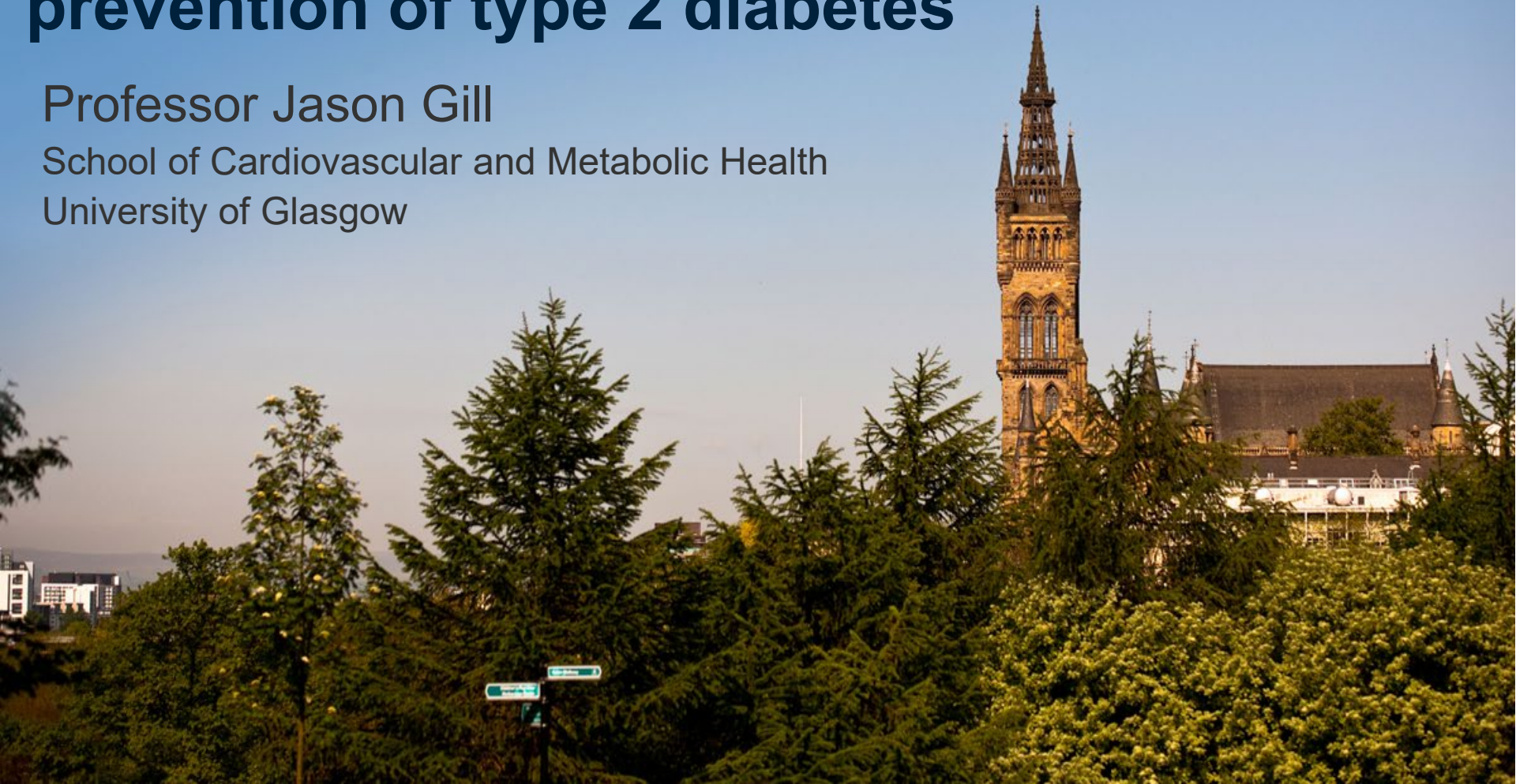


Some reflections on ethnicity and prevention of type 2 diabetes

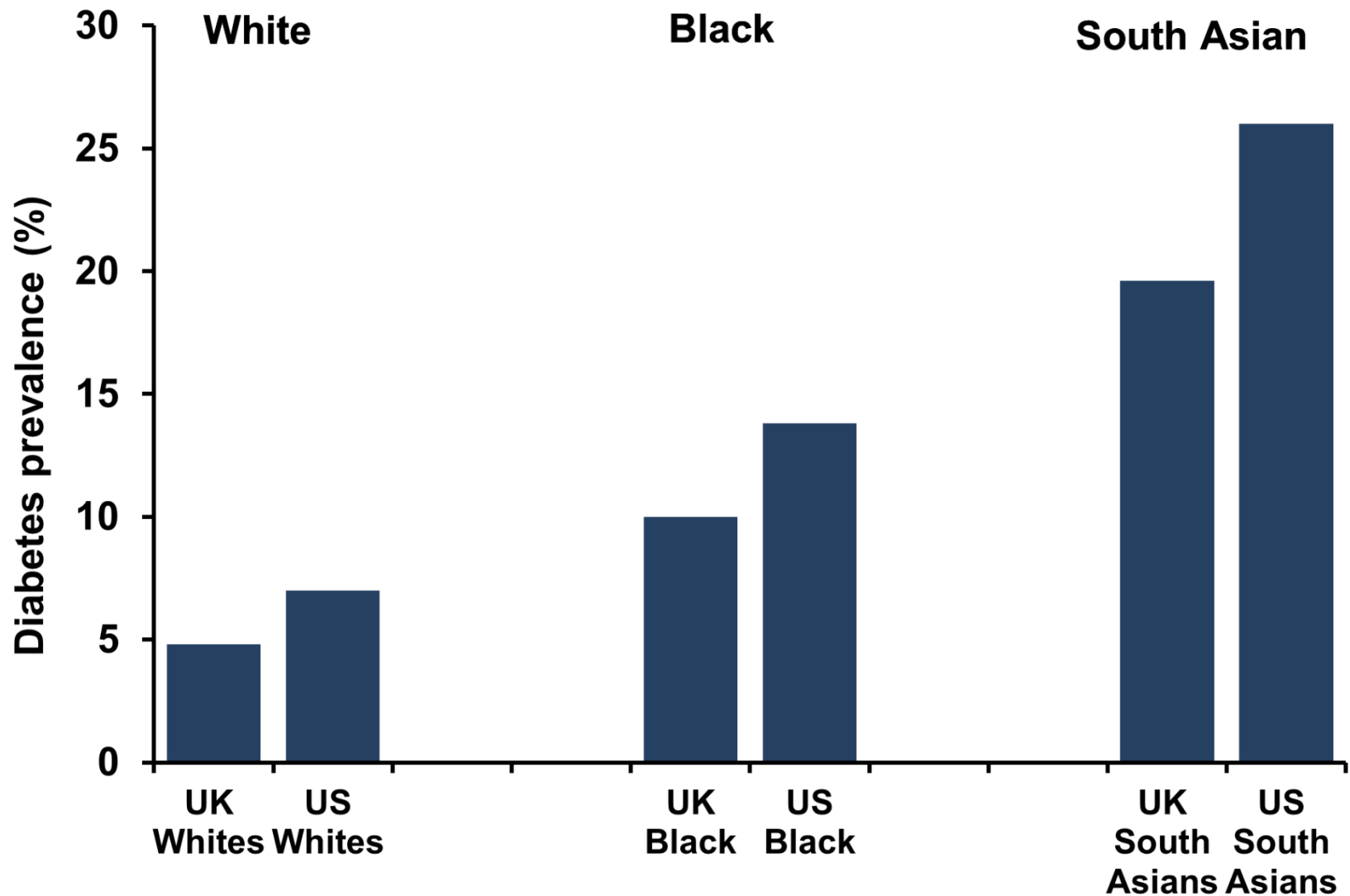
Professor Jason Gill

School of Cardiovascular and Metabolic Health

University of Glasgow



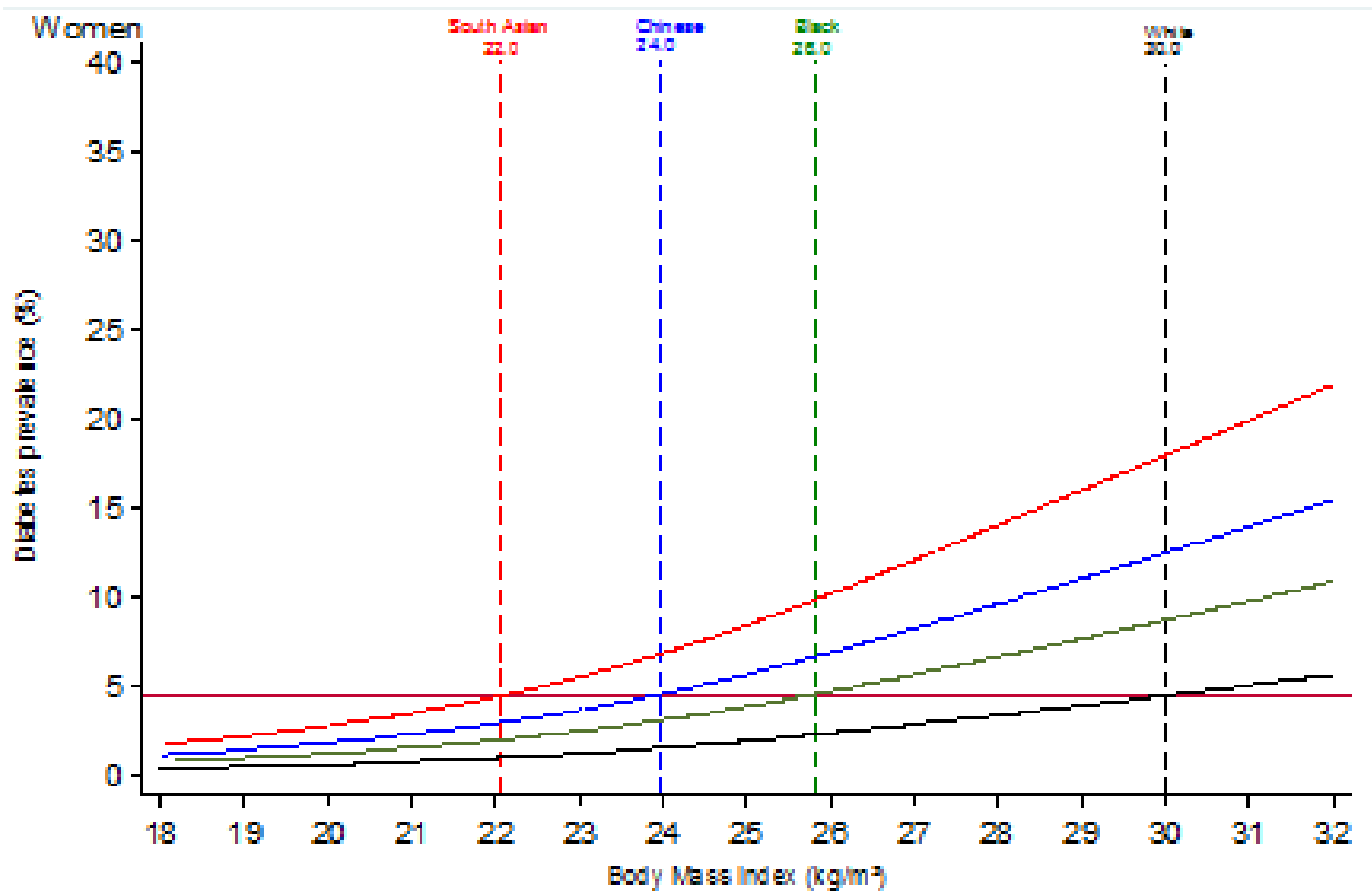
Ethnicity and diabetes risk





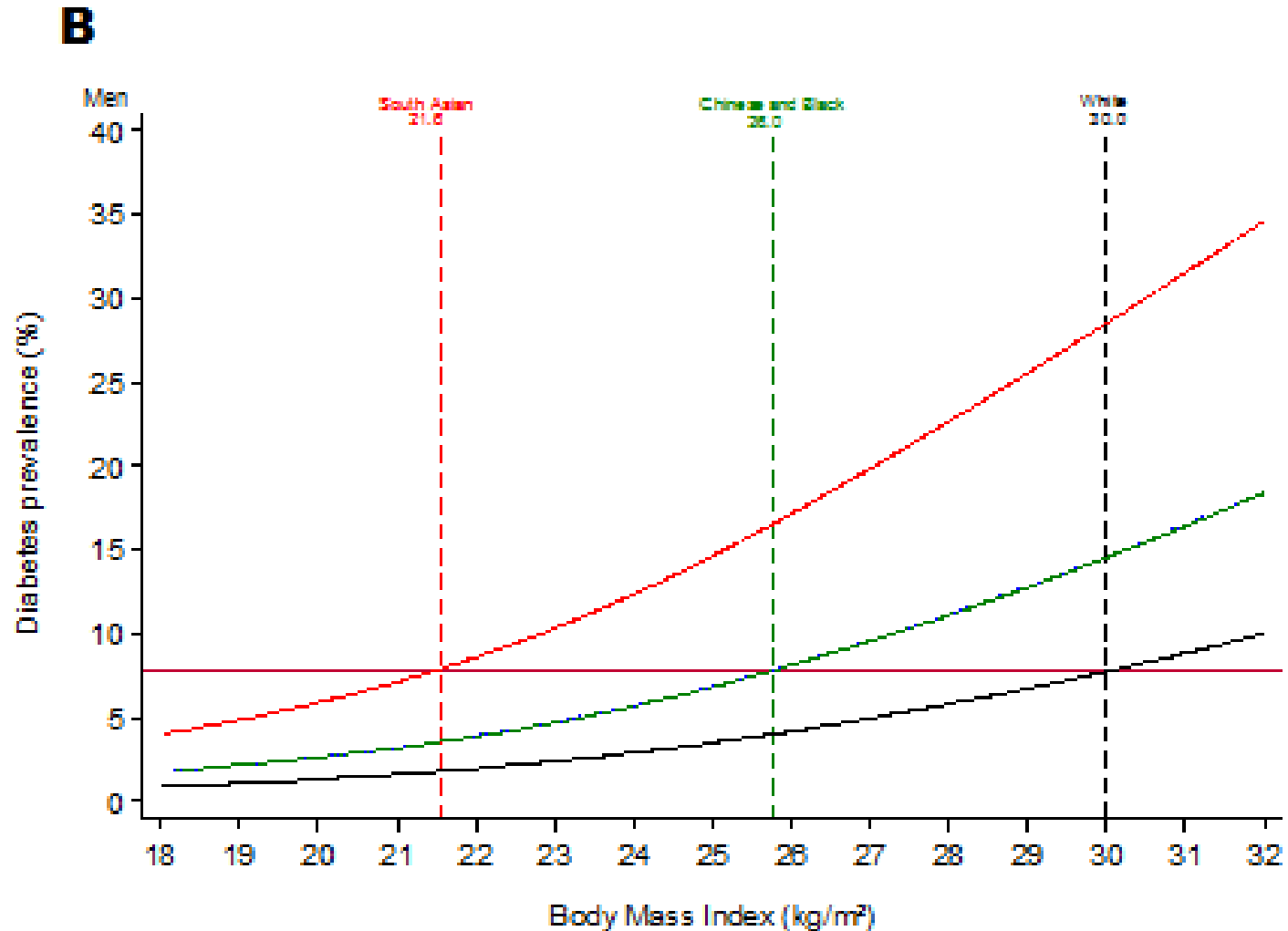
Ethnicity, BMI and diabetes prevalence in UK Biobank

A





Ethnicity, BMI and diabetes prevalence in UK Biobank



Ntuk et al (2014) Diabetes Care 37:2500-7

NICE National Institute for
Health and Care Excellence

Assessing body mass index and waist circumference thresholds for intervening to prevent ill health and premature death among adults from black, Asian and other minority ethnic groups in the UK

Issued: July 2013

NICE public health guidance 46
guidance.nice.org.uk/ph46

Recommendation 1 Preventing type 2 diabetes

Follow NICE recommendations 1–18 in Preventing type 2 diabetes: risk identification and interventions for individuals at high risk (public health guidance 38). This includes:

- using lower thresholds (23 kg/m² to indicate increased risk and 27.5 kg/m² to indicate high risk) for BMI to trigger action to prevent type 2 diabetes among Asian (South Asian and Chinese) populations
- identifying people at risk of developing type 2 diabetes using a staged (or stepped) approach
- providing those at high risk with a quality-assured, evidence-based, intensive lifestyle-change programme to prevent or delay the onset of type 2 diabetes.

Diabetologia (2019) 62:1337–1348

<https://doi.org/10.1007/s00125-019-4905-2>

META-ANALYSIS



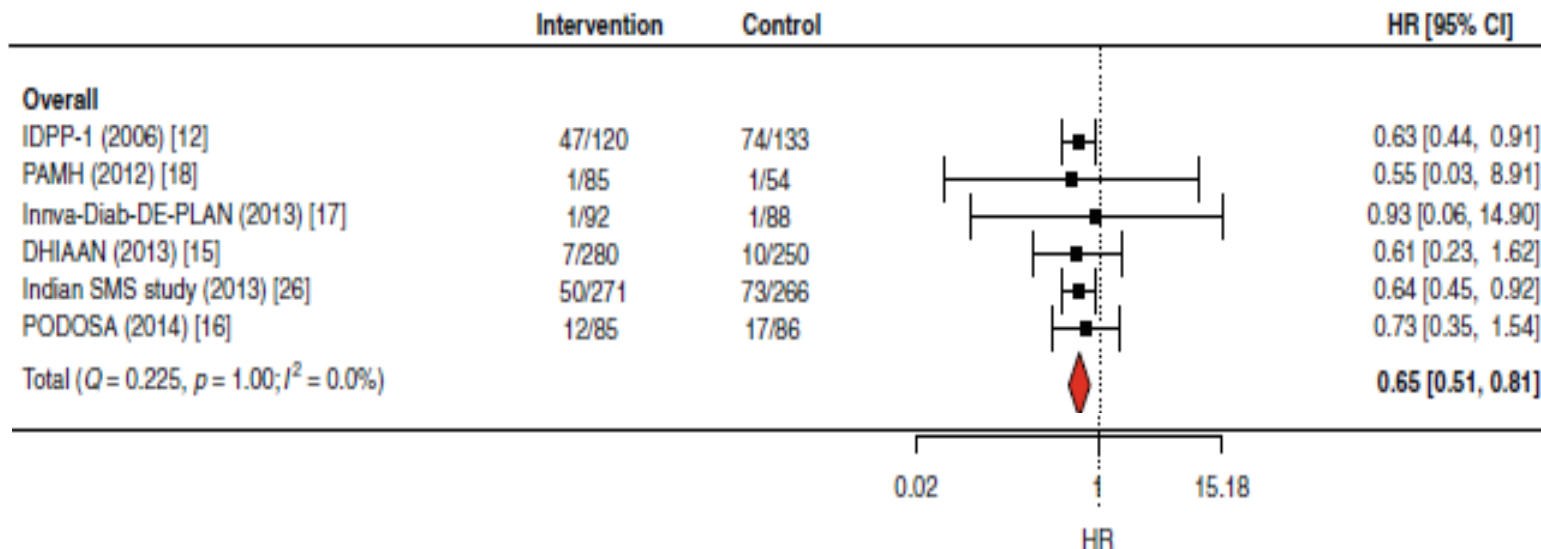
Effects of dietary and physical activity interventions on the risk of type 2 diabetes in South Asians: meta-analysis of individual participant data from randomised controlled trials

Anne Karen Jenum¹ • Idunn Brekke^{2,3} • Ibrahimu Mdala¹ • Mirthe Muilwijk⁴ • Ambady Ramachandran^{5,6} • Marte Kjøllesdal⁷ • Eivind Andersen⁸ • Kåre R. Richarlsen⁹ • Anne Douglas¹⁰ • Genevieve Cezard^{10,11} • Aziz Sheikh¹⁰ • Carlos A. Celis-Morales¹² • Jason M. R. Gill¹² • Naveed Sattar¹² • Raj S. Bhopal¹⁰ • Erik Beune⁴ • Karien Stronks⁴ • Per Olav Vandvik¹³ • Irene G. M. van Valkengoed⁴

Received: 20 December 2018 / Accepted: 15 April 2019 / Published online: 15 June 2019

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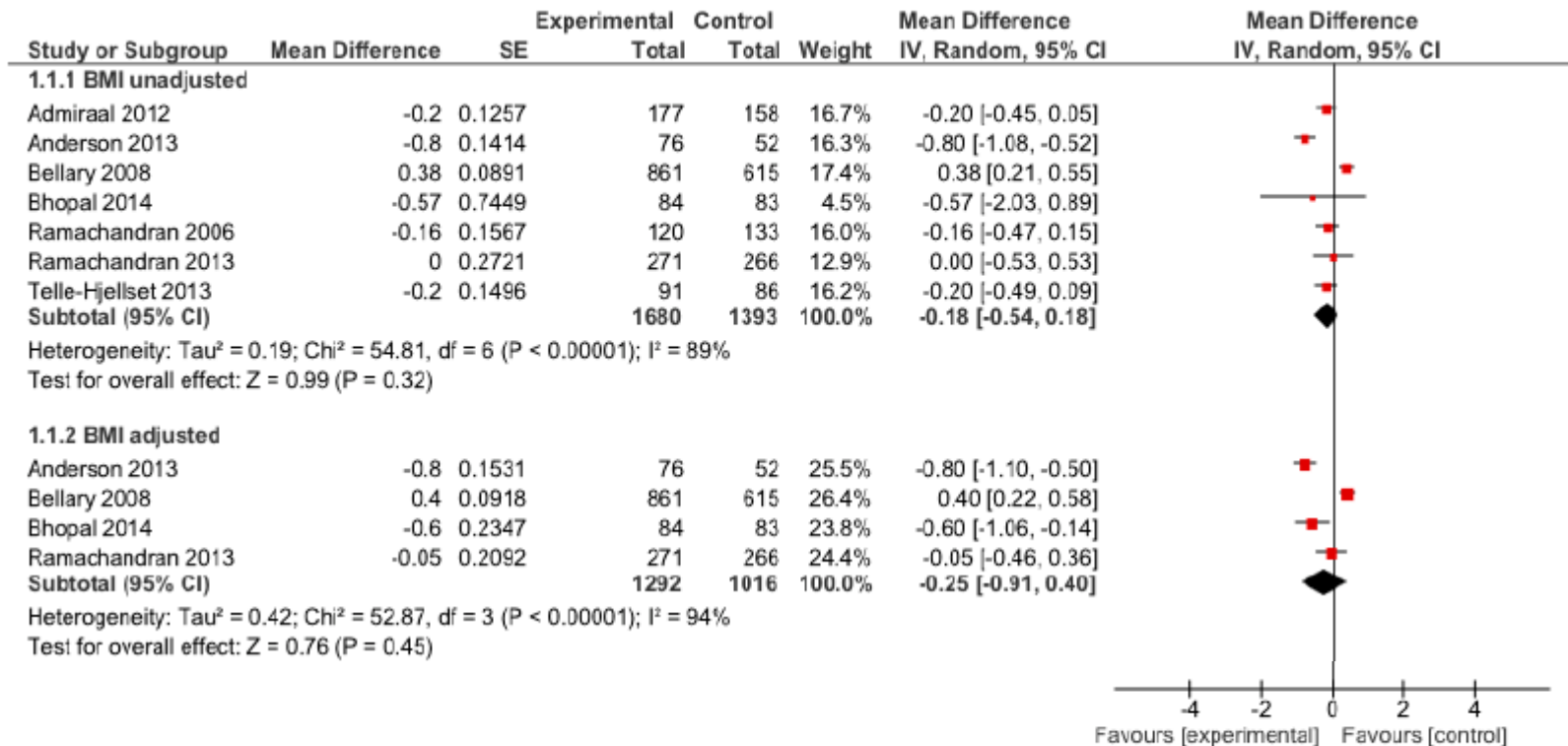
Effectiveness of diet and physical activity interventions for type 2 diabetes prevention in South Asians



35% reduction in incidence of T2D
0.75 kg reduction in weight



Diet and PA interventions to prevent or treat obesity in South Asian adults



0.25 BMI unit reduction in BMI-adjusted analyses



Weight loss and diabetes remission in South Asians in STANDby

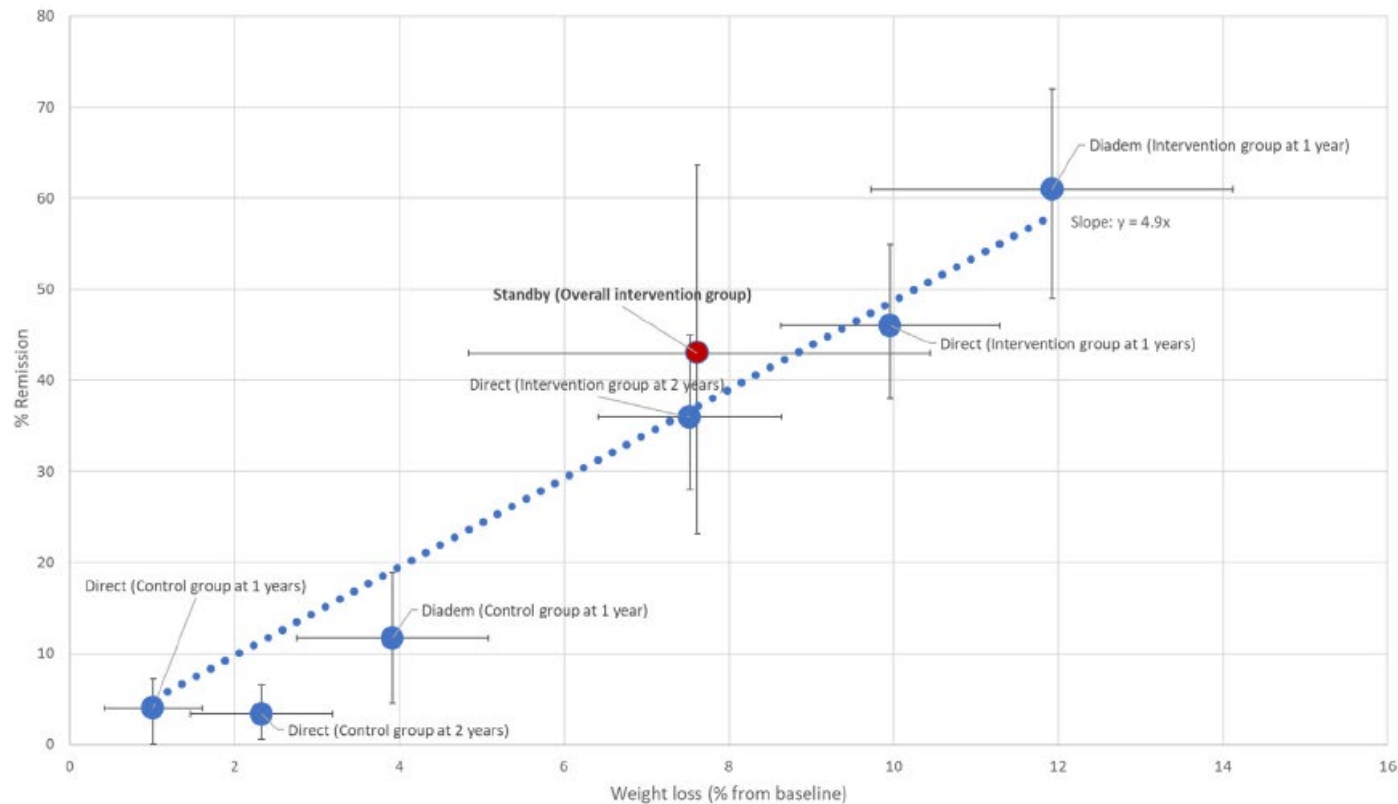


Fig. 4: Relationship between relative weight loss and achieving remission in STANDby, DIRECT 1 and 2 year follow-up studies, and DIADEM-I. Bars are 95% CI.

Lifestyle diabetes prevention interventions appear to have a smaller effect on relative risk (but similar effect on absolute risk) of diabetes in South Asians than other ethnic groups.

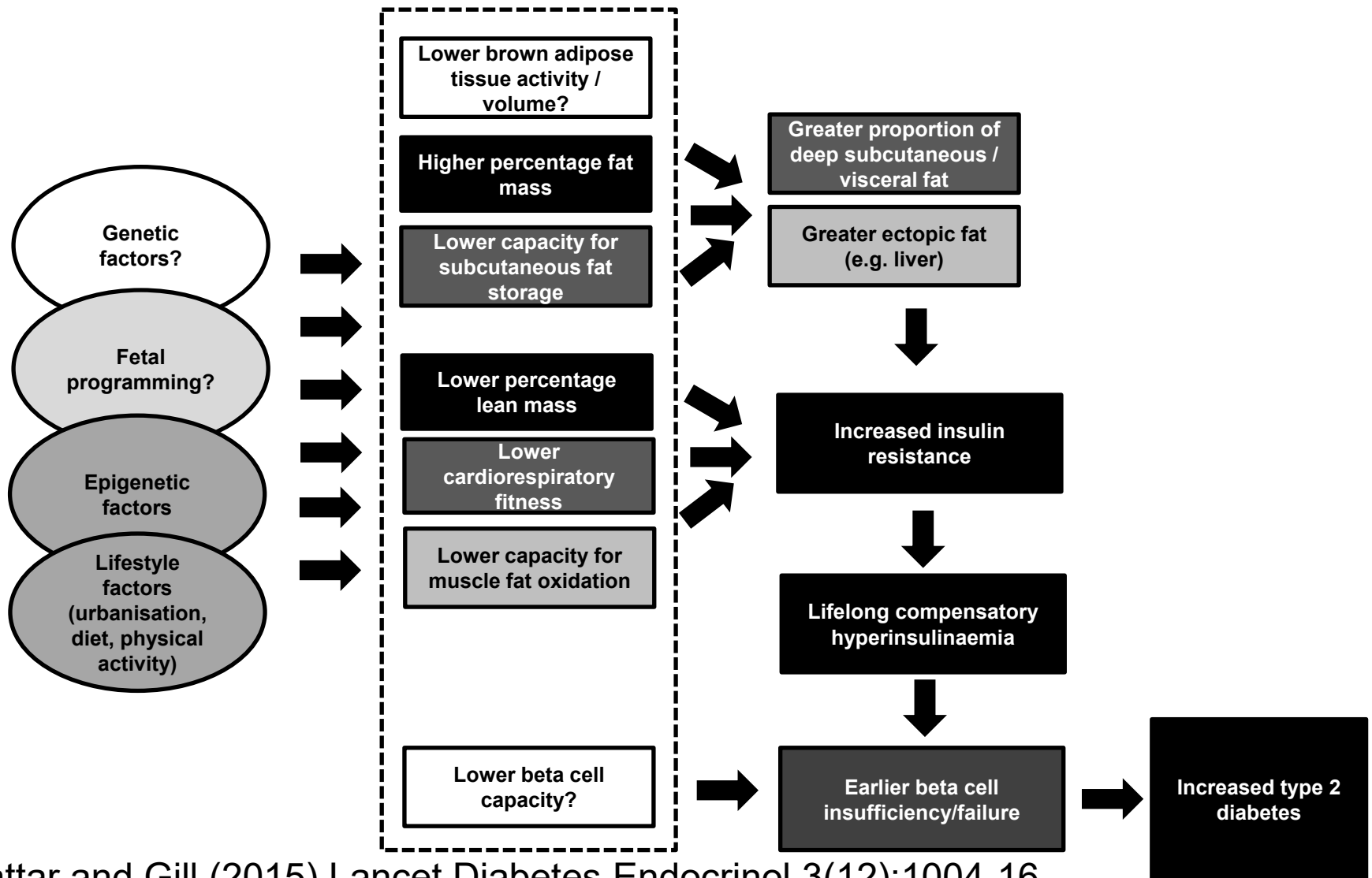
Weight loss in response to diet and physical activity interventions appears to be smaller in South Asians than other ethnic groups.

Does this represent physiological differences in response to intervention?

Solution: Different/more intensive/earlier interventions



Hypothesised mechanisms for South Asians' increased diabetes risk





Subcutaneous, visceral and liver fat in South Asians vs Europeans



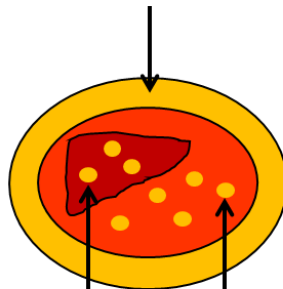
**white European
adults**



**South Asian
adults**

South Asians have
2-5 fold higher
type 2 diabetes
risk than white
Europeans.

Subcutaneous fat
(SAT)



Visceral fat
(VAT)

Liver fat

Does greater
visceral and liver
fat accumulation
in South Asians
contribute to this
higher risk?



N = 2891



N = 2271



N = 1156



N = 697

Meta-analysis of
10 (eight
published + two
new) studies
comparing SAT,
VAT and liver fat in
South Asian and
white European
adults.



SAT



VAT



Liver fat



SAT



VAT



Liver fat

South Asians store
more ectopic fat in
the liver than
white Europeans
at comparable BMI
levels. This may
contribute their
higher diabetes
risk.



**GlasVisceral & Ectopic fat
with weight Gain in south AsianS**

The GlasVEGAs study

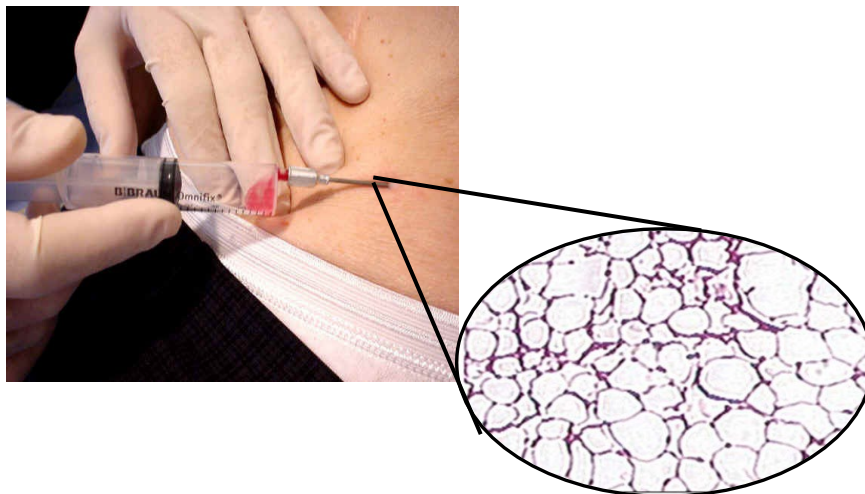
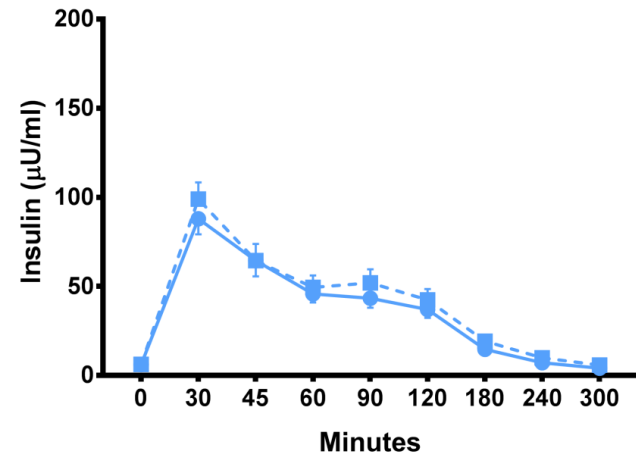
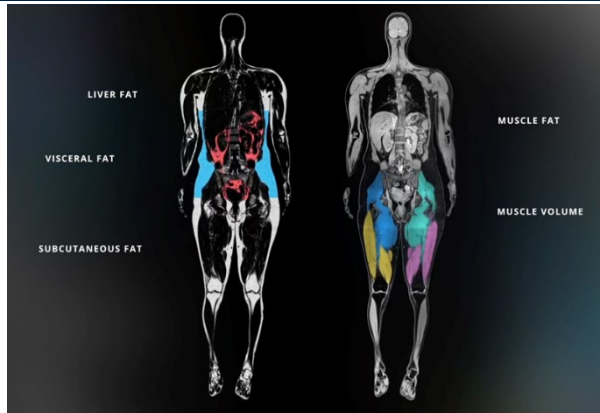


- 15 South Asian & 21 European men, aged 18-45 years, with normal BMI ($20\text{-}25\text{ kg/m}^2$) studied at baseline and after ~7% weight gain.
- Mixed-meal tolerance test, MRI for body composition, subcutaneous adipose tissue biopsy, fitness and physical activity assessed at baseline and after weight gain



University
of Glasgow

The GlasVEGAs study



McLaren et al (2024) Nature Metabolism 6:1632-1645



	Europeans (n=21)	South Asians (n=14)	p value (EU vs SA)
Weight (kg)	4.71 ± 0.22**	4.41 ± 0.26**	0.39
BMI (kg/m ²)	1.41 ± 0.06**	1.41 ± 0.08**	0.97
Waist (cm)	3.83 ± 0.40**	5.21 ± 0.87**	0.12

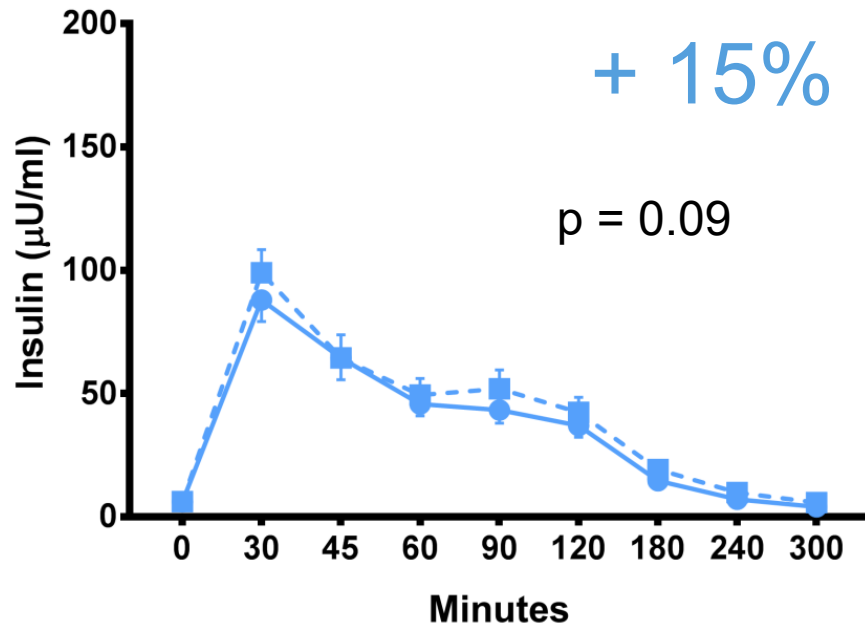
**p < 0.01 for change from baseline, values are mean ± SEM



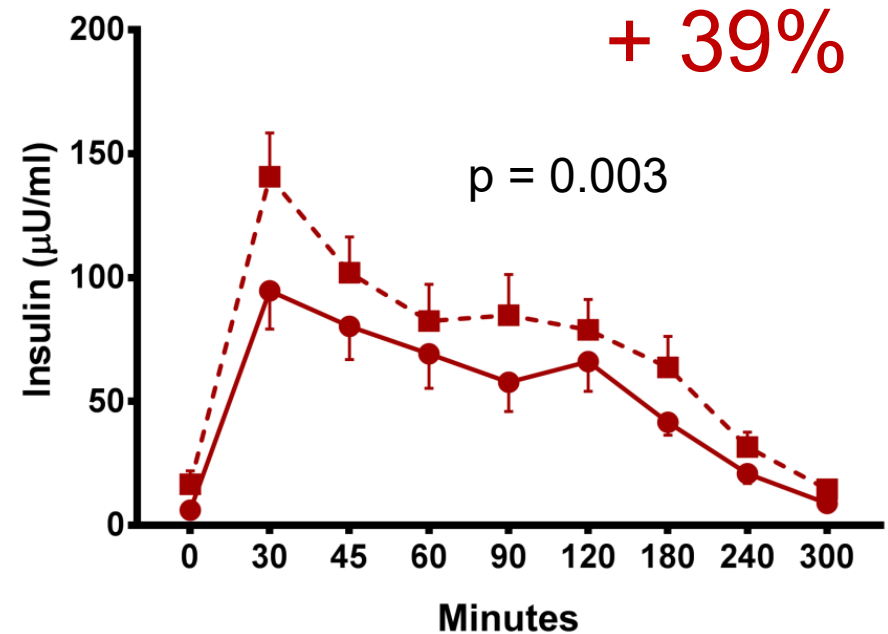
Change in postprandial responses



White Europeans



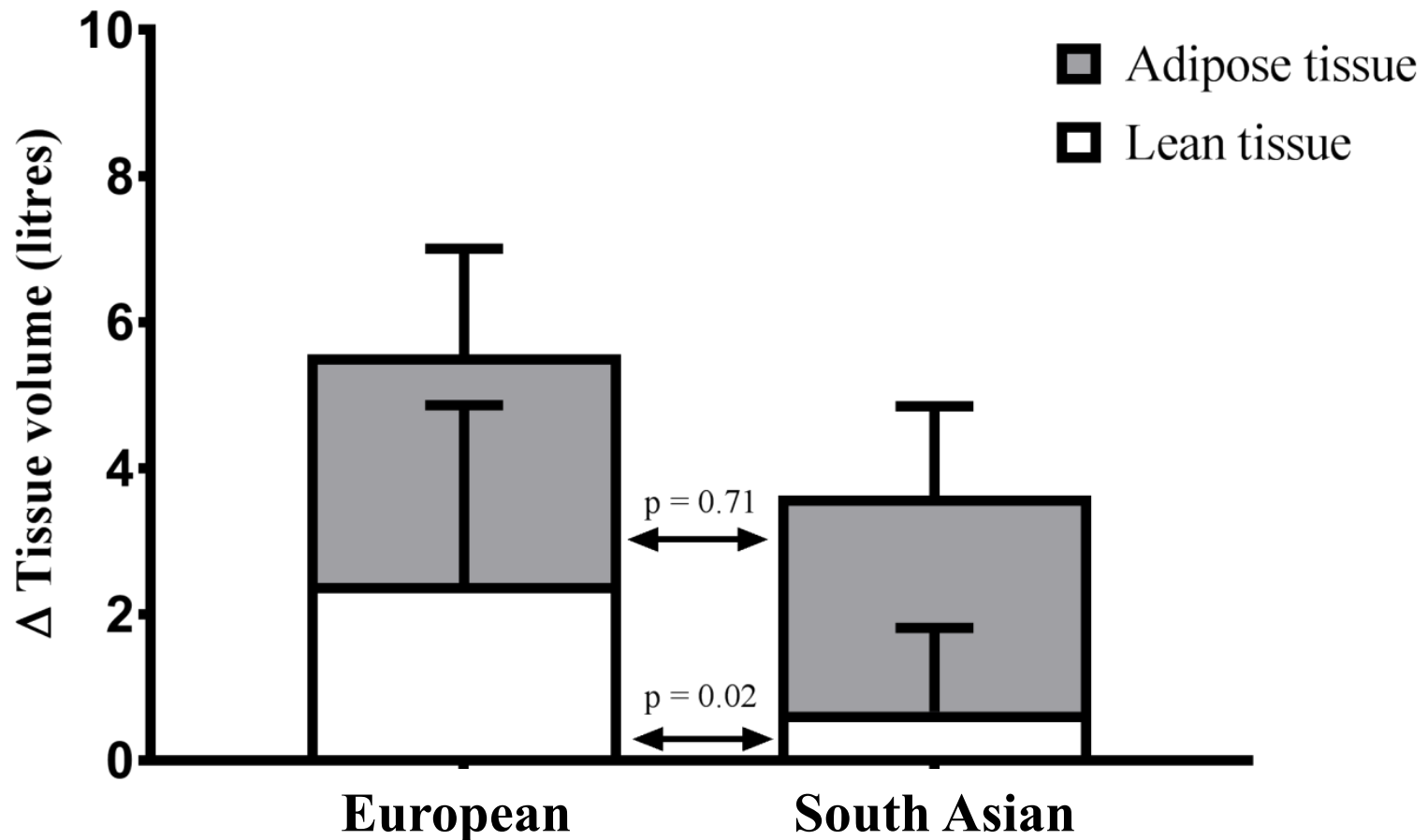
South Asians



$p = 0.01$ for interaction

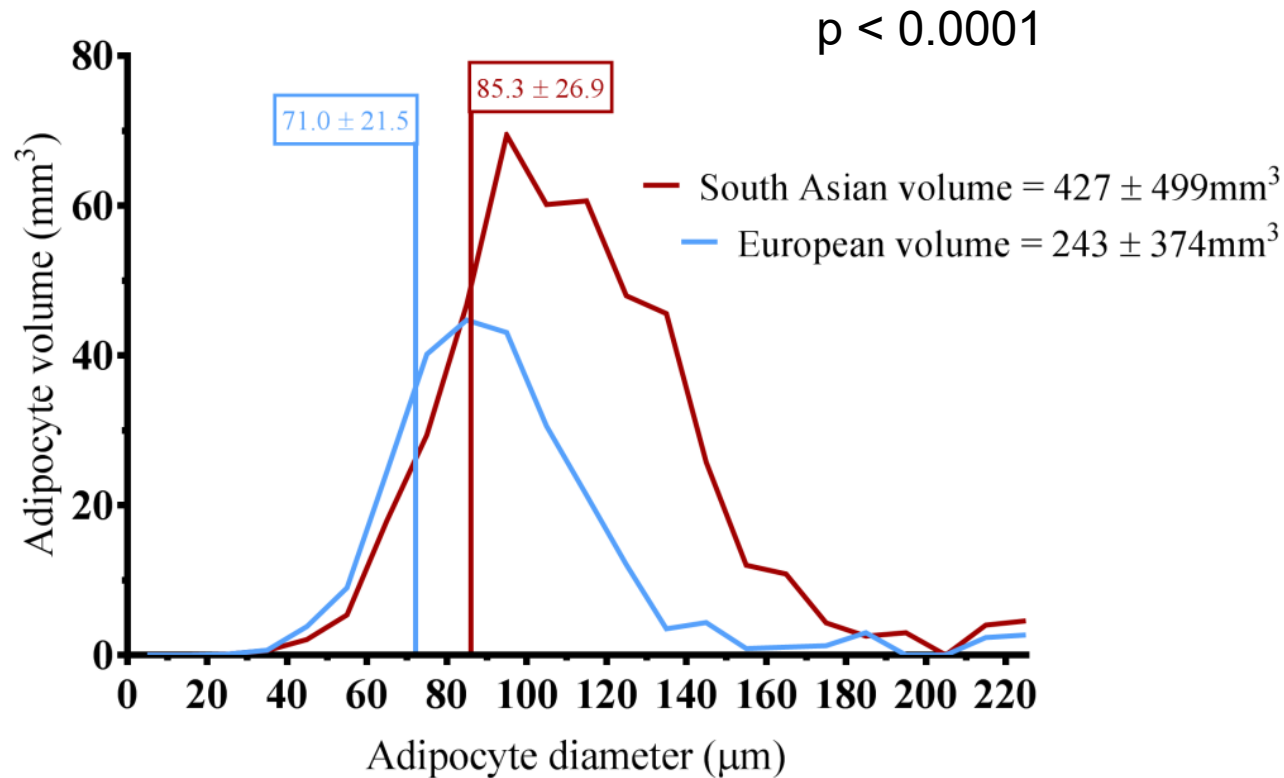


Change in body composition with weight gain



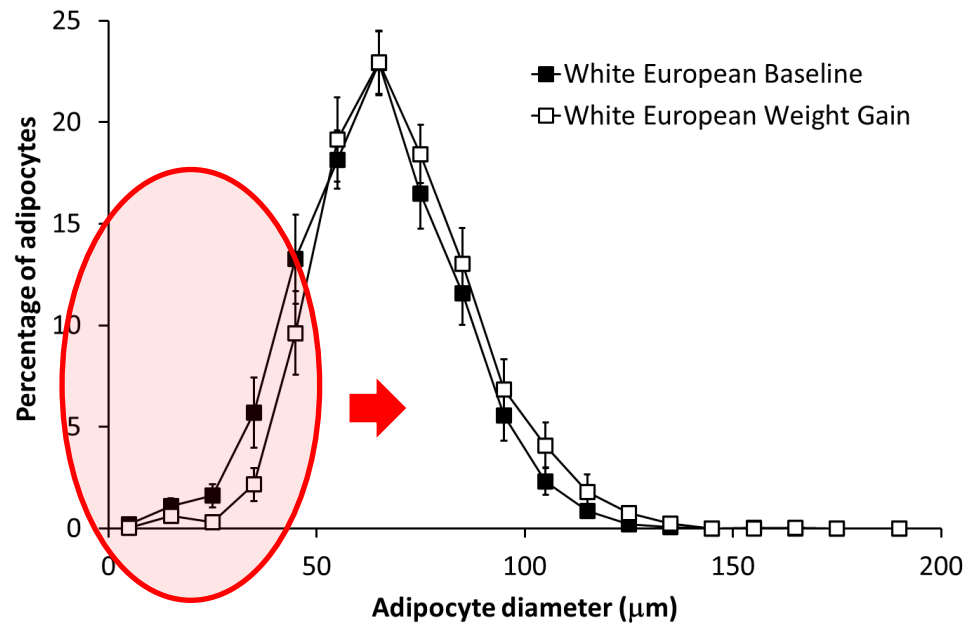


Baseline adipocyte volume distribution

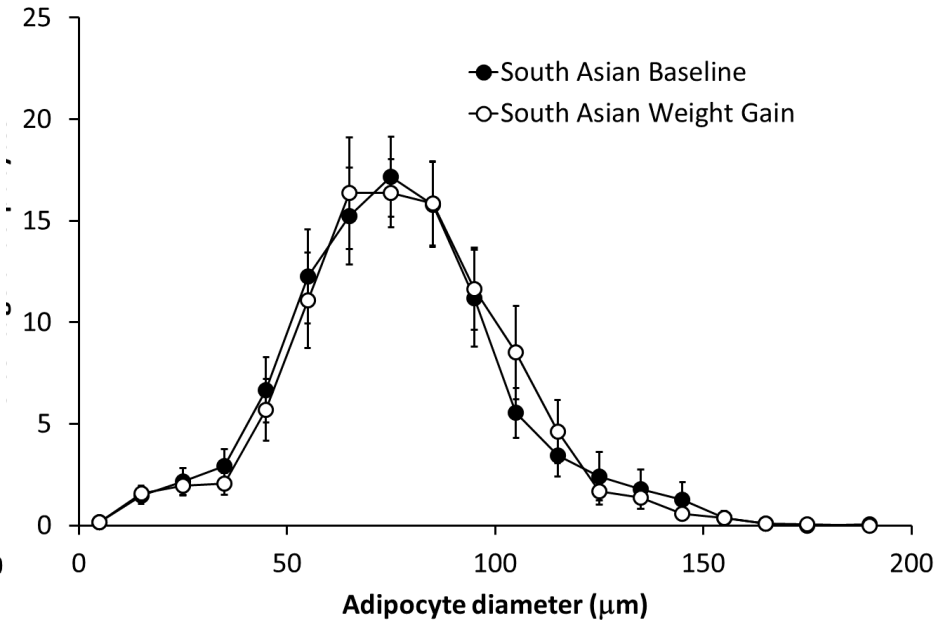


Changes in adipocyte characteristics

White Europeans

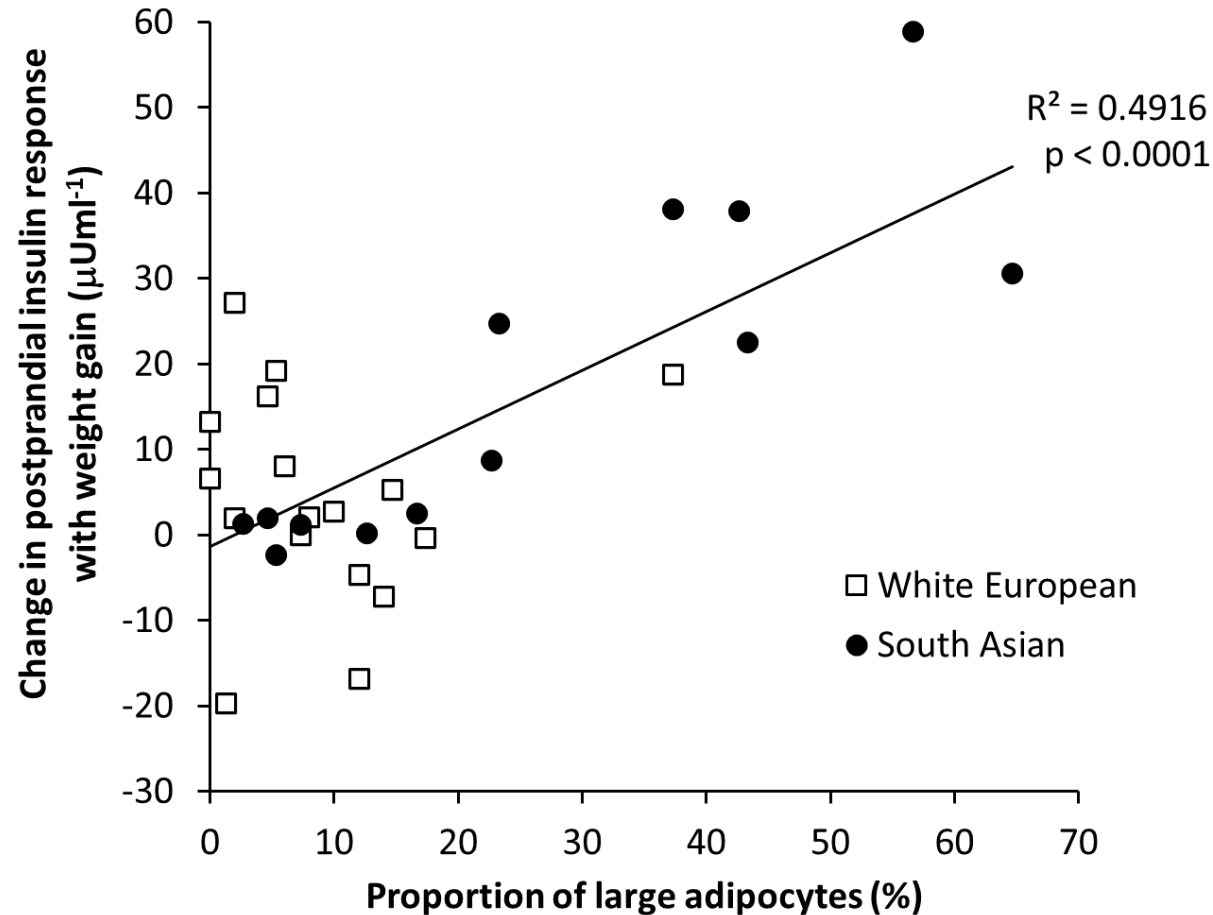


South Asians





Baseline adipocyte volume distribution



What about ethnic differences in physical activity and fitness?



Ethnicity, physiology and type 2 diabetes risk

- Cardiorespiratory fitness is (on average) ~20% lower in South Asians than White Europeans. This difference in fitness 'explains' over two thirds of the ethnic difference in insulin resistance.

Hall et al (2010) PLoS ONE: 5(12): e14197

Ghouri et al (2013) Diabetologia, 56:2238-49

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Ghouri et al (2013) Diabetologia, 56:2238-49

- During exercise South Asians (on average) burn ~30% less fat than White Europeans. This is associated with lower insulin sensitivity at both the level of whole body and skeletal muscle insulin signalling.

Hall et al (2010) PLoS ONE: 5(12): e14197

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Ghoury et al (2013) Diabetologia, 56:2238-49

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Hall et al (2010) PLoS ONE: 5(12): e14197

- South Asians (on average) have lower muscular strength than White European and Black ethnic groups. This is associated with their higher risk of type 2 diabetes.

Ntuk et al (2017) Diabetic Medicine, 34:1120-1128

There appear to be some innate ethnic differences (on average) in biology relating to adiposity, fitness, and strength which may contribute to ethnic differences in insulin resistance and type 2 diabetes risk.

Should the lifestyle interventions we undertake in different ethnic groups take this into account?

Does this represent physiological differences in response to intervention?

Solution: Different/more intensive/earlier interventions

and/or

Does this represent differences in engagement/adherence to interventions?

Solution: Adaptations to improve engagement/adherence/motivation



Early Outcomes From the English National Health Service Diabetes Prevention Programme

Diabetes Care 2020;43:152–160 | <https://doi.org/10.2337/dc19-1425>



Jonathan Valabhji,^{1,2,3} Emma Barron,⁴
Dominique Bradley,¹ Chirag Bakhai,^{1,5}
Jamie Fagg,⁴ Simon O'Neill,⁶ Bob Young,⁶
Nick Wareham,⁷ Kamlesh Khunti,⁸
Susan Jebb,⁹ and Jenifer Smith⁴

OBJECTIVE

To assess weight and HbA_{1c} changes in the Healthier You: National Health Service Diabetes Prevention Programme (NHS DPP), the largest DPP globally to achieve universal population coverage.

RESEARCH DESIGN AND METHODS

A service evaluation assessed intervention effectiveness for adults with nondiabetic hyperglycemia (HbA_{1c} 42–47 mmol/mol [6.0–6.4%] or fasting plasma glucose 5.5–6.9 mmol/L) between program launch in June 2016 and December 2018, using prospectively collected, national service-level data in England.

RESULTS

By December 2018, 324,699 people had been referred, 152,294 had attended the

Table 1—Participant characteristics at each stage in the program between June 2016 and December 2018

	Referred		Referred and attended an IA		Attended at least one group- based IV		Associated with cohorts that finished the program		Completed the program*		χ^2 P value		
											Reached IA vs. referred	Attended at least one IV vs. reached IA	Completed vs. finished
	n	%	n	%	n	%	n	%	n	%			
Ethnicity													
Asian	NA	NA	17,364	11	10,249	11	3,381	10	1,382	8	NA	<0.001	<0.001
Black	NA	NA	9,567	6	5,402	6	2,099	6	959	6			
Mixed	NA	NA	2,539	2	1,673	2	559	2	249	1			
Other	NA	NA	1,432	1	765	1	220	1	82	0			
White	NA	NA	105,315	69	69,477	72	23,113	71	13,006	75			
Unknown	NA	NA	16,077	11	8,876	9	3,293	10	1,574	9			

Greater drop-out in Asian and Mixed groups

Table 2—Primary outcomes (weight change and HbA_{1c} change) for participants who have finished the program, including respectively those for whom all data fields, except HbA_{1c}, were complete (*N* = 26,753) and for those with all data fields complete (*N* = 16,083): univariate analysis

	Mean weight change (kg), intention-to-treat					Mean HbA _{1c} change (mmol/mol), intention-to-treat				
	<i>n</i>	Baseline	Change	95% CI	<i>P</i> value	<i>n</i>	Baseline	Change	95% CI	<i>P</i> value
Ethnicity										
Asian	3,087	74.8	−1.0	−1.1, −0.9	<0.001	1,844	42.1	−0.9	−1.0, −0.8	<0.001
Black	1,821	86.3	−1.7	−1.9, −1.6		1,167	42.2	−0.8	−1.0, −0.6	
Mixed	513	84.1	−1.7	−2.0, −1.4		285	42.2	−1.0	−1.3, −0.7	
Other	181	80.9	−1.5	−2.0, −1.1		95	41.3	−0.6	−1.1, −0.0	
White	21,151	84.5	−2.5	−2.5, −2.4		12,692	41.7	−1.4	−1.4, −1.3	

Less weight loss and HbA1c reduction in non-White groups



Original Investigation | Diabetes and Endocrinology

Effects of a Lifestyle Intervention to Prevent Deterioration in Glycemic Status Among South Asian Women With Recent Gestational Diabetes

A Randomized Clinical Trial

Nikhil Tandon, PhD; Yashdeep Gupta, DM; Deksha Kapoor, MSc; Josyula K. Lakshmi, PhD; Devarsetty Praveen, PhD; Amritendu Bhattacharya, MSc; Laurent Billot, MRes; Aliya Naheed, PhD; Asita de Silva, Dphil; Ishita Gupta, MPH; Noshin Farzana, MPH; Renu John, MPH; Saumiyah Ajanthan, BSc; Hema Divakar, MD; Neerja Bhatla, MD; Ankush Desai, DM; Arunasalam Pathmeswaran, MD; Dorairaj Prabhakaran, DM; Rohina Joshi, PhD; Stephen Jan, PhD; Helena Teede, PhD; Sophia Zoungas, PhD; Anushka Patel, PhD; for the LIVING Collaborative Group

Key Points

Question Can an evidence-based lifestyle intervention, adapted to local context, prevent glycemic deterioration among women with recent gestational diabetes (GDM) in South Asia?

Findings In this randomized clinical trial of 1612 women with recent GDM, 25.5% of participants allocated to a lifestyle intervention and 27.1% of participants allocated to usual care experienced worsening glycemia at a median of 14.1 months of follow-up. The intervention did not prevent glycemic deterioration, including development of diabetes.

Meaning This study found that a lifestyle intervention was not effective in reducing glycemic deterioration, which occurred in a substantial proportion of women with recent GDM within 2 years of childbirth.

But no significant difference in change in physical activity, change in sedentary behaviour or change in energy intake between intervention and usual care groups

Relatively poorer engagement and adherence to lifestyle interventions may have contributed to the more limited effectiveness to date of interventions to improve glycaemic outcomes in non-White (particularly South Asian) groups.

How can we design better, more engaging interventions for these groups?

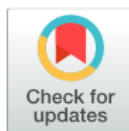


PLOS ONE

RESEARCH ARTICLE

The acceptability and effect of a culturally-tailored dance intervention to promote physical activity in women of South Asian origin at risk of diabetes in the Netherlands—A mixed-methods feasibility study

Erik Beune^{1*}, Mirthe Muilwijk¹, Judith G. M. Jelsma², Irene van Valkengoed¹, Annemarie M. Teitsma-Jansen¹, Bernadette Kumar³, Esperanza Diaz^{3,4}, Jason M. R. Gill⁵, Anne Karen Jennum⁶, Latha Palaniappan⁷, Hidde P. van der Ploeg², Aziz Sheikh⁸, Emma Davidson⁹, Karien Stronks¹

 OPEN ACCESS

Citation: Beune E, Muilwijk M, Jelsma JGM, van Valkengoed I, Teitsma-Jansen AM, Kumar B, et al. (2022) The acceptability and effect of a culturally-tailored dance intervention to promote physical activity in women of South Asian origin at risk of

1 Department of Public and Occupational Health, Amsterdam Public Health Research Institute, Amsterdam UMC, Location AMC, University of Amsterdam, Amsterdam, The Netherlands, **2** Department of Public and Occupational Health, Amsterdam Public Health Research Institute, Amsterdam UMC, Vrije Universiteit Amsterdam, Amsterdam, The Netherlands, **3** Unit for Migration and Health, Norwegian Public Health Institute, Oslo, Norway, **4** Department of Global Public Health and Primary Care, University of Bergen, Bergen, Norway, **5** Institute of Cardiovascular and Medical Sciences, University of Glasgow, Glasgow, United Kingdom, **6** Department of General Practice, Institute of Health and Society, General Practice Research Unit (AFE), University of Oslo, Oslo, Norway, **7** Department of Medicine, Stanford University School of Medicine, Stanford, California, United States of America, **8** Centre for Population Health Sciences, Usher Institute, University of Edinburgh, Scotland, Edinburgh, United Kingdom, **9** Centre for Clinical Brain Sciences, University of Edinburgh, Scotland, Edinburgh, United Kingdom

* e.j.beune@amsterdamumc.nl

Summary

- (In high income countries) the influence of obesity and physical inactivity on cardiometabolic health appears to be differ by ethnic background – physiological differences between may contribute
- Current diet and physical activity interventions for weight loss and to improve glycaemic outcomes are less effective in non-white ethnic groups
- Understanding the extent that ethnic differences in intervention effectiveness reflect differences in physiological response vs differences in engagement can help inform better interventions

Acknowledgments

