# An evaluation of personalized benefits and harms of colorectal cancer screening in order to facilitate informed decision making on participation in the CRC screening program.

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The benefit-harm balance of CRC screening of an individual

Personal risks

Benefits

Harms

Personal preferences
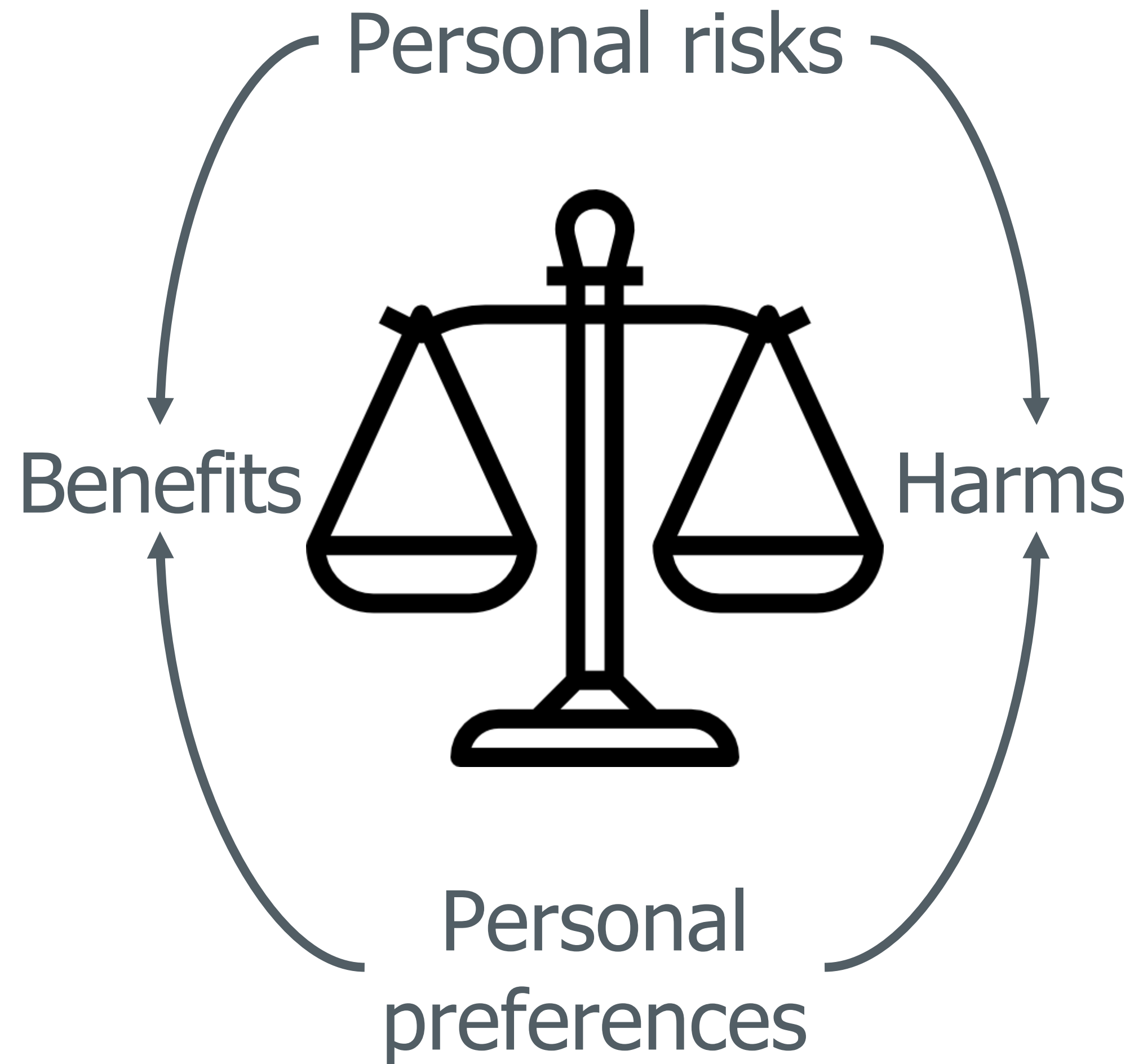
Aim:
To assess the benefit-harm balance of participating in CRC screening for finely stratified subgroups

DECISION MODELING CENTER

Preference weights of benefits and harms

Best-worst scaling survey:

- Most & least important outcome

- Odds of selecting that outcome as most important

N=265 individuals aged 55-75 years

	OR (95% CI)
Risk of stress after positive FIT	1
Risk of false-positive FIT	1.4 (1.3-1.6)
Risk of colonoscopy compliations	1.6 (1.4-1.8)
Risk of false-negative test	3.1 (2.7-3.5)
Lower risk of CRC death	4.1 (3.6-4.7)
Lower risk of developing CRC	4.5 (3.9-5.1)

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ASCCA microsimulation model

Screening & surveillance

No lesions → Adenomas → Colorectal cancer

No lesions → Serrated lesions → Colorectal cancer
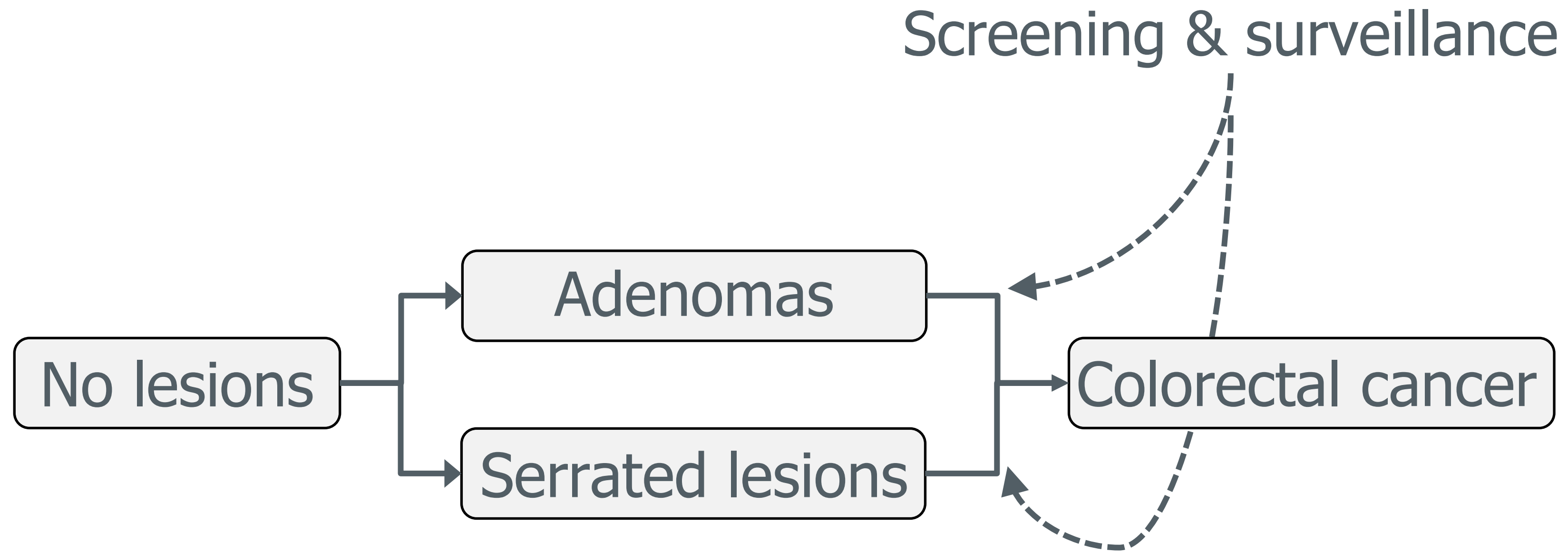
ASCCA microsimulation model

30, 20 and 10 year time horizon

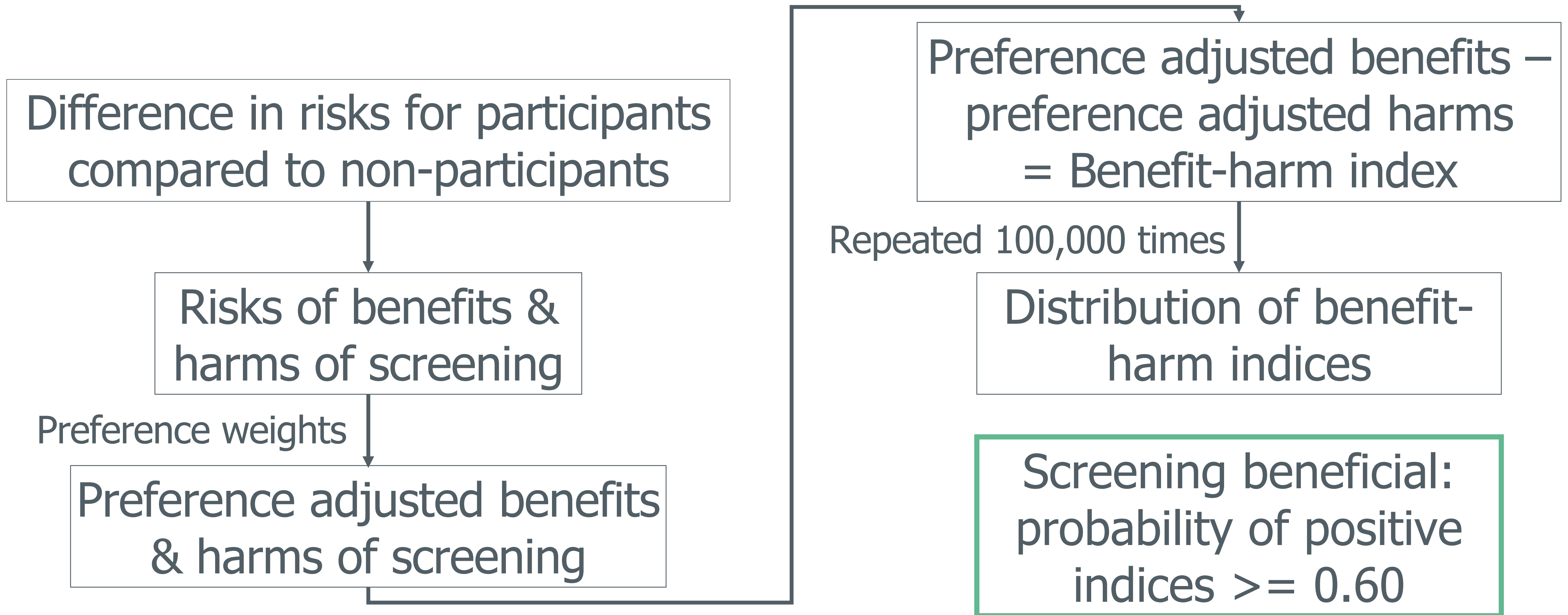| Participants	Non-participants
Risk of false-positive FIT	-
Risk of colonoscopy complications	-
Risk of false-negative test	*Risk of undetected CRC*
Risk of CRC death	Risk of CRC death
Risk of developing CRC	Risk of developing CRC

210 subgroups:

- Age: 55-75 years with 2-years interval

- Sex

- History of CRC screening

- Lifestyle: 0-1, 2, 3, 4 or 5 healthy lifestyle factors (HLF)[1]

1. Aleksandrova K, Pischon T, Jenab M, et al. Combined impact of healthy lifestyle factors on colorectal cancer: a large European cohort study. BMC Med. 2014

Benefit-harm analysis[1]

Difference in risks for participants compared to non-participants

Risks of benefits & harms of screening

Preference weights

Preference adjusted benefits & harms of screening

Preference adjusted benefits – preference adjusted harms = Benefit-harm index

Repeated 100,000 times

Distribution of benefit-harm indices

Screening beneficial: probability of positive indices >= 0.60

1. Gail MH, Costantino JP, Bryant J, et al. Weighing the risks and benefits of tamoxifen treatment for preventing breast cancer. J Natl Cancer Inst. 1999

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Results

Net health benefit: 87% (183/210) of the subgroups

No net health benefit:

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│ ≥ 70   │ & │ Unhealthy   │ & │ Previously   │
│ years   │   │ (0-1 HLFs)   │   │ participated │
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Probability of net benefit

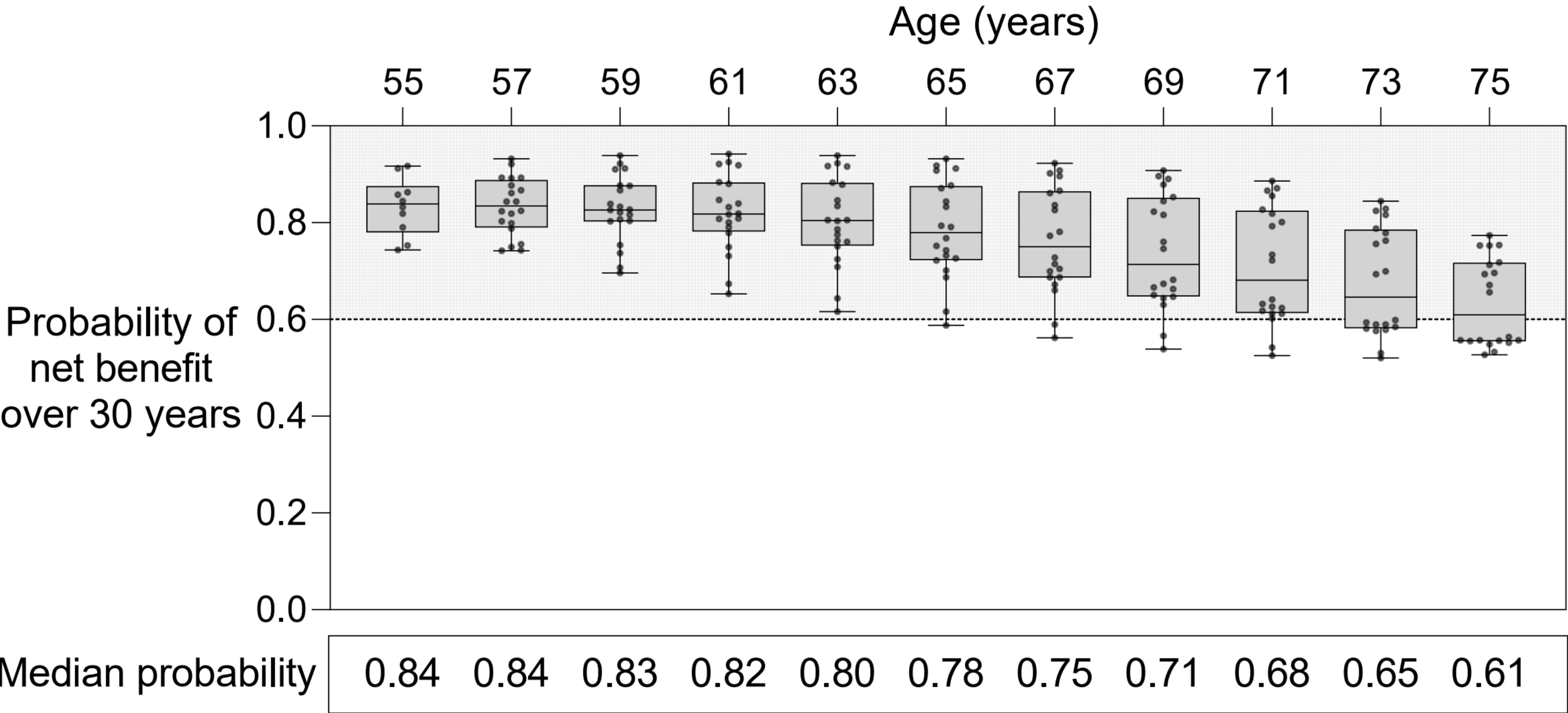| Median probability	0.79

Results

Net benefit decreased with increasing age.

Results

Net benefit was lower for:

- Those with 0-1 HLFs
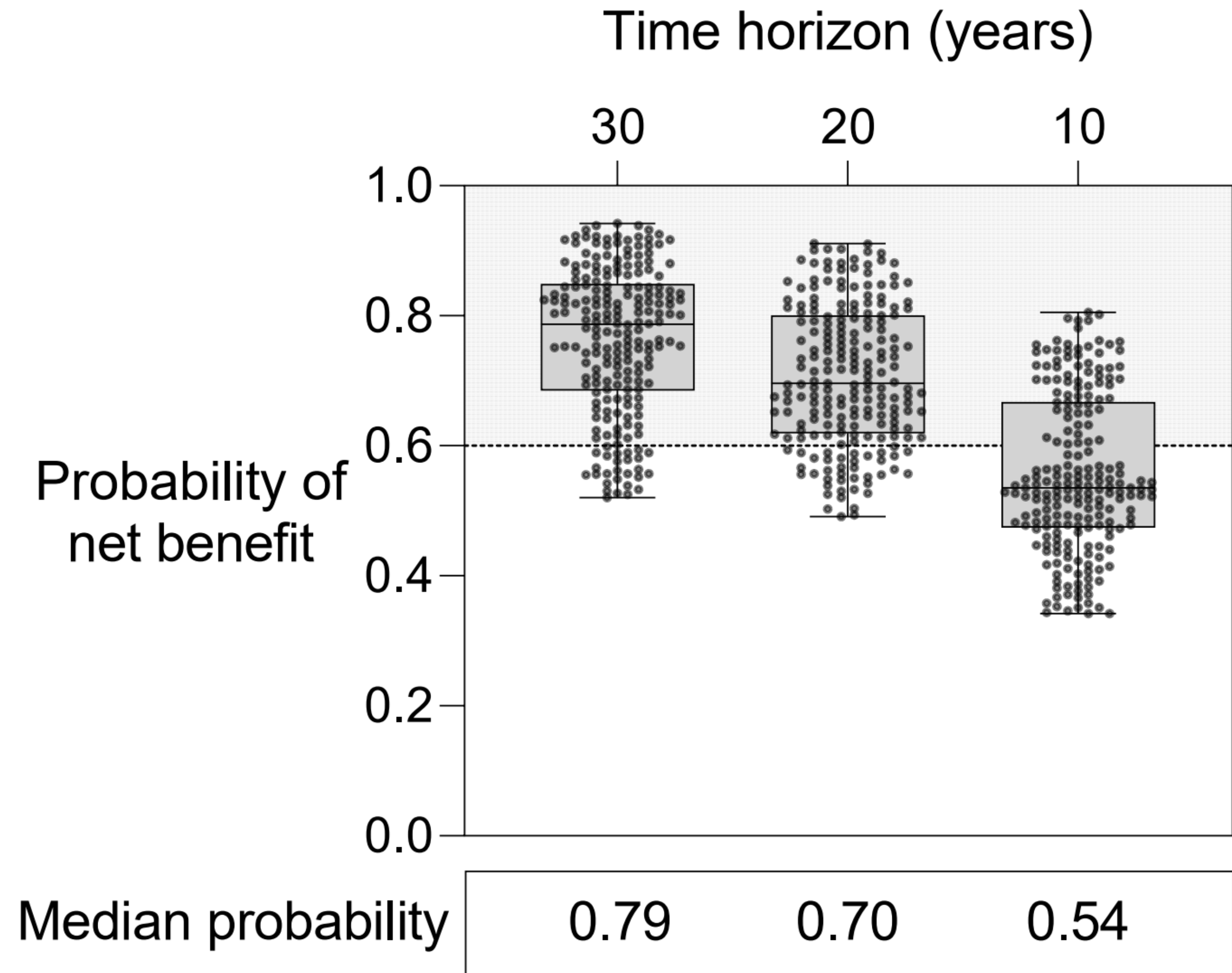
Net benefit was greater for:

- Men than women

- Those without history of participation

Results

Net benefit decreased with shorter time horizons.

- 30-year: 87% net health benefit
- 20-year: 81% net health benefit
- 10-year: 34% net health benefit

Time horizon (years)

Probability of net benefit

| Median probability | 0.79 | 0.70 | 0.54 |

Conclusions

CRC screening is beneficial for most subgroups over 30 years.

Subgroups that did not achieve a net health benefit:

≥ 70 years	&	Unhealthy (0-1 HLFs)	&	Previously participated

The shorter the time horizon, the smaller the benefit from screening.

The results of this study can help individuals making informed decisions in participating in CRC screening