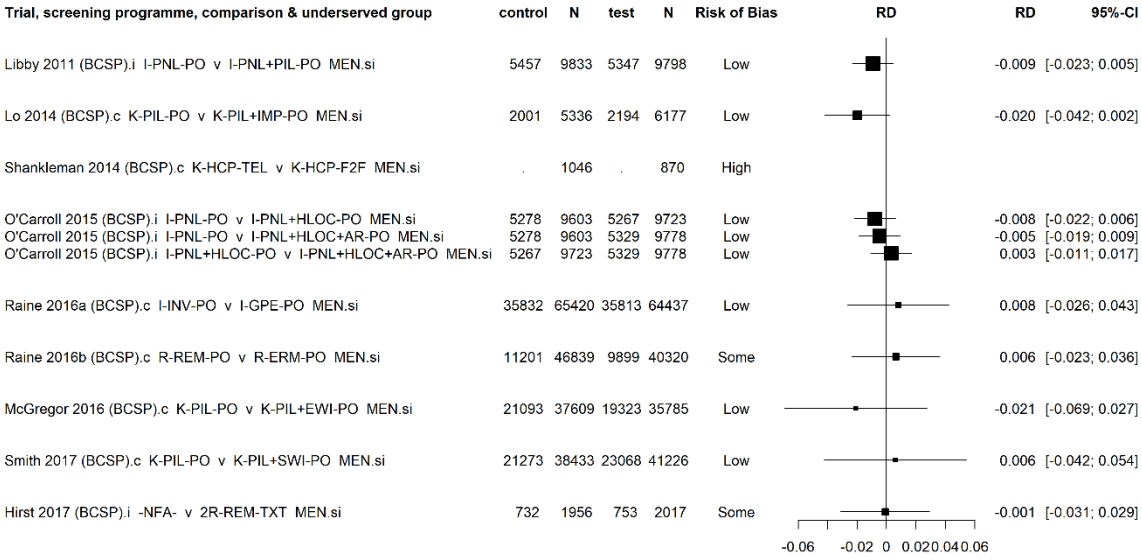


Assumes ICC of 0.03 for Atri 1997 and Bush 2014 because ICC was not reported.

3 Forest plots for men in BCSP

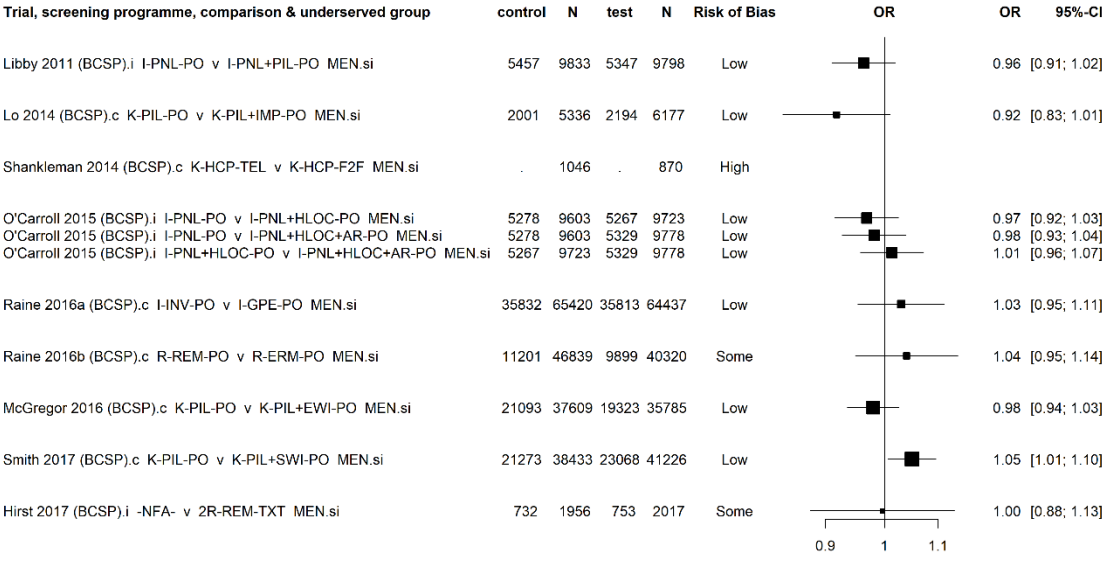
The only underserved group identified by sex was men in the BCSP.

Figure 5 Risk difference (sex, ordered by screening programme)



Assumes ICC of 0.03 for Raine 2016a, Raine 2016b, Smith 2017 and McGregor 2017 because ICC was not reported.

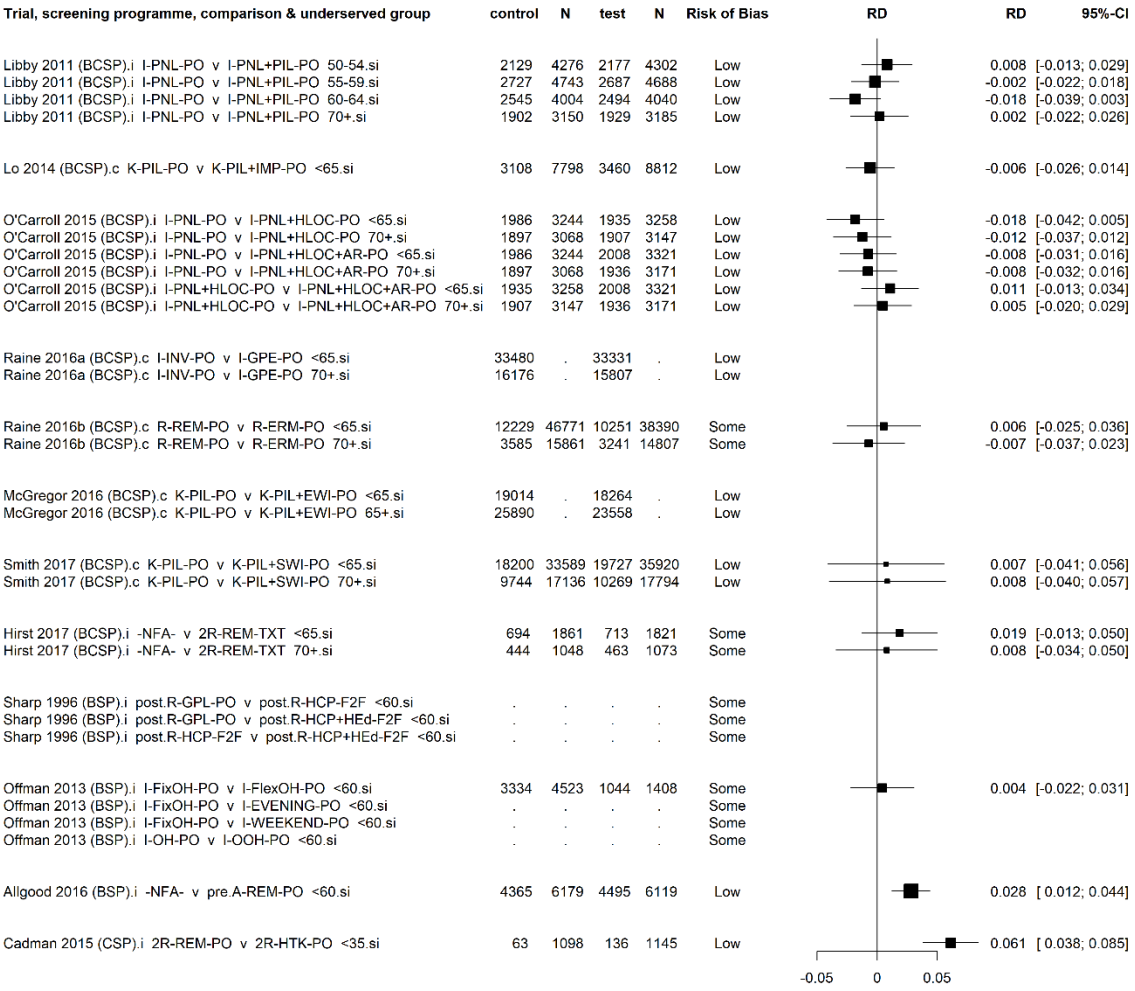
Figure 6 Odds ratio (sex, ordered by screening programme)



For Raine 2016a, Raine 2016b, Smith 2017 and McGregor 2017, adjusted ORs are reported.

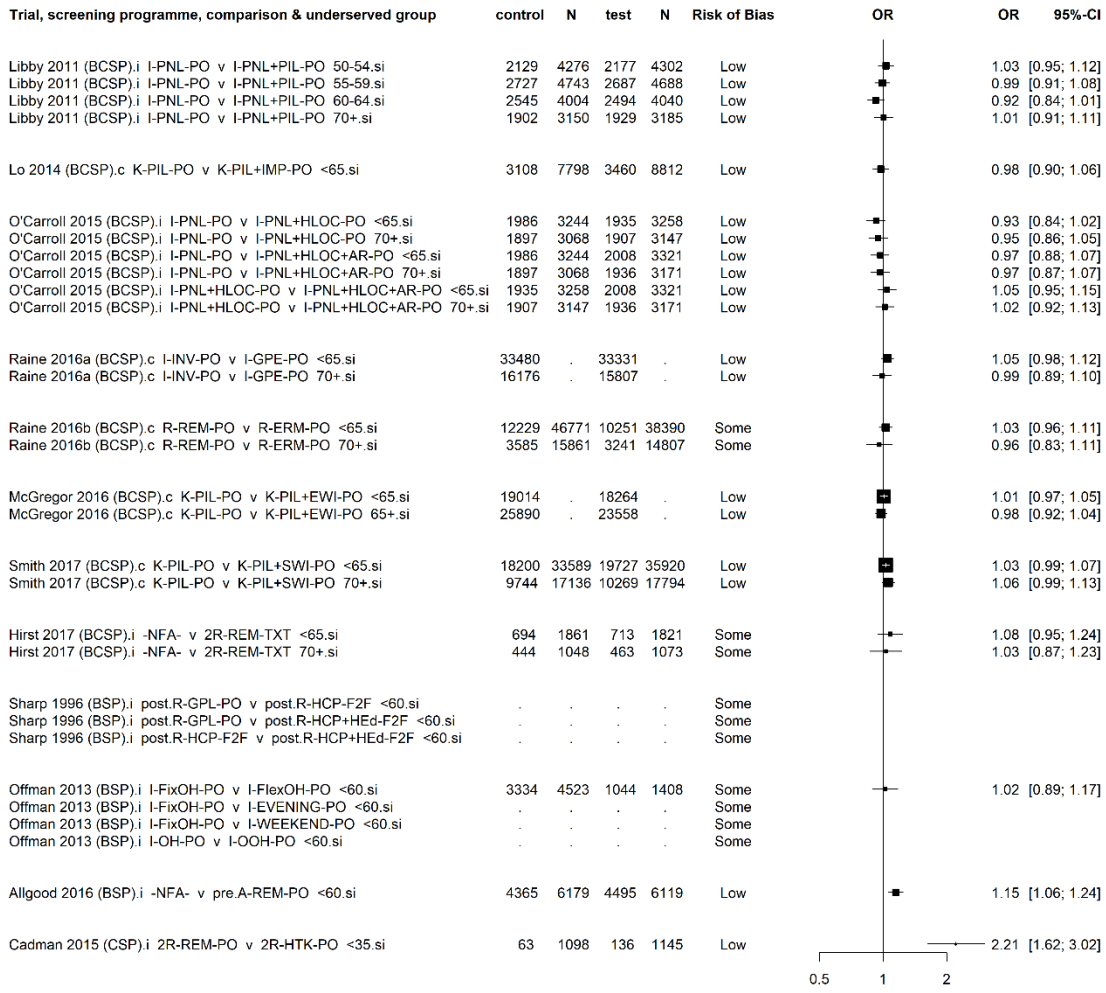
4 Forest plots for age

Figure 7 Risk difference (age, ordered by screening programme)



Assumes ICC of 0.03 for Raine 2016b and Smith 2017 2017 because ICC was not reported.

Figure 8 Odds ratio (age, ordered by screening programme)



For Raine 2016a, Raine 2016b, Smith 2017 and McGregor 2017, adjusted ORs are reported.

5 Forest plots for screening history

The underserved groups by screening history are first-time invitees and previous non-responders (with trials which report these groups usually also reporting on previous responders). Some trials also recruited long-term non-responders or considered them as a subgroup.

For RD plots: assumes ICC of 0.03 for Raine 2016a, Raine 2016b, Smith 2017 and McGregor 2017 because ICC was not reported.

For OR plots: for Raine 2016a, Raine 2016b, Smith 2017 and McGregor 2017, adjusted ORs are reported.

Figure 9 Risk difference (screening history, ordered by screening programme)

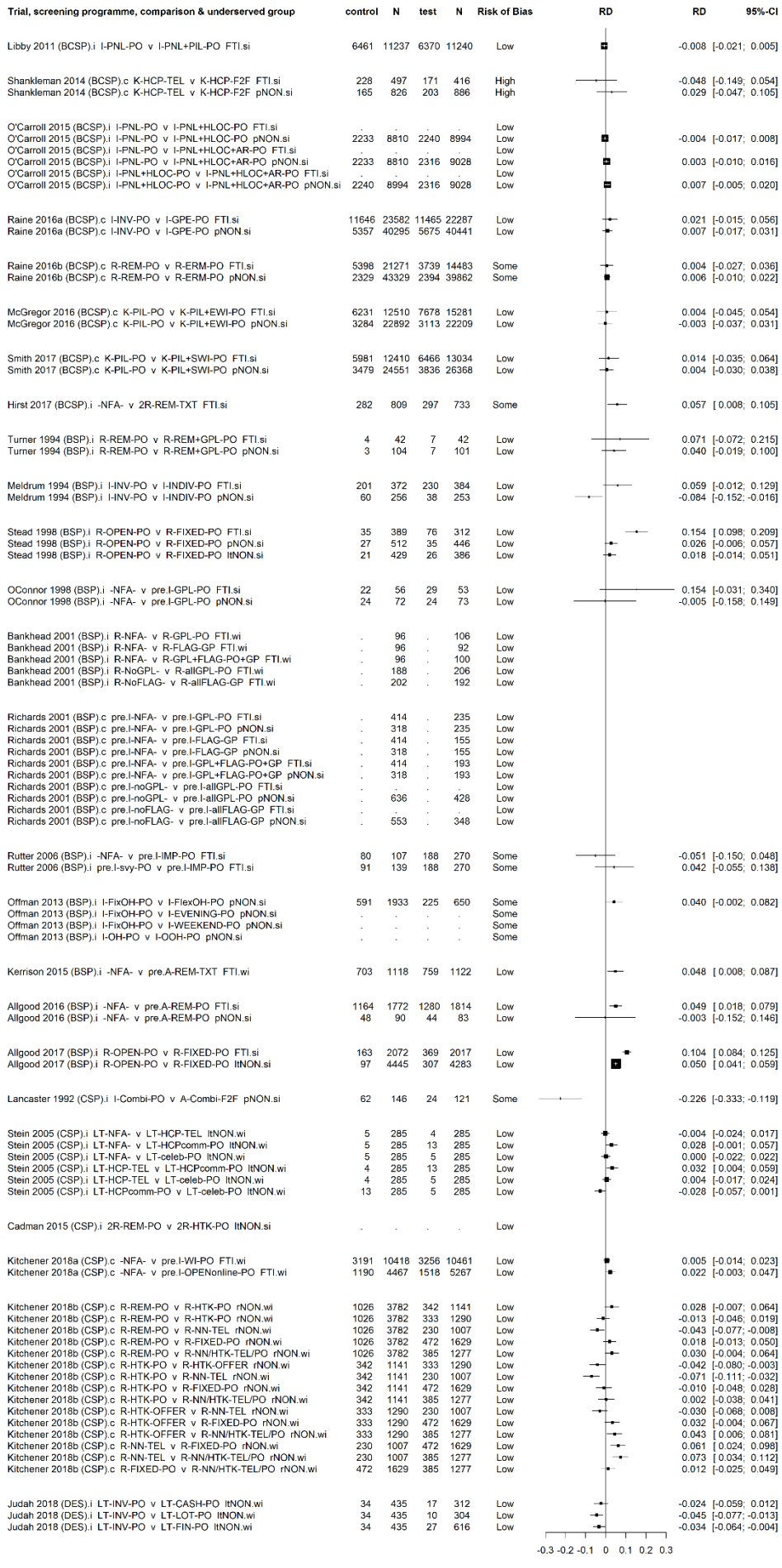
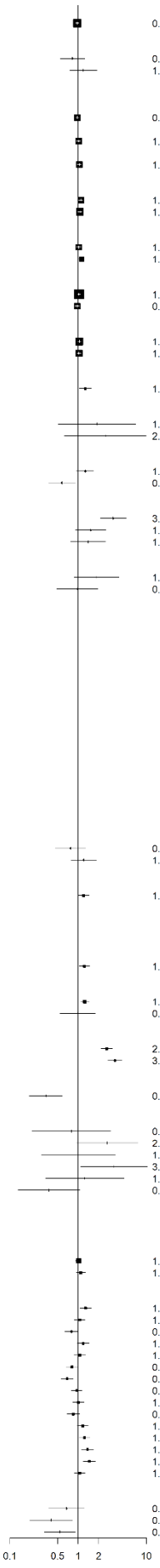


Figure 10 Odds ratio (screening history, ordered by screening programme)

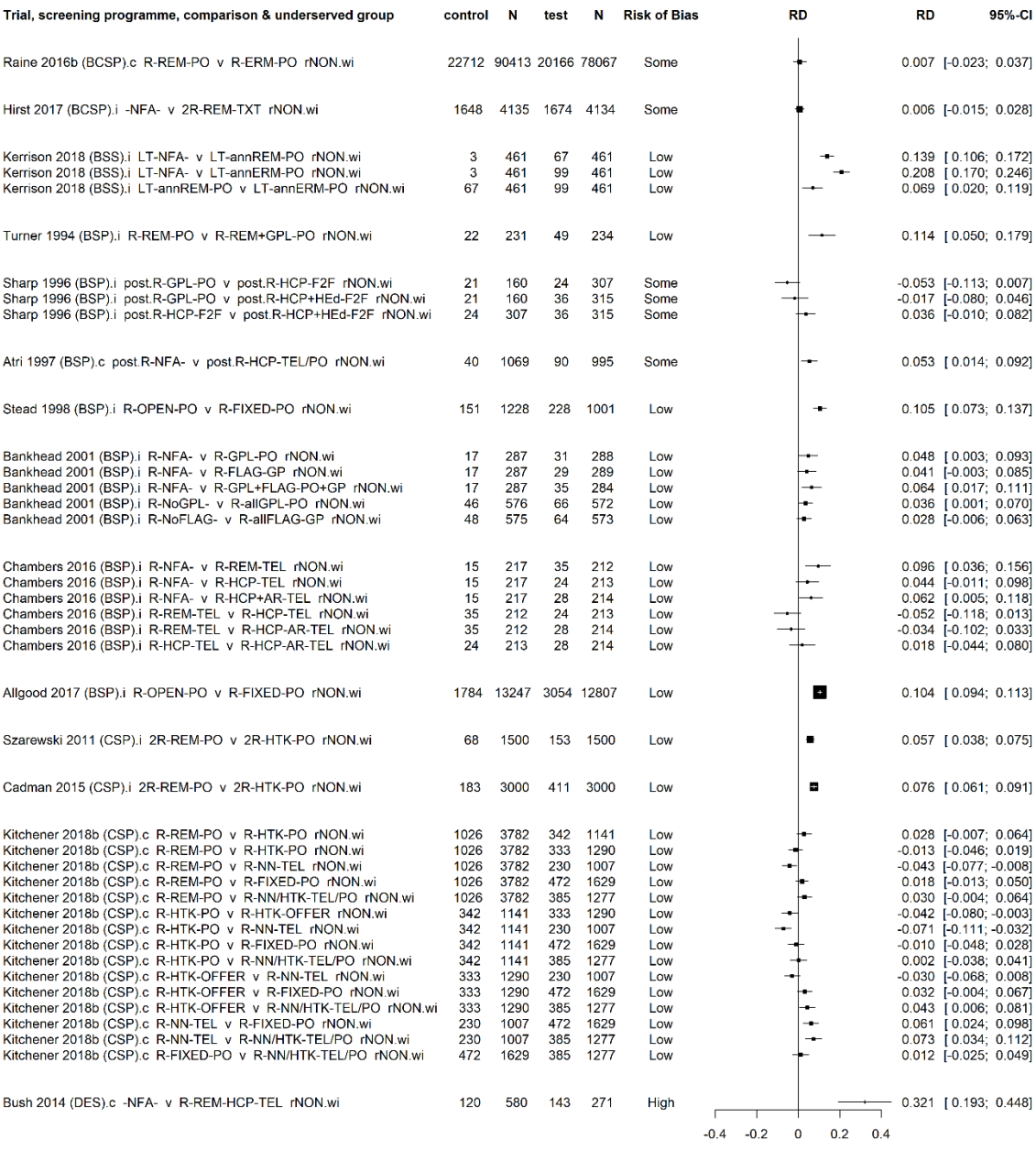
Trial, screening programme, comparison & underserved group	control	N	test	N	Risk of Bias	OR	95%-CI
Libby 2011 (BCSP).i I-PNL-PO v I-PNL+PIL-PO FTI.si	6461	11237	6370	11240	Low	0.97	[0.92; 1.02]
Shankleman 2014 (BCSP).c K-HCP-TEL v K-HCP-F2F FTI.si	228	497	171	416	High	0.82	[0.54; 1.25]
Shankleman 2014 (BCSP).c K-HCP-TEL v K-HCP-F2F pNON.si	165	826	203	886	High	1.19	[0.76; 1.87]
O'Carroll 2015 (BCSP).i I-PNL-PO v I-PNL+HLOC-PO FTI.si	.	.	.	.	Low		
O'Carroll 2015 (BCSP).i I-PNL-PO v I-PNL+HLOC-PO pNON.si	2233	8810	2240	8994	Low	0.98	[0.91; 1.05]
O'Carroll 2015 (BCSP).i I-PNL-PO v I-PNL+HLOC+AR-PO FTI.si	.	.	.	.	Low		
O'Carroll 2015 (BCSP).i I-PNL-PO v I-PNL+HLOC+AR-PO pNON.si	2233	8810	2316	9028	Low	1.02	[0.95; 1.09]
O'Carroll 2015 (BCSP).i I-PNL+HLOC-PO v I-PNL+HLOC+AR-PO FTI.si	.	.	.	.	Low		
O'Carroll 2015 (BCSP).i I-PNL+HLOC-PO v I-PNL+HLOC+AR-PO pNON.si	2240	8994	2316	9028	Low	1.04	[0.97; 1.11]
Raine 2016a (BCSP).c I-INV-PO v I-GPE-PO FTI.si	11646	23582	11465	22287	Low	1.09	[1.02; 1.17]
Raine 2016a (BCSP).c I-INV-PO v I-GPE-PO pNON.si	5357	40295	5675	40441	Low	1.06	[1.00; 1.13]
Raine 2016b (BCSP).c R-REM-PO v R-ERM-PO FTI.si	5398	21271	3739	14483	Some	1.02	[0.95; 1.10]
Raine 2016b (BCSP).c R-REM-PO v R-ERM-PO pNON.si	2329	43329	2394	39862	Some	1.12	[1.02; 1.22]
McGregor 2016 (BCSP).c K-PIL-PO v K-PIL+EWI-PO FTI.si	6231	12510	7678	15281	Low	1.03	[0.99; 1.08]
McGregor 2016 (BCSP).c K-PIL-PO v K-PIL+EWI-PO pNON.si	3284	22892	3113	22209	Low	0.97	[0.90; 1.04]
Smith 2017 (BCSP).c K-PIL-PO v K-PIL+SWI-PO FTI.si	5981	12410	6466	13034	Low	1.04	[0.98; 1.10]
Smith 2017 (BCSP).c K-PIL-PO v K-PIL+SWI-PO pNON.si	3479	24551	3836	26368	Low	1.03	[0.97; 1.10]
Hirst 2017 (BCSP).i -NFA- v 2R-REM-TXT FTI.si	282	809	297	733	Some	1.27	[1.04; 1.57]
Turner 1994 (BSP).i R-REM-PO v R-REM+GPL-PO FTI.si	4	42	7	42	Low	1.90	[0.51; 7.05]
Turner 1994 (BSP).i R-REM-PO v R-REM+GPL-PO pNON.si	3	104	7	101	Low	2.51	[0.63; 9.98]
Meldrum 1994 (BSP).i I-INV-PO v I-INDIV-PO FTI.si	201	372	230	384	Low	1.27	[0.95; 1.70]
Meldrum 1994 (BSP).i I-INV-PO v I-INDIV-PO pNON.si	60	256	38	253	Low	0.58	[0.37; 0.91]
Stead 1998 (BSP).i R-OPEN-PO v R-FIXED-PO FTI.si	35	389	76	312	Low	3.26	[2.11; 5.02]
Stead 1998 (BSP).i R-OPEN-PO v R-FIXED-PO pNON.si	27	512	35	446	Low	1.53	[0.91; 2.57]
Stead 1998 (BSP).i R-OPEN-PO v R-FIXED-PO ltNON.si	21	429	26	386	Low	1.40	[0.78; 2.54]
OConnor 1998 (BSP).i -NFA- v pre.I-GPL-PO FTI.si	22	56	29	53	Low	1.87	[0.87; 4.00]
OConnor 1998 (BSP).i -NFA- v pre.I-GPL-PO pNON.si	24	72	24	73	Low	0.98	[0.49; 1.96]
Bankhead 2001 (BSP).i R-NFA- v R-GPL-PO FTI.wi	.	96	.	106	Low		
Bankhead 2001 (BSP).i R-NFA- v R-FLAG-GP FTI.wi	.	96	.	92	Low		
Bankhead 2001 (BSP).i R-NFA- v R-GPL+FLAG-PO+GP FTI.wi	.	96	.	100	Low		
Bankhead 2001 (BSP).i R-NoGPL- v R-allGPL-PO FTI.wi	.	188	.	206	Low		
Bankhead 2001 (BSP).i R-NoFLAG- v R-allFLAG-GP FTI.wi	.	202	.	192	Low		
Richards 2001 (BSP).c pre.I-NFA- v pre.I-GPL-PO FTI.si	.	414	.	235	Low		
Richards 2001 (BSP).c pre.I-NFA- v pre.I-GPL-PO pNON.si	.	318	.	235	Low		
Richards 2001 (BSP).c pre.I-NFA- v pre.I-FLAG-GP FTI.si	.	414	.	155	Low		
Richards 2001 (BSP).c pre.I-NFA- v pre.I-FLAG-GP pNON.si	.	318	.	155	Low		
Richards 2001 (BSP).c pre.I-NFA- v pre.I-GPL+FLAG-PO+GP FTI.si	.	414	.	193	Low		
Richards 2001 (BSP).c pre.I-NFA- v pre.I-GPL+FLAG-PO+GP pNON.si	.	318	.	193	Low		
Richards 2001 (BSP).c pre.I-noGPL- v pre.I-allGPL-PO FTI.si	.	.	.	.	Low		
Richards 2001 (BSP).c pre.I-noGPL- v pre.I-allGPL-PO pNON.si	.	636	.	428	Low		
Richards 2001 (BSP).c pre.I-noFLAG- v pre.I-allFLAG-GP FTI.si	.	.	.	.	Low		
Richards 2001 (BSP).c pre.I-noFLAG- v pre.I-allFLAG-GP pNON.si	.	553	.	348	Low		
Rutter 2006 (BSP).i -NFA- v pre.I-IMP-PO FTI.si	80	107	188	270	Some	0.77	[0.47; 1.29]
Rutter 2006 (BSP).i pre.I-svy-PO v pre.I-IMP-PO FTI.si	91	139	188	270	Some	1.21	[0.78; 1.87]
Offman 2013 (BSP).i I-FixOH-PO v I-FlexOH-PO pNON.si	591	1933	225	650	Some	1.20	[1.00; 1.45]
Offman 2013 (BSP).i I-FixOH-PO v I-EVENING-PO pNON.si	.	.	.	.	Some		
Offman 2013 (BSP).i I-FixOH-PO v I-WEEKEND-PO pNON.si	.	.	.	.	Some		
Offman 2013 (BSP).i I-OH-PO v I-OOH-PO pNON.si	.	.	.	.	Some		
Kerrison 2015 (BSP).i -NFA- v pre.A-REM-TXT FTI.wi	703	1118	759	1122	Low	1.23	[1.04; 1.47]
Allgood 2016 (BSP).i -NFA- v pre.A-REM-PO FTI.si	1164	1772	1280	1814	Low	1.25	[1.09; 1.44]
Allgood 2016 (BSP).i -NFA- v pre.A-REM-PO pNON.si	48	90	44	83	Low	0.99	[0.54; 1.79]
Allgood 2017 (BSP).i R-OPEN-PO v R-FIXED-PO FTI.si	163	2072	369	2017	Low	2.62	[2.16; 3.19]
Allgood 2017 (BSP).i R-OPEN-PO v R-FIXED-PO ltNON.si	97	4445	307	4283	Low	3.46	[2.74; 4.37]
Lancaster 1992 (CSP).i I-Combi-PO v A-Combi-F2F pNON.si	62	146	24	121	Some	0.34	[0.19; 0.58]
Stein 2005 (CSP).i LT-NFA- v LT-HCP-TEL ltNON.wi	5	285	4	285	Low	0.80	[0.21; 3.00]
Stein 2005 (CSP).i LT-NFA- v LT-HCPcomm-PO ltNON.wi	5	285	13	285	Low	2.68	[0.94; 7.61]
Stein 2005 (CSP).i LT-NFA- v LT-celeb-PO ltNON.wi	5	285	5	285	Low	1.00	[0.29; 3.49]
Stein 2005 (CSP).i LT-HCP-TEL v LT-HCPcomm-PO ltNON.wi	4	285	13	285	Low	3.36	[1.08; 10.42]
Stein 2005 (CSP).i LT-HCP-TEL v LT-celeb-PO ltNON.wi	4	285	5	285	Low	1.25	[0.33; 4.72]
Stein 2005 (CSP).i LT-HCPcomm-PO v LT-celeb-PO ltNON.wi	13	285	5	285	Low	0.37	[0.13; 1.06]
Cadman 2015 (CSP).i 2R-REM-PO v 2R-HTK-PO ltNON.si	.	.	.	.	Low		
Kitchener 2018a (CSP).c -NFA- v pre.I-WI-PO FTI.wi	3191	10418	3256	10461	Low	1.01	[0.93; 1.11]
Kitchener 2018a (CSP).c -NFA- v pre.I-OPEnonline-PO FTI.wi	1190	4467	1518	5267	Low	1.10	[0.94; 1.28]
Kitchener 2018b (CSP).c R-REM-PO v R-HTK-PO rNON.wi	1026	3782	342	1141	Low	1.29	[1.06; 1.57]
Kitchener 2018b (CSP).c R-REM-PO v R-HTK-PO rNON.wi	1026	3782	333	1290	Low	1.06	[0.88; 1.26]
Kitchener 2018b (CSP).c R-REM-PO v R-NN-TEL rNON.wi	1026	3782	230	1007	Low	0.80	[0.64; 0.99]
Kitchener 2018b (CSP).c R-REM-PO v R-FIXED-PO rNON.wi	1026	3782	472	1629	Low	1.19	[0.97; 1.46]
Kitchener 2018b (CSP).c R-REM-PO v R-NN/HTK-TEL/PO rNON.wi	1026	3782	385	1277	Low	1.06	[0.87; 1.29]
Kitchener 2018b (CSP).c R-HTK-PO v R-HTK-OFFER rNON.wi	342	1141	333	1290	Low	0.81	[0.67; 0.99]
Kitchener 2018b (CSP).c R-HTK-PO v R-NN-TEL rNON.wi	342	1141	230	1007	Low	0.69	[0.56; 0.85]
Kitchener 2018b (CSP).c R-HTK-PO v R-FIXED-PO rNON.wi	342	1141	472	1629	Low	0.95	[0.79; 1.14]
Kitchener 2018b (CSP).c R-HTK-PO v R-NN/HTK-TEL/PO rNON.wi	342	1141	385	1277	Low	1.01	[0.84; 1.22]
Kitchener 2018b (CSP).c R-HTK-OFFER v R-NN-TEL rNON.wi	333	1290	230	1007	Low	0.85	[0.69; 1.05]
Kitchener 2018b (CSP).c R-HTK-OFFER v R-FIXED-PO rNON.wi	333	1290	472	1629	Low	1.17	[0.98; 1.40]
Kitchener 2018b (CSP).c R-HTK-OFFER v R-NN/HTK-TEL/PO rNON.wi	333	1290	385	1277	Low	1.24	[1.03; 1.50]
Kitchener 2018b (CSP).c R-NN-TEL v R-FIXED-PO rNON.wi	230	1007	472	1629	Low	1.38	[1.13; 1.68]
Kitchener 2018b (CSP).c R-NN-TEL v R-NN/HTK-TEL/PO rNON.wi	230	1007	385	1277	Low	1.46	[1.19; 1.79]
Kitchener 2018b (CSP).c R-FIXED-PO v R-NN/HTK-TEL/PO rNON.wi	472	1629	385	1277	Low	1.06	[0.89; 1.26]
Judah 2018 (DES).i LT-INV-PO v LT-CASH-PO ltNON.wi	34	435	17	312	Low	0.68	[0.37; 1.24]
Judah 2018 (DES).i LT-INV-PO v LT-LOT-PO ltNON.wi	34	435	10	304	Low	0.40	[0.20; 0.82]
Judah 2018 (DES).i LT-INV-PO v LT-FIN-PO ltNON.wi	34	435	27	616	Low	0.54	[0.32; 0.91]



6 Forest plots for recent non-responders (trials of reminders)

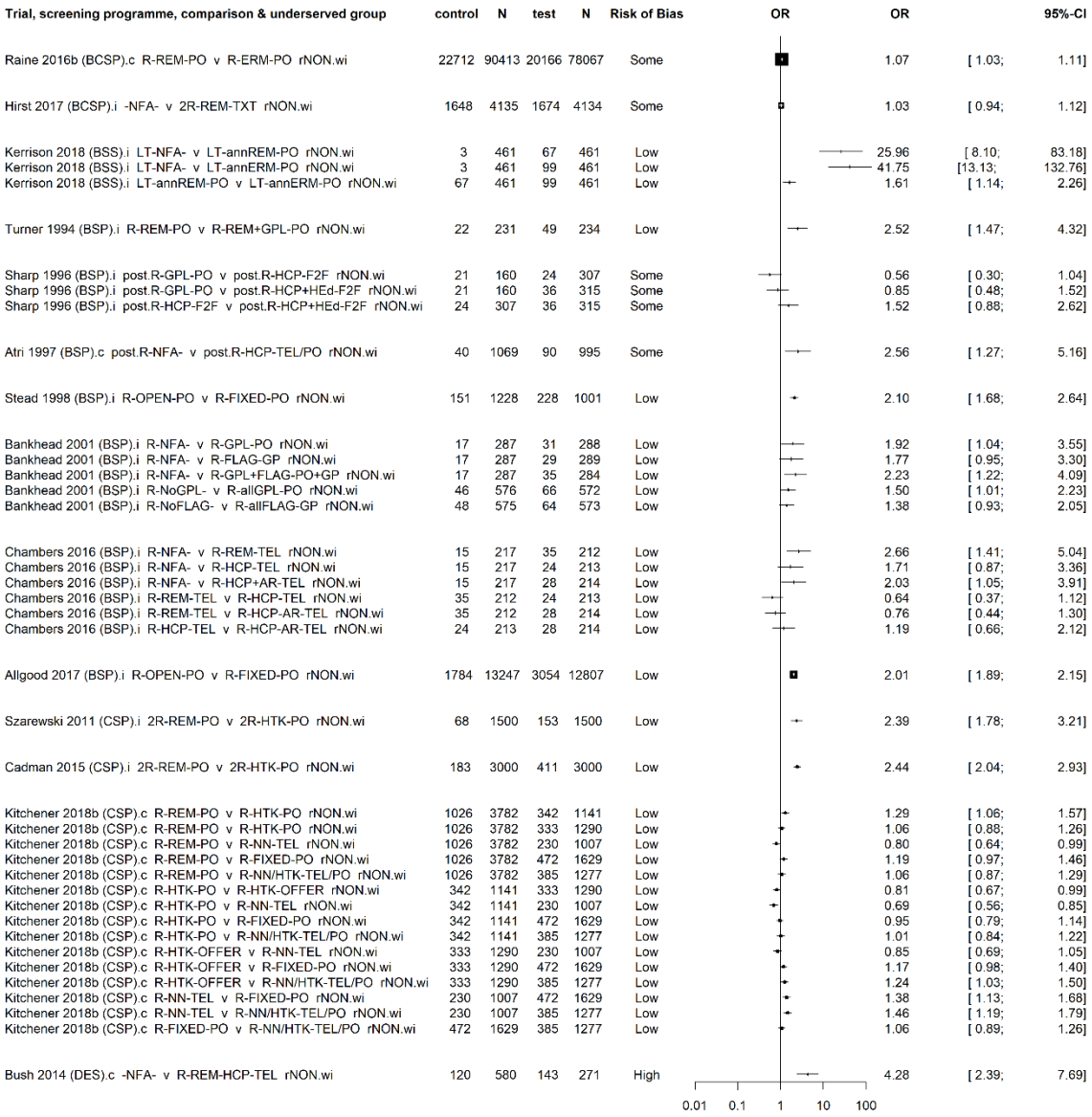
Control arms with no reminders at all have been excluded from this analysis, apart from those for BSS, as reminders are already a part of the standard screening process for other programmes because there is very strong evidence that they improve uptake.

Figure 11 Risk difference (recent non-responders, ordered by screening programme)



Assumes ICC of 0.03 for Atri 1997, Bush 2014 and Raine 2016b because ICC not reported.

Figure 12 Odds ratio (recent non-responders, ordered by screening programme)



For Raine 2016b, adjusted OR is reported.